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ПРАКТИЧНИЙ КУРС З ВИВЧЕННЯ ІНОЗЕМНОЇ МОВИ ДЛЯ КУРСАНТІВ (СТУДЕНТІВ) 4 КУРСУ ЗА СПЕЦІАЛЬНІСТЮ «ГЕОІНФОРМАЦІЙНІ СИСТЕМИ ТА ТЕХНОЛОГІЇ»

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Златніков В.Г. Практичний курс з вивчення іноземної мови для курсантів (студентів) 4 курсу за спеціальністю «Геоінформаційні системи та технології» (англійська мова). – К.: ВІКНУ, 2013. – 210 с.

Практичний курс складений для курсантів за спеціальністю «Геоінформаційні системи та технології», які продовжують вивчення іноземної мови на основі знань, набутих на перших трьох курсах навчання у військовому інституті. Вивчення іноземної мови, як культурного та соціального явища повинно сприяти формуванню у курсантів загальної культури. Метою посібника є практичне оволодіння англійською мовою, ознайомлення з базовою лексикою за спеціальністю, активізація навичок усного мовлення з професійної тематики.

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ПЕРЕДМОВА

За останні роки в системі військових навчальних закладів особливого значення набуває підготовка курсантів з іноземних мов, значно зростають вимоги до випускників вищих військових навчальних закладів (військових підрозділів вищих навчальних закладів) (далі – ВВНЗ (ВП ВНЗ)) стосовно їх професіоналізму, компетентності та особливо знання іноземних мов. Це зумовлено низкою важливих чинників, а саме: розширенням міжнародного військового співробітництва між Збройними Силами України та збройними силами інших держав; збільшенням кількості міжнародних контактів, виникненням необхідності в успішному вирішенні завдань з реалізації міжнародних договорів та програм тощо. Тому вивчення іноземних мов є невід'ємним елементом підготовки фахівців для Збройних Сил нашої держави.

Даний навчальний посібник передбачений для проведення занять з англійської мови з курсантами 4 курсу, що навчаються за спеціальністю «Геоінформаційні системи та технології».

Основна мета навчального посібника полягає у формуванні у курсантів іншомовної компетенції, що включає в себе розвиток мовних, мовленнєвих та соціокультурних навичок, навичок монологічного та діалогічного мовлення, перекладу та розуміння оригінальних текстів за спеціальністю, підготовки їх до ведення дискусій на запропоновані військово-спеціальні розмовні теми, підтримання бесіди англійською мовою, обговорення важливих питань, пов'язаних з темами занять. Концептуально навчальний посібник складається з 6 тем, кожна з яких відповідно поділена на 5-6 занять.

При розробці навчального посібника особливу увагу було приділено комунікативному підходу до вивчення англійської мови, оскільки він передбачає розвиток критичного мислення і вирішення проблем через обмін думками про прочитане.

Комунікативно-орієнтовані заняття побудовані на автентичному матеріалі, а їх методична організація сприятиме ефективному опануванню англійської мови як засобу спілкування та формуванню навичок самостійної роботи курсантів. У системі вправ кожного заняття пропонується комплекс лексичних вправ, призначений на закріплення та повторення слів і зворотів, що зустрічаються у текстах або пов'язані з темою, яка вивчається. Зазначений вище комплекс вправ розрахований на активне оволодіння лексикою та розвиток навичок усного мовлення. Поряд з цим, використання цього навчального посібника дозволяє розширити словниковий запас курсантів щодо військових проблем і цінностей, прийняття певних рішень, ставлення до праці, розуміння значення військової служби, навчання та освіти. У подальшій роботі курсанти матимуть можливість використовувати отриману мовленнєву інформацію, мовленнєві зразки та матеріал для обговорення цих та інших важливих питань.

Метою системи граматичних вправ є формування навичок володіння граматичними конструкціями та навчання використовувати ці граматичні

конструкції на практиці.

У додатках наведено англо-український та українсько-англійський словники основних термінів по спеціальності «Геоінформаційні системи та технології».

Автор висловлює глибоку вдячність професору, кандидату філологічних наук, генерал-майору Балабіну Віктору Володимировичу – начальнику Військового інституту Київського національного університету імені Тараса Шевченка за цінні критичні зауваження та рекомендації щодо форми й змісту підручника.

Крім того автор вдячний підполковнику Лісовському Володимиру Миколайовичу – начальнику кафедри військового перекладу та спеціальної мовної підготовки за цінні критичні зауваження та рекомендації. А також підполковнику Писаренко Роману Вікторовичу – старшому викладачу кафедри топогеодезичного та навігаційного забезпечення військ за надані інформаційні матеріали.

Усі побажання та критичні зауваження, направлені на усунення недоліків посібника, будуть сприйняті автором із вдячністю й враховані під час наступних видань посібника. Критичні зауваження просимо направляти на адресу: кафедра військового перекладу та спеціальної мовної підготовки (кім. 234), Військовий інститут Київського національного університету імені Тараса Шевченка, вул. Ломоносова, 81 м. Київ, 03680. Тел.: (044) 521-35-48.

ТЕМА 29:

КАРТОГРАФІЯ ЯК НАУКА

Заняття 1

КАРТОГРАФІЯ ЯК НАУКА

1.	**Прочитайте та перекладіть текст українською мовою**

CARTOGRAPHY

Cartography or **mapmaking** (in Greek chartis = map and graphein = write) is the study and practice of making representations of the Earth on a flat surface. Cartography combines science, aesthetics, and technical ability to create a balanced and readable representation that is capable of communicating information effectively and quickly.

One problem in creating maps is the simple reality that the surface of the Earth, a curved surface in three-dimensional space, must be represented in two dimensions as a flat surface. This necessarily entails some degree of distortion, which can be dealt with by utilizing projections that minimize distortion in certain areas. Furthermore, the Earth is not a regular sphere, but its shape is instead known as a geoid, which is a highly irregular but exactly knowable and calculable shape.

Maps of all scales have traditionally been drawn and made by hand, but the recent advent and spread of computers has revolutionized cartography. Most commercial-quality maps are now made with software that falls into one of three main types: CAD, GIS, and specialized illustration software.

Functioning as tools, maps communicate spatial information by making it visible. Spatial information is acquired from measurement of space and can be stored in a database, from which it can be extracted for a variety of purposes. Current trends in this field are moving away from analog methods of mapmaking and toward the creation of increasingly dynamic, interactive maps that can be manipulated digitally.

Cartographic representation involves the use of symbols and lines to illustrate geographic phenomena. This can aid in visualizing space in an abstract and portable format. The cartographic process rests on the premise that the world is measurable and that we can make reliable representations or models of that reality.

2. ?	**Дайте відповіді на наступні запитання:**

1. What is cartography?
2. What hampers creating maps?

3. What are the new methods of mapmaking?
4. What illustrates geographic phenomena?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Естетика, тривимірний, плоский, викривлення, геоїд, комплекс програм, комп'ютерне моделювання, просторовий, передумова.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. Cartography combines science, aesthetics, and _____ to create a balanced and readable _____ that is capable of communicating information effectively and quickly.
2. One problem in creating maps is the simple reality that the _____ of the Earth, a curved surface in three-dimensional space, must be represented in two _____ as a flat surface.
3. Maps of all _____ have traditionally been drawn and made by hand, but the recent advent and spread of computers has revolutionized _____.
4. Functioning as tools, maps communicate _____ by making it visible.
5. Cartographic representation involves the use of _____ and lines to illustrate geographic _____.

ГРАМАТИЧНІ ВПРАВИ
ПОНЯТТЯ ПРО ГЕРУНДІЙ

5. 	**Складіть речення та перекладіть їх українською мовою. Зверніть увагу на особливості перекладу герундія.**

1. I'd like you to stop
   talking.
   interrupting me.
   asking me questions.
   speaking Russian in class.
   smoking here.
   being angry with me.

2. Have you begun
   reading the book that I gave you.
   learning to skate?
   looking through the text?
   making notes of the lectures?
   discussing the question without them?

3. I don't mind
   you(r) smoking here.

	them (their) using my notes. his (him) coming to see us tomorrow evening.
	going out for a walk now. telling you another story.
4. Do you mind if we go on	playing chess here? discussing the matter now? telling funny stories? packing tomorrow morning? watching TV?
5. He hasn't finished	translating the article yet. speaking on the telephone yet. reading the newspaper yet. cooking dinner.
6. They continue	interrupting him. changing their plans. talking. making mistakes.

6. 	**Використовуючи таблицю, складіть якомога більше речень.**

I He/She We You They	insisted on objected to agreed to thought of succeeded in	visiting that museum. doing morning exercises. buying the tickets beforehand. helping them. learning the poem by heart.

I He/She We You They	suggested finished couldn't help enjoyed gave up	playing hockey. smoking. meeting them. learning English. laughing.

After Before On	finishing school coming home recovering getting there leaving for Kyiv	I he/she we they	decided to go there. had a short rest. spent a week at home. began to work. booked a ticket.

I He/She We You They	insisted on looked forward to thought of objected to dreamed of	my his/her our your their	going there. being sent there. coming back. being given this task. being invited to the party.

I He/She We You They	am is are was were	pleased with sure of surprised at proud of	my his our your their Jane's	behaving so. having said it. having been praised. playing so well. being invited there. having won the match.

7. **Дайте відповіді на запитання.**

1. What are you fond of doing?
2. Are you fond of reading?
3. What do you like better: football or basket-ball?
4. Do you remember going to school for the first time? What can you say about that day?
5. What films have you seen lately? Which of them is worth seeing?
6. How many English books have you read this year? Which of them are worth reading?
7. What do you dream of becoming?
8. What are you busy doing now?
9. What do we use for cutting bread?
10. What do we use for writing?
11. Is it possible to learn English without working hard?
12. Do you enjoy travelling by air? Why?
13. Where do you intend spending your holidays?

ТЕМА 29:

КАРТОГРАФІЯ ЯК НАУКА

Заняття 2

ІСТОРІЯ КАРТОГРАФІЇ

1. 	**Прочитайте та перекладіть текст українською мовою**

HISTORY OF CARTOGRAPHY

The earliest known map is a matter of some debate, both because the definition of "map" is not sharp and because some artifacts speculated to be maps might actually be something else.

A wall painting which may depict the ancient Anatolian city of Çatalhöyük has been dated to the late 7th millennium BCE. Other known maps of the ancient world include the Minoan “House of the Admiral” wall painting from c. 1600 BCE showing a seaside community in an oblique perspective, and an engraved map of the holy Babylonian city of Nippur, from the Kassite period (14th – 12th centuries BCE).

The ancient Greeks and Romans created maps beginning at latest with Anaximander in the 6th century BC. Ptolemy's world map is a map of the known world (*Ecumene*) to Western society in the 2nd century A.D. As early as the 700s, Arab scholars were translating the works of the Greek geographers into Arabic.

In ancient China, geographical literature spans back to the 5th century BC. The oldest extant Chinese maps come from the State of Qin, dated back to the 4th century BC during the Warring States era.

Early forms of cartography of India included legendary paintings; maps of locations described in Indian epic poetry, for example the *Ramayana*. Indian cartographic traditions also covered the locations of the Pole star, and other constellations of use. These charts may have been in use by the beginning of the Common Era for purposes of navigation.

Mappa mundi is the general term used to describe Medieval European maps of the world. Approximately 1,100 mappae mundi are known to have survived from the Middle Ages. Of these, some 900 are found illustrating manuscripts and the remainder exist as stand-alone documents.

The *Tabula Rogeriana*, drawn by Muhammad al-Idrisi for Roger II of Sicily in 1154.

The Arab geographer, Muhammad al-Idrisi, produced his medieval atlas *Tabula Rogeriana* in 1154. He incorporated the knowledge of Africa, the Indian Ocean and the Far East gathered by Arab merchants and explorers with the information inherited from the classical geographers to create the most accurate map of the world up until his time. It remained the most accurate world map for the next three centuries.

In the Age of Exploration from the 15th century to the 17th century, European cartographers both copied earlier maps and drew their own based on explorers' observations and new surveying techniques. The invention of the magnetic compass, telescope and sextant enabled increasing accuracy. In 1492, Martin Behaim, a German cartographer, made the oldest extant globe of the Earth.

Johannes Werner refined and promoted the *Werner map projection*. In 1507, Martin Waldseemüller produced a globular world map and a large 12-panel world wall map (*Universalis Cosmographia*) bearing the first use of the name "America". Portuguese cartographer Diego Ribero was author of the first known planisphere with a graduated Equator (1527). Italian cartogapher Battista Agnese produced at least 71 manuscript atlases of sea charts.

Due to the sheer physical difficulties inherent in cartography, map-makers frequently lifted material from earlier works without giving credit to the original cartographer. For example, one of the most famous early maps of North America is unofficially known as the Beaver Map, published in 1715 by Herman Moll. This map is an exact reproduction of a 1698 work by Nicolas de Fer. De Fer in turn had copied images that were first printed in books by Louis Hennepin, published in 1697, and François Du Creux, in 1664. By the 1700s, map-makers started to give credit to the original engraver by printing the phrase "After [the original cartographer]" on the work.

2. ?	**Дайте відповіді на наступні запитання:**

1. When did the early paintings appear?
2. What is “Mappa mundi”?
3. What contribution in development of cartography did Muhammad al-Idrisi make?
4. When was the oldest extant globe of the Earth made?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Артефакт, настінний живопис, зображати, існуючий, сузір’я, рукопис, решта, середньовічний, об’єднувати, торговець, дослідник, успадковувати, точний, магнітний компас, глобус, планісфера, морська мапа, різьбар.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. In ancient China, _____ spans back to the 5th century BC.
2. _____ is the general term used to describe Medieval European maps of the world.
3. Of these, some 900 are found _____ and the remainder exist as stand-alone documents.
4. It remained the most accurate _____ for the next three centuries.
5. In the Age of _____ from the 15th century to the 17th century, European cartographers both copied earlier maps and drew their own based on explorers' observations and new _____.

ГРАМАТИЧНІ ВПРАВИ
УТВОРЕННЯ ГЕРУНДІЯ

5. 	**Замініть в реченнях форму інфінітива на герундій.**

1. My father began to work at this plant 20 years ago.
2. We continue to study English.
3. Children like to play football.
4. The boy started to run.
5. They preferred to go there by plane.
6. She tried to open the window but couldn't.
7. I have just begun to translate the text.
8. We agreed to buy tickets beforehand.
9. I like to help people.
10. He has just finished to do his morning exercises.

6. 	**Перефразуйте речення так, щоб герундій став підметом.**

Example: It is important to learn English. –
Learning English is important.

1. It is foolish to make a decision without knowing the facts.
2. It’s difficult to plan your future.
3. It’s important to have enough sleep.
4. It is not necessary to meet friends every day.
5. It’s a good idea to spend a whole week on the seaside.
6. It’s impossible for me to stay in Kyiv this summer.
7. It’s pleasant to read a new novel of this author.
8. It’s hard to do some work on holiday.

9. It’s difficult to earn enough money nowadays.
10. It’s a bad idea to buy a new car now.

7. 	**В наступних реченнях замініть підряде речення герундіальним зворотом**

Model 1: *I think I'll go to Minsk next week. -*
I think of going to Minsk next week.

1. I think I'll go to the theatre tomorrow.
2. I think I'll join them.
3. I thought I would buy that coat.
4. Tom thinks he will play tennis on Sunday.
5. She thought she would take a taxi.
6. We think we shall visit him in the hospital.

Model 2: *After he finished school, he worked at a plan. -*
After finishing school he worked at a plant.

1. After they passed their exams, they went to the Crimea.
2. Before we moved to this town we lived in Kyiv.
3. After she wrote the letter, she went to the post-office.
4. Before you cross the street you must look to the left and then to the right.
5. I turned off the light before I left home.
6. We met him after we walked about 2 miles.

Model 3: *She insisted that she should go to the library. -*
She insisted on going to the library.

1. He insisted that he should show them the way.
2. They insisted that they should help me.
3. I insisted that I should check their tests in the afternoon.
4. We insisted that we should come to us next week.
5. I insisted that I should buy a new car.
6. He insisted that he should be present at the lesson.

8. 	**Трансформуйте складні речення в прості за допомогою герундія**

Model: *When she plays, I enjoy it. –* ***I enjoy her playing.***

1. When you quarrel, I dislike it.
2. When you open the window I don’t mind it.
3. If she comes in time, I will be very surprised at it.

4. When they dance, I enjoy it.
5. If you make much noise, I dislike it.
6. When you don't know the lesson, I am surprised at it.
7. If you pass your exams good, your parents will be proud of it.
8. When she plays the piano, I am pleased with it.
9. If our football team wins the match, we are proud of it.
10. If you invite me to a party, I will be very pleased with it.

ТЕМА 29:

КАРТОГРАФІЯ ЯК НАУКА

Заняття 3

ТЕХНІЧНИЙ ПРОГРЕС У КАРТОГРАФІЇ

1. 	**Прочитайте та перекладіть текст українською мовою**

TECHNOLOGICAL CHANGES

In cartography, technology has continually changed in order to meet the demands of new generations of mapmakers and map users. The first maps were manually constructed with brushes and parchment and therefore varied in quality and were limited in distribution. The advent of magnetic devices, such as the compass and much later magnetic storage devices, allowed for the creation of far more accurate maps and the ability to store and manipulate them digitally.

Advances in mechanical devices such as the printing press, quadrant and vernier allowed for the mass production of maps and the ability to make accurate reproductions from more accurate data. Optical technology, such as the telescope, sextant and other devices that use telescopes, allowed for accurate surveying of land and the ability of mapmakers and navigators to find their latitude by measuring angles to the North Star at night or the sun at noon.

Advances in photochemical technology, such as the lithographic and photochemical processes, have allowed for the creation of maps that have fine details, do not distort in shape and resist moisture and wear. This also eliminated the need for engraving which further shortened the time it takes to make and reproduce maps.

In the late 20th century and early 21st century advances in electronic technology led to a new revolution in cartography. Specifically, computer hardware devices such as computer screens, plotters, printers, scanners and analytic stereo plotters along with visualization, image processing, spatial analysis and database software, have democratized and greatly expanded the making of maps. The ability to superimpose spatially located variables onto existing maps created new uses for maps and new industries to explore and exploit these potentials.

2. ?	**Дайте відповіді на наступні запитання:**

1. What did the first maps look like?
2. What helped to create more accurate maps?
3. What role did the optical technology/photochemical technology play?
4. What brought to a new revolution in cartography?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Широта, накреслювати, потреба, вручну, пергамент, поширення, цифровий, прогрес, викривляти, кут, зношення, волога, усувати, масове виробництво, розширювати, накладати, оптична технологія.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. The first maps were manually constructed with brushes and _____ and therefore varied in quality and were limited in _____.
2. The advent of _____, such as the compass and much later magnetic storage devices, allowed for the creation of far more _____ maps.
3. Optical technology, such as the _____, sextant and other devices that use telescopes, allowed for accurate _____ of land.
4. In the late 20th century and early 21st century advances in _____ led to a new revolution in cartography.
5. Advances in mechanical devices such as the _____, quadrant and _____ allowed for the mass production of maps and the ability to make accurate reproductions from more accurate _____.

ГРАМАТИЧНІ ВПРАВИ
ПОРІВНЯННЯ ГЕРУНДІЯ, ДІЄПРИКМЕТНИКА ТА ВІДДІЄСЛІВНОГО ІМЕННИКА

5. 	**Визначіть, в яких реченнях дієслово є герундієм, а в яких дієприкметником.**

1. He was looking at the plane flying overhead.
2. Wishing to learn to skate, she bought herself a pair of skates.
3. Just imagine his coming first in the race!
4. The children were tired of running.
5. Being frightened by the dog, the cat climbed a high fence.
6. It is no use going there now.
7. Coming out of the wood, the travellers saw a ruined castle in the distance.
8. My greatest pleasure is travelling.
9. Growing corn on his desert island, Crusoe hoped to eat bread one day.
10. Growing roses takes a lot of care and attention.
11. Having prepared all the necessary equipment, they began the experiment.
12. While translating the text I looked up many words in the dictionary.
13. Usually I help my mother by washing the dishes and doing the room.
14. Entering the room, I saw my friends smiling at me.
15. Instead of phoning his friends, he went to see them.

6. 	**Визначіть, в яких реченнях дієслово є герундієм, а в яких віддієслівним іменником. Перекладіть речення українською мовою.**

1. Sleeping is necessary.
2. Your hair needs cutting.
3. We felt so disappointed at your having missed nearly half of the programme.
4. The building of this house will cost a lot of money.
5. Are you dressed for going out?
6. I hate the idea of doing it once more.
7. But you don't mind being asked to help us, do you?
8. The forest resounded with the hooting of owls and the howling of wolves.
9. It was no use talking about it any longer.
10. The motor was carefully examined before starting.
11. The singing of those beautiful folk songs impressed me greatly.
12. Your having written is not really an excuse for your not coming on the day fixed.
13. I am looking forward to seeing you soon.
14. Such doings can hardly be explained.
15. I am pleased very much to meet you after hearing so much about you.

7. 	**Визначіть, в яких реченнях дієслово є герундієм, в яких віддієслівним іменником, а в яких дієприкметником. Перекладіть речення українською мовою.**

1. We sat by the riverside listening to the running of the water.
2. The cleaning of the room was done by the girls.
3. Working in the garden is very good for the people's health.
4. Going home from the theatre, they were discussing the play they had seen.
5. You should think before speaking.
6. After finding a new world in the dictionary, I wrote it down and went on reading.
7. He spent much time on the copying of his literature lectures.
8. What do you mean by saying that?
9. The students found the reading of English newspapers rather difficult at first.
10. Instead of going home after school, the girls went for a walk.

ТЕМА 29:

КАРТОГРАФІЯ ЯК НАУКА

Заняття 4

ТИПИ КАРТ

1. 	**Прочитайте та перекладіть текст українською мовою**

MAP TYPES

General vs thematic cartography

Small section of an orienteering map.

In understanding basic maps, the field of cartography can be divided into two general categories: general cartography and thematic cartography. General cartography involves those maps that are constructed for a general audience and thus contain a variety of features. General maps exhibit many reference and location systems and often are produced in a series. For example the 1:24,000 scale topographic maps of the United States Geological Survey (USGS) are a standard as compared to the 1:50,000 scale Canadian maps. The government of the UK produces the classic 1:63,360 (1 inch to 1 mile) "Ordnance Survey" maps of the entire UK and with a range of correlated larger- and smaller-scale maps of great detail.

Thematic cartography involves maps of specific geographic themes oriented toward specific audiences. A couple of examples might be a dot map showing corn production in Indiana or a shaded area map of Ohio counties divided into numerical choropleth classes. As the volume of geographic data has exploded over the last century, thematic cartography has become increasingly useful and necessary to interpret spatial, cultural and social data.

An orienteering map combines both general and thematic cartography, designed for a very specific user community. The most prominent thematic element is shading that indicates degrees of difficulty of travel due to vegetation. The vegetation itself is not identified, merely classified by the difficulty ("fight") that it presents.

Topographic vs topological

Topographic map of Easter Island.

A topographic map is primarily concerned with the topographic description of a place, including (especially in the 20th century) the use of contour lines showing elevation. Terrain or relief can be shown in a variety of ways.

A topological map is a very general type of map, the kind you might sketch on a napkin. It often disregards scale and detail in the interest of clarity of communicating specific route or relational information.

2. ?	**Дайте відповіді на наступні запитання:**

1. What categories of cartography do you know?
2. What does general cartography involve?
3. What do general maps contain?
4. What does thematic cartography involve?
5. What is orienteering/topographic/topological map?

3.	**Знайдіть еквіваленти слів у тексті англійською мовою**

Тематичний, масштаб, округ, географічні дані, картографічне управління, просторовий, орієнтування, топологічна карта, маршрут.

4.	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. In understanding basic maps, the field of cartography can be divided into two general categories: _____ and _____.
2. Thematic cartography involves maps of specific _____ oriented toward specific audiences.
3. A couple of examples might be a _____ showing corn production in Indiana or a shaded area map of Ohio counties divided into numerical _____ classes.
4. An _____ combines both general and thematic cartography, designed for a very specific user community.
5. A _____ map is a very general type of map, the kind you might sketch on a napkin.

ГРАМАТИЧНІ ВПРАВИ
ПОНЯТТЯ ТА ВЖИВАННЯ ГЕРУНДІЯ

5.  **Доповніть речення, використовуючи герундій.**

1. We couldn't even dream of _____
2. Everybody wished he stopped _____
3. He is sure to boast of _____
4. You can't act without_____
5. Are English people fond of_____
6. I hardly remember _____
7. We don't often have the chance of _____
8. My children are not used to _____
9. Is there any use in _____
10. He didn't care for _____
11. We all look forward to _____
12. Everybody disliked the idea of _____
13. He has given up _____
14. What kept you from _____?
15. Is it worth while _____?
16. The boy kept on _____
17. What prevented her from _____
18. The audience enjoyed_____
19. What do you mean by _____?

6.  **Відкрийте дужки, використовуючи правильну форму герундія.**

1. (to speak) without (to think) is (to shoot) without aim.
2. Do you know what is peculiar about the English rule of (to drive)?
3. I'm glad to say that the lady didn't keep us (to wait).
4. I remember (to take) to Paris when I was a very small child.
5. I strongly suspect Gerald of (to know) all about it beforehand, though he swears he didn't.
6. Excuse me for not (to write) more at the moment.
7. She never lost the power of (to form) quick decisions.
8. He had an air of (to be) master of his fate, which was his chief attraction.
9. She denied (to see) me at the concert though I'm sure I saw her in the stalls.
10. I want to thank her for (to look) after the children while I was out.

7. 	**Відкрийте дужки, використовуючи правильну форму герундія.**

1. He passed to the front door and out without (to see) us.
2. I enjoy (to read) poetry.
3. I don't mind (to stay) here for a little while.
4. Are you going to keep me (to wait) all day?
5. They reproached us for (not to come) to the party; they were waiting for us the whole evening.
6. He suspected her of (to give) the police information about him while the workers were on strike.
7. I sat on the doorstep thinking over my chances of (to escape) from home.
8. There is very little hope of the work (to do) in time.
9. The coat showed evident signs of (to wear) on the preceding night.
10. (to avoid) the use of the perfect gerund is quite common if there is no fear of (to misunderstand).

8. 	**Відкрийте дужки, використовуючи правильну форму герундія.**

1. After the accident, the injured man recovered consciousness in hospital. He remembered (cross) the road, but he didn't remember (knock down).
2. I am still thirsty in spite of (drink) four cups of tea.
3. This carpet always looks dirty, in spite of (sweep) every day.
4. He didn't return the book he had borrowed after (promise) to do so.
5. He got into the house by (climb) through a window, without (see) by anyone.
6. I think he was foolish to buy a car before (learn) how to drive it.
7. Peter is a much better chess-player than I am, and he was very surprised when I beat him yesterday for the first time. He isn't used to (beat).
8. He went to bed at 9 p.m. in spite of (sleep) all the afternoon.
9. He complained of (give) a very small room at the back of the hotel.
10. The little girl isn't afraid of dogs in spite of (bite) twice.

9. 	**Відкрийте дужки, використовуючи правильну форму герундія.**

1. The little girl didn't go near the dog; she was afraid of (bite).
2. The baby went to sleep a few minutes after (feed).
3. The little girl never gets tired of (ask) her mother questions, but her mother often gets tired of (ask) so many questions.
4. They lived in a small town for ten years and then moved without (make) friends with any of their neighbours.
5. The little boy was punished for (tell) lie by (send) to bed without his supper.

6. Mary was chosen a year ago to act in the school play. She was very pleased at (choose).
7. Jack doesn't like boxing. I don't know if he is afraid of (hurt) his opponent or of (hurt) himself.
8. He was taken to hospital unconscious after the accident. He died in hospital without (recover) consciousness.
9. I always treat people politely and I insist on (treat) politely.
10. Little boy was very hungry at eleven o'clock in spite of (eat) a big breakfast two hours earlier.
11. She didn't get out of bed until ten o'clock in spite of (wake up) at seven.

ТЕМА 29:

КАРТОГРАФІЯ ЯК НАУКА

Заняття 5

УГОДА ПРО НАЙМЕНУВАННЯ

1. 	**Прочитайте та перекладіть текст українською мовою**

NAMING CONVENTIONS

Most maps use text to label places and for such things as a map title, legend, and other information. Maps are often made in specific languages, though names of places often differ between languages. So a map made in English may use the name *Germany* for that country, while a German map would use *Deutschland*, and French map *Allemagne*. A word that describes a place using a non-native terminology or language is referred to as an exonym.

In some cases the proper name is not clear. For example, the nation of Burma officially changed its name to Myanmar, but many nations continue to use *Burma*. Sometimes an official name change is resisted in other languages and the older name may remain in common use. Examples include the use of *Saigon* for Ho Chi Minh City, *Bangkok* for Krung Thep, and *Ivory Coast* for Côte d'Ivoire.

Difficulties arise when transliteration or transcription between writing systems is required. National names tend to have well established names in other languages and writing systems, such as *Russia* for Росси́я, but for many placenames a system of transliteration or transcription is required.

Further difficulties arise when countries, especially former colonies, do not have a strong national geographic naming standard. In such cases cartographers may have to choose between various phonetic spellings of local names versus older imposed, sometimes resented, colonial names. Some countries have multiple official languages, resulting in multiple official placenames. For example, the capital of Belgium is both *Brussel* and *Bruxelles*. In Canada, English and French are official languages and places have names in both languages. British Columbia is also officially named *la Colombie-Britannique*. English maps rarely show the French names outside Quebec, which itself is spelled *Québec* in French.

2. ?	**Дайте відповіді на наступні запитання:**

1. How do you understand the term “exonym”?
2. Give the examples of proper names.
3. Give the examples of transliteration or transcription for geographical names.

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Давати назву, відрізнятися, власна назва, зрозумілий, загальновживаний, виникати, подальший, колишній, різний, офіційна мова, назва карти, офіційна назва, топонім, місцева назва.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. A word that describes a place using a _____ or language is referred to as an _____.
2. In some cases the _____ name is not clear.
3. Difficulties arise when _____ or _____ between writing systems is required.
4. Further difficulties arise when countries, especially _____, do not have a strong national geographic _____.

ГРАМАТИЧНІ ВПРАВИ
PARTICIPLE I, II. ЗАГАЛЬНІ ПОНЯТТЯ. ВИПАДКИ ВЖИВАННЯ

5. 	**Перекладіть на українську мову, звертаючи увагу на дієприкметники.**

1. Everybody looked at the dancing girl.
2. The little plump woman standing at the window is my grandmother.
3. The man playing the piano is Kate's uncle.
4. Entering the room she turned on the light.
5. Coming to the theatre, she saw that the performance had already begun.
6. Looking out of the window, he saw his mother watering the flowers.
7. Hearing the sounds of music, she stopped talking.
8. She went into the room, leaving the door open.
9. Working at his desk, he listened to a new CD.
10. Running into the road, the young man stopped a taxi.
11. Looking through the newspaper, she noticed a photograph of her boss.
12. Using chemicals the fireman soon put out the fire in the forest.
13. Being very ill, she could not go to school.
14. The first rays of the rising sun lit up the top of the hill.
15. The tree struck by the lightning was all black and leafless.
16. Being busy, he postponed his trip.
17. The door bolted on the inside could not be opened.
18. Having been shown the wrong direction, the travelers soon lost their way.

19. The room facing the garden is much more comfortable than this one.
20. Having descended the mountain they heard a man calling for help.
21. Flushed and excited, the boy came running to his mother.
22. He stood watching the people who were coming down the street shouting and waving their hands.
23. The boy lay sleeping when the doctor came.
24. The broken arm was examined by the doctor.
25. While being examined, the boy could not help crying.
26. Having prescribed the medicine, the doctor went away.
27. The medicine prescribed by the doctor was bitter.
28. The dress bought at the department store was very beautiful.
29. While using a needle you should be careful not to prick your finger.
30. While crossing the street one should first look to the left and then to the right.

6. 	**Перекладіть на українську мову, звертаючи увагу на Past Participle.**

1. She put a plate of fried fish in front of me.
2. The coat bought last year is too small for me.
3. Nobody saw the things kept in that box.
4. My sister likes boiled eggs.
5. We stopped before a shut door.
6. Tied to the tree, the goat could not run away.
7. They saw overturned tables and chairs and pieces of broken glass all over the room.
8. This is a church built many years ago.
9. The books written by Dickens give us a realistic picture of the 19th century England.
10. A letter sent to St. Petersburg today will be there in two days.
11. Some of the questions put to the lecturer yesterday were very important.
12. A fish taken out of the water cannot live.
13. A line seen through this crystal looks double.
14. The word said by the student was not correct.
15. A word spoken in time may have very important results.

7. 	**Замініть виділені частини речень дієприкметниковими зворотами. Замініть конструкцію речень, де необхідно.**

1. **When he had left the house and was crossing the street**, he suddenly stopped as he remembered that he had forgotten to phone his friend.
2. He looked at me and hesitated: **he didn't know what to say.**
3. **As he had long lived in those parts and knew the place well,** he easily found the way to the market place.

4. He has no English language problems, **because he has been studying English for a long time.**
5. **After I had written this exercise,** I began to doubt whether it was correct.
6. Take care **when you cross the street.**
7. Students should always be attentive **while they are listening to the lecturer.**
8. There are many students **who study music.**
9. Don't you feel tired **after you have walked so much?**
10. **When he arrived at the railway station,** he bought a ticket, walked to the platform and boarded the train.
11. **As he was promised help,** he felt quieter.
12. **After he was shown in,** he was told to take off his coat and wait for a while.
13. Robinson **started the building of the house at once** and finished it before the season of rains set in.
14. He **poured out a cup of coffee,** sat down in an armchair and looked at the woman who was sitting opposite him.

8. 	**Перекладіть англійською мовою, звертаючи увагу на дієприкметники.**

1. Хлопчик, який біг повз будинок, раптом зупинився.
2. Будучи дуже заклопотаним, він не відразу почув мене.
3. Почувши кроки, він підвів голову.
4. Випивши чашку чаю, вона відчула себе набагато краще.
5. Граючись у саду, діти не помітили, що стало темно.
6. Том підійшов до дівчинки, яка сміялася.
7. Дівчинка, що плакала була голодна.
8. Принісши свої іграшки до кімнати, дитина почала гратися.
9. Прочитавши багато книг Діккенса, він добре ознайомився з цим письменником.

ТЕМА 29:

КАРТОГРАФІЯ ЯК НАУКА

Заняття 6

КАРТОГРАФІЧНА СИМВОЛІКА

1. 	**Прочитайте та перекладіть текст українською мовою**

MAP SYMBOLOGY

A map of the southwest coast of Ireland created in the early 18th century.

The quality of a map's design affects its reader's ability to extract information, and to learn from the map. Cartographic symbology has been developed in an effort to portray the world accurately and effectively convey information to the map reader. A legend explains the pictorial language of the map known as its symbology. The title indicates the region the map portrays; the map image portrays the region and so on. Although every map element serves some purpose, convention only dictates inclusion of some elements while others are considered optional. A menu of map elements includes the neatline (border), compass rose or north arrow, overview map, scale bar, projection, and information about the map sources, accuracy and publication.

When examining a landscape, scale can be intuited from trees, houses and cars. Not so with a map. Even such a simple thing as a north arrow is crucial. It may seem obvious that the top of a map should point north but this might not be the case.

Color likewise is equally important. How the cartographer displays the data in different hues can greatly affect the understanding or feel of the map. Different intensities of hue portray different objectives the cartographer is attempting to get across to the audience. Today, personal computers can display up to 16 million distinct colors at a time even though the human eye can distinguish only a minimum number of these. This fact allows for a multitude of color options even for the most demanding maps. Moreover, computers can easily hatch patterns in colors to give even more options. This is very beneficial when symbolizing data in categories such as quintile and equal interval classifications.

Quantitative symbols give a visual measure of the relative size/importance/number that a symbol represents and to symbolize this data on a

map there are two major classes of symbols used for portraying quantitative properties: Proportional symbols change their visual weight according to a quantitative property. These are appropriate for extensive statistics. Choropleth maps portray data collection areas (such as counties, or census tracts) with color. Using color this way, the darkness and intensity (or value) of the color is evaluated by the eye as a measure of intensity or concentration.

2. ?	**Дайте відповіді на наступні запитання:**

1. What is cartographic symbology for?
2. What map elements do you know?
3. What is the role of color?
4. What is the role of quantative symbols?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Картографічна символіка, оглядова мапа, вимірювальна лінійка, ландшафт, розрізняти кольори, кількісні та якісні символи, пропорційний, графство.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. _____ has been developed in an effort to portray the world accurately and effectively convey information to the map reader.
2. A legend explains the _____ of the map known as its symbology.
3. When examining a landscape, _____ can be intuited from trees, houses and cars.
4. Proportional symbols change their visual weight according to a _____.
5. _____ maps portray data collection areas (such as counties, or census tracts) with color.

ГРАМАТИЧНІ ВПРАВИ
ПРИСЛІВНИКИ. СТУПЕНІ ПОРІВНЯННЯ ПРИСЛІВНИКІВ

5. 	**Визначте чи правильно вжито підкреслені слова. Виправте слова, що вжито неправильно.**

Example: *The driver of the car was <u>serious</u> injured. ....WRONG...* ***seriously***
Be <u>quiet</u>, please! I'm trying to concentrate. RIGHT.

1.I waited <u>nervous</u> in the waiting-room before the interview. ….....….
2. Why were you so <u>unfriendly</u> when I saw you yesterday? .....….

3. It rained continuous for three days. ……...
4. Alice and Stan are very happy married. ……
5. Tom's French is not very good but his German is almost fluent ……
6. Eva lived in America for five years, so she speaks very well English ……
7. Everybody at the party was very colourful dressed. ……
8. Ann likes wearing colourful clothes. ……
9. Sue is terrible upset about losing her job. ……

6. ⇔		**Закінчить речення, використовуючи well + одне з наступних слів: *balanced behaved dressed informed kept known***

1. The children were very good. They were ...***well-behaved***…….
2. Many people have heard of him. He is quite well-.....
3. Their garden is neat and tidy. It is very .....
4. You should eat different types of food. Your diet should be .....
5. Ann knows quite a lot about many things. She is quite .....
6. His clothes weren't very smart. He wasn't very.....

7.	**Закінчить речення, використовуючи *hardly + any/ anyone/ anything/ anywhere /ever*. Перекладіть наступні речення англійською мовою**

Example: I'll have to go shopping. *We've got……**hardly any**……food.*

1. I listen to the radio a lot but I..... watch television.
2. The weather was good during our holiday. There was..... rain.
3. He is not very popular..... likes him.
4. It's crowded in here. There's .....to sit down.
5. We used to be good friends but we ..... see each other now.
6. I hate this town. There's..... to do and ....to go.
7. I enjoyed driving this morning. There was ..... traffic.

8.	**Використайте вищий і найвищий ступені порівняння прислівників.**

1. Then the bus began to run ____ , through a long avenue. (fast). (Faulkner). 2. ... moreover, he was _____ educated than the others. (well). (Buck) 3. She was the one who was being hurt _____ . (deeply). (Wilson) 4. He contrived to get a glimpse of Montanelli once or _____ in every week, if only for a few minutes. (often). (Voynich) 5. Driving _____ now, she arrived between four and five. (slowly). (Galsworthy) 6. However, I must bear my cross as _____ I may. (well) (Shaw) 7. Then he dismissed the thought as unworthy and impossible, and yielded himself _____ to the music. (freely). (London) 8. He followed her mental process

_____ now, and her soul was no _____ the sealed wonder it had been. (clearly; long). (London) 9. Felix's eyebrows rose _____ than ever. (high). (James) 10. It was a comfort to Margaret about this time, to find that her mother drew ____ and _____ towards her than she had ever done since the days of her childhood. (tenderly; intimately). (Gasketl)

9. 	**Дайте відповіді на запитання, використовуючи вищий ступінь порівняння прислівників.**

1. Does Peter drive the car as carefully as Tom? 2. Does a taxi run as fast as a bus? 3. Did Jane speak as calmly as Helen? 4. Did you come as late as your brother? 5. Does Nick speak English as slowly as Peter? 6. Does Susan speak French as well as her mother? 7. Does Harry get up as early as his father? 8. Does Jack do his grammar exercises as carelessly as he did last year?

10. 	**Вставте прислівник в дужках принаймні в дві позиції в реченні і поясніть різницю в значенні:.**

1. I'm sure he's clever, (quite)
2. I knew you had a lot of money, (never)
3. I can't answer that question, (frankly)
4. He realized that she wasn't well, (obviously)
5. They knew he was able to play chess, (well)
6. I don't think she can answer your questions, (honestly)
7. I saw him yesterday at the theatre, (only)
8. He told her what he thought of her. (actually)
9. I love you more than Peter, (still)
10. George likes French cooking, (even)
11. He discussed the design with her. (very sensibly)
12. I can see what he's doing, (just)

ТЕМА 30:

НАВІГАЦІЯ

Заняття 1

НАВІГАЦІЯ

1.	**Прочитайте та перекладіть текст українською мовою**

NAVIGATION

Navigation is the process of planning, reading, and controlling the movement of a craft or vehicle from one place to another. It is also the term of art used for the specialized knowledge used by navigators to perform navigation tasks. The word navigate is derived from the Latin roots navis meaning "ship" and agere meaning "to move" or "to direct." All navigational techniques involve locating the navigator's position compared to known locations or patterns.

Basic concepts of navigation

Latitude

The latitude of a place on the earth's surface is the angular distance north or south of the equator. Latitude is usually expressed in degrees (marked with °) ranging from 0° at the Equator to 90° at the North and South poles. The latitude of the North Pole is 90° N, and the latitude of the South Pole is 90° S. Historically, mariners calculated latitude in the Northern Hemisphere by sighting the North Star Polaris with a sextant and sight reduction tables to take out error for height of eye and atmospheric refraction. Generally, the height of Polaris in degrees of arc above the horizon is the latitude of the observer.

Longitude

Similar to latitude, the longitude of a place on the earth's surface is the angular distance east or west of the prime meridian or Greenwich meridian. Longitude is usually expressed in degrees (marked with °) ranging from 0° at the Greenwich meridian to 180° east and west. Sydney, Australia, for example, has a longitude of about 151° east. New York City has a longitude of about 74° west. For most of history, mariners struggled to determine precise longitude. The problem was solved with the invention of the marine chronometer. Longitude can be calculated if the precise time of a sextant sighting is known.

Modern technique

Most modern navigation relies primarily on positions determined electronically by receivers collecting information from satellites. Most other modern techniques rely on crossing lines of position or LOP. A line of position

can refer to two different things: a line on a chart and a line between the observer and an object in real life. A bearing is a measure of the direction to an object. If the navigator measures the direction in real life, the angle can then be drawn on a nautical chart and the navigator will be on that line on the chart.

In addition to bearings, navigators also often measure distances to objects. On the chart, a distance produces a circle or arc of position. Circles, arcs, and hyperbolae of positions are often referred to as lines of position.

If the navigator draws two lines of position, and they intersect he must be at that position. A fix is the intersection of two or more LOPs.

If only one line of position is available, this may be evaluated against the dead reckoning position to establish an estimated position.

Lines (or circles) of position can be derived from a variety of sources:

- celestial observation (a short segment of the circle of equal altitude, but generally represented as a line),
- terrestrial range (natural or man made) when two charted points are observed to be in line with each other,
- compass bearing to a charted object,
- radar range to a charted object,
- on certain coastlines, a depth sounding from echo sounder or hand lead line.

There are some methods seldom used today such as "dipping a light" to calculate the geographic range from observer to lighthouse.

Methods of navigation have changed through history. Each new method has enhanced the mariner's ability to complete his voyage. One of the most important judgments the navigator must make is the best method to use.

2. ?	**Дайте відповіді на наступні запитання:**

1. Give the definition of the term "navigation"?
2. Explain the term "latitude"?
3. How did mariners calculate latitude in the Northern Hemisphere long ago?
4. Explain the term "longitude"?
5. What modern techniques of navigation do you know?
6. What sources of LOPs do you know?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Широта, довгота, півкуля, горизонт, навігаційні системи, нульовий меридіан, супутник, навігаційна карта, лінія позицій.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. The _____ of a place on the earth's surface is the angular distance north or south of the _____.
2. The _____ of a place on the earth's surface is the angular distance east or west of the prime meridian or _____ meridian.
3. The problem was solved with the invention of the marine _____ .
4. A _____ can refer to two different things: a line on a chart and a line between the observer and an object in real life.
5. Methods of _____ have changed through history.

ГРАМАТИЧНІ ВПРАВИ
УМОВНІ РЕЧЕННЯ І ТИПУ

5. 	**Вимовте вголос усі можливі умовні речення I типу, використовуючи підстановочну таблицю.**

If I	live in the south, come home late, live in the country, go to the wood, receive his letter, fall ill, find my book, lose my money, see my friend,	I shall	bathe every day. go to bed at once. often go to the wood. gather many mushrooms. be very happy. go to the doctor. be very glad. be very sorry. ask his advice.

6. 	**Розкрийте дужки, вживаючи дієслова у потрібній формі.**

1. If you (to give) me your address, I shall write you a letter. 2. If she (not to be) so absent-minded, she will be a much better student. 3. If my sister does not go to the south, we (to spend) the summer in St. Petersburg together. 4. If they (not to go) to Moscow this year, they will hear that famous musician. 5. If you (not to get) tickets for the Philharmonic, we shall stay at home. 6. If you are not so careless about your health, you (to consult) the doctor. 7. If it (to rain), we shall have to stay at home. 8. If he (to work) hard, he will achieve great progress. 9. If it is not too cold, I (not to put) on my coat. 10. If he (not to read) so much, he will not be so clever. 11. If my friend (to be) at home, he will tell us what to do.

7.  **Розкрийте дужки, вживаючи дієслова у потрібній формі.**

1. If you (not to buy) coffee, we shall drink tea. 2. If he is free tomorrow, he certainly (to come) to our party. 3. If my friend (to work) in my office, we shall meet every day. 4. If you speak English every day, you (to improve) your language skills. 5. If you get a "five", your mother (to be) happy. 6. If she (to return) earlier, she will be able to see him before he leaves. 7. If these shoes are not too big for me, I (to buy) them. 8. If you (to ring) me up, I shall tell you a secret. 9. If my brother (to be) in trouble, I shall help him, of course. 10. If I don't manage to finish my report today, I (to stay) at home tomorrow. 11. If he (not to pass) his- examination, he will not get a scholarship.

ТЕМА 30:

НАВІГАЦІЯ

Заняття 2

РАДІОНАВІГАЦІЯ

1.	**Прочитайте та перекладіть текст українською мовою**

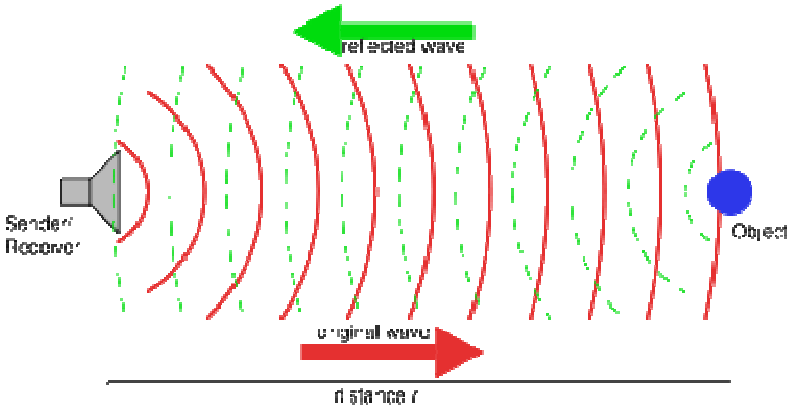
RADIONAVIGATION

Radio navigation or radionavigation is the application of radio frequencies to determining a position on the Earth. Like radiolocation, it is a type of radio determination.

The first system of radio navigation was the Radio Direction Finder, or RDF. By tuning in a radio station and then using a directional antenna to find the direction to the broadcasting antenna, radio sources replaced the stars and planets of celestial navigation with a system that could be used in all weather and times of day. By using triangulation, two such measurements can be plotted on a map where their intersection is the position. Commercial AM radio stations can be used for this task due to their long range and high power, but strings of low-power radio beacons were also set up specifically for this task. Early systems used a loop antenna that was rotated by hand to find the angle to the signal, while modern systems use a much more directional solenoid that is rotated rapidly by a motor, with electronics calculating the angle. These later systems were also called Automatic Direction Finders, or ADF.

Distance measurement

Transit time



Principle of radar distance measurement using pulse round trip time.

One way to measure the distance to an object is to transmit a short pulse of radio signal, and measure the time it takes for the reflection to return. The distance is one-half the product of round trip time (because the signal has to travel to the

target and then back to the receiver) and the speed of the signal. $Range = \frac{c\tau}{2}$ where c is the speed of light in a vacuum, and τ is the round trip time. For radar, the speed of signal is the speed of light, making the round trip times very short for terrestrial ranging. Accurate distance measurement requires high-performance electronics. The receiver cannot detect the return while the signal is being sent out – there is no way to tell if the signal it hears is the original or the return. This means that radar has a distinct minimum range, which is the length of the pulse multiplied by the speed of light, divided by two. In order to detect closer targets one must use a shorter pulse length.

A similar effect imposes a specific maximum range as well. If the return from the target comes in when the next pulse is being sent out, once again the receiver cannot tell the difference. In order to maximize range, one wants to use longer times between pulses, the inter-pulse time.

These two effects tend to be at odds with each other, and it is not easy to combine both good short range and good long range in single radar. This is because the short pulses needed for a good minimum range broadcast have less total energy, making the returns much smaller and the target harder to detect. This could be offset by using more pulses, but this would shorten the maximum range again. So each radar uses a particular type of signal. Long range radars tend to use long pulses with long delays between them, and short range radars use smaller pulses with less time between them. This pattern of pulses and pauses is known as the Pulse Repetition Frequency (or PRF), and is one of the main ways to characterize a radar. As electronics have improved many radars now can change their PRF.

Frequency modulation

Another form of distance measuring radar is based on frequency modulation. Frequency comparison between two signals is considerably more accurate, even with older electronics, than timing the signal. By changing the frequency of the returned signal and comparing that with the original, the difference can be easily measured.

This technique can be used in radar systems, and is often found in aircraft radar altimeters. In these systems a "carrier" radar signal is frequency modulated in a predictable way, typically varying up and down with a sine wave or sawtooth pattern at audio frequencies. The signal is then sent out from one antenna and received on another, typically located on the bottom of the aircraft, and the signal can be continuously compared.

Since the signal frequency is changing, by the time the signal returns to the aircraft the broadcast has shifted to some other frequency. The amount of that shift is greater over longer times, so greater frequency differences mean a longer distance, the exact amount being the "ramp speed" selected by the electronics. The amount of shift is therefore directly related to the distance travelled, and can be displayed on an instrument. This signal processing is similar to that used in speed detecting Doppler radar.

2. ?	**Дайте відповіді на наступні запитання:**

1. What was the first system of radio navigation?
2. How does the RDF work?
3. What ways of measuring the distance to an object do you know?
4. What types of radars do you know?
5. What is PRF?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Радіонавігація, вимірювання відстані, передавач, амплітудна модуляція, частотна модуляція, частота повторення імпульсів, швидкість світла, радар, висотомір.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. The first system of _____ was the Radio Direction Finder, or RDF.
2. One way to measure the distance to an object is to transmit a _____ of radio signal, and measure the time it takes for the _____ to return.
3. Accurate _____ requires high-performance electronics.
4. So each radar uses a particular type of _____.
5. Since the _____ is changing, by the time the signal returns to the aircraft the broadcast has shifted to some other _____.

ГРАМАТИЧНІ ВПРАВИ
УМОВНІ РЕЧЕННЯ II ТИПУ

5. 	**Вимовте вголос усі можливі умовні речення II типу, використовуючи підстановочну таблицю.**

I wish I were If I were	in the south at home in the country in the wood at the camp a scientist a composer a poet a writer a spaceman a sailor	**I should**	bathe every day. go to bed. go to the wood. gather many mushrooms. have a very good time. invent a time machine. write beautiful music. write beautiful poetry. write interesting novels. fly to other planets. sail to Africa.

6.  **Розкрийте дужки, вживаючи дієслова у потрібній формі.**

1. If I (to have) this rare book, I should gladly lend it to you. 2. The dish would be much more tasty if she (to be) a better cook. 3. He never (to phone) you if I didn't remind him to do that. 4. Your brother (to become) much stronger if he took cold baths regularly. 5. If he (to be) more courageous, he would not be afraid. 6. If the fisherman was less patient, he (not to catch) so much fish. 7. If you (to put) the ice cream into the refrigerator, it would not melt. 8. If I (to know) the result now, I would phone her immediately. 9. If it (to snow), the children would play snowballs. 10. If I (not to know) English, I should not be able to enjoy Byron's poetry. 11. I (not to do) it if you did not ask me. 12. If men (to have) no weapons, would wars be possible? 13. You will never finish your work if you (to waste) your time like that. 14. If I (to have) his telephone number, I should easily settle this matter with him.

7.  **Розкрийте дужки, вживаючи дієслова у потрібній формі.**

1. If you (to do) your morning exercises every day, your health would be much better. 2. If he was not very busy, he (to agree) to go to the museum with us. 3. If a dog (to bite) in her leg, she would go straight to hospital. 4. If only I (to have) more pocket money, I could buy some new English books. 5. If you gave me your dictionary for a couple of days, I (to translate) this text. 6. If I (to be) a musician, I should be very happy. 7. If Barbara (to get) up at half past eight, she would be late for school. 8. I should be very glad if he (to come) to my place. 9. If he (to live) in St. Petersburg, he would go to the Hermitage every week. 10. If he weren't such a bookworm, he (not to spend) so much time sitting in the library. 11. If he did not live in St. Petersburg, we (not to meet) so often.

ТЕМА 30:

НАВІГАЦІЯ

Заняття 3

АСТРОНАВІГАЦІЯ

1. 	**Прочитайте та перекладіть текст українською мовою**

CELESTIAL NAVIGATION

Celestial navigation, also known as astronavigation, is a position fixing technique that was devised to help sailors cross the featureless oceans without having to rely on dead reckoning to enable them to strike land. Celestial navigation uses angular measurements (sights) between the horizon and a common celestial object. The Sun is most often measured. Skilled navigators can use the Moon, planets or one of 57 navigational stars whose coordinates are tabulated in nautical almanacs.

Celestial navigation is the process whereby angles between objects in the sky (celestial objects) and the horizon are used to locate one's position on the globe. At any given instant of time, any celestial object (e.g. the Moon, Jupiter, navigational star Spica) will be located directly over a particular geographic position on the Earth. This geographic position is known as the celestial object's subpoint, and its location (e.g. its latitude and longitude) can be determined by referring to tables in a nautical or air almanac.

The measured angle between the celestial object and the horizon is directly related to the distance between the subpoint and the observer, and this measurement is used to define a circle on the surface of the Earth called a celestial line of position (LOP). The size and location of this circular line of position can be determined using mathematical or graphical methods (discussed below). The LOP is significant because the celestial object would be observed to be at the same angle above the horizon from any point along its circumference at that instant.

An example illustrating the concept behind the intercept method for determining one's position is shown in the Figure below. (Two other common methods for determining one's position using celestial navigation are the longitude by chronometer and ex-meridian methods.) In the image below, the two circles on the map represent lines of position for the Sun and Moon at 1200 GMT on October 29, 2005. At this time, a navigator on a ship at sea measured the Moon to be 56 degrees above the horizon using a sextant. Ten minutes later, the Sun was observed to be 40 degrees above the horizon. Lines of position were then calculated and plotted for each of these observations. Since both the Sun and Moon were observed at their respective angles from the same location, the navigator would have to be located at one of the two locations where the circles cross.

In this case the navigator is either located on the Atlantic Ocean, about 350 nautical miles (650 km) west of Madeira, or in South America, about 90 nautical miles (170 km) southwest of Asunción, Paraguay. In most cases, determining which of the two intersections is the correct one is obvious to the observer because they are often thousands of miles apart. As it is unlikely that the ship is sailing across the Pampas, the position in the Atlantic is the correct one. Note that the lines of position in the figure are distorted because of the map's projection; they would be circular if plotted on a globe.

2. ?	**Дайте відповіді на наступні запитання:**

1. What do you know about celestial navigation?
2. Where is celestial navigation used?
3. What is the principle of operation of celestial navigation?
4. What is LOP?
5. What is sextant used for?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Мореплавець, астронавігація, морський альманах, географічне розташування, морська миля, точка перетину, визначати, математичний метод, мапа зоряного неба.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. Celestial navigation, also known as _____.
2. Celestial navigation uses _____ (sights) between the horizon and a common celestial object.
3. The measured angle between the _____ and the horizon is directly related to the distance between the _____ and the observer.
4. An example illustrating the concept behind the _____ for determining one's position is shown in the Figure below.
5. In most cases, determining which of the two _____ is the correct one is obvious to the _____ because they are often thousands of miles apart.

ГРАМАТИЧНІ ВПРАВИ
УМОВНІ РЕЧЕННЯ III ТИПУ

5.  **Вимовте вголос усі можливі умовні речення III типу, використовуючи підстановочну таблицю.**

I wish I had If I had	translated the article yesterday met you yesterday learned my lesson seen your brother yesterday bought a dictionary gone to the library had more practice in chess asked you to help me	I should have	found out all about this discovery. told you something. got a good mark. found out all about his illness. done the work well. met interesting people. been sent abroad. been pleased.

6.  **Розкрийте дужки, вживаючи дієслова у потрібній формі.**

1. If you were on a hijacked plane, you (to attack) the hijackers? 2. If they were on a hijacked plane, they (to stay) calm and probably (to survive). 3. If my friend had been trying harder, he (to succed). 4. If I (to live) in 1703, I shouldn't (wouldn't') have had a computer. 5. If she (to smell) smoke in the middle of the night, she would telephone the fire brigade and run into the street and shout "Fire!" 6. If he (to invite), he would have come to the party lust night. 7. If the driver in front hadn't stopped suddenly, the accident (not to happen). 8. If you (not to know) how to play, my sister will explain the rules to you. 9. If she had told them it was her birthday, they (to give) her a birthday present. 10. If I had more time, I (to read) more books. 11. If their TV had been working, they (to watch) the President's speech last night. .12. If my T-shirt hadn't been 100 percent cotton, it (not to shrink) so much. 13. How can you become more popular in your class: if you (to get) the top mark in mathematics or English or if you (to be) good at sports? 14. If they (to go) by car, they would have saved time. 15. If I (to be) a bird, I would be able to fly. 16. If he (to bring) his book home, he would have done his homework last night. 17. If my mother (to win) a million pounds, she would spend it as fast as possible. 18. If you had been feeling well, you (to be) in class yesterday.

7.  **Розкрийте дужки, вживаючи дієслова у потрібній формі.**

1. I am sorry that you do not read English novels; if you (to read) them, I (to lend) you some very interesting ones. 2. You say that you did not read yesterday's

papers; if you (to read) them, you (to see) the announcement of Professor X's coming to our town. 3. He is not ill: if he (to be) ill, he (not to play) tennis so much. 4. He was not ill last week: if he (to be) ill, he (not to take) part in the football match. 5. How slippery it is! If it (not to rain), it (not to be) so slippery. 6. I am glad I was able to attend the lecture yesterday. You (to be) displeased if I (not to come)? 7. Let's take a taxi to the railway station: we have very much luggage. If we (not to have) so much luggage, we (to walk). 8. Stop working and let's go inside: it is too dark. If the evening (not to be) so dark, we (to continue) the work. 9. I don't believe you: you only say that you want to know languages. If you (to be) really interested in languages, you (to study) them.

8.  **Утворіть умовні речення.**

1. He is busy and does not come to see us. If ... 2. The girl did not study well last year and received bad marks. If ... 3. He broke his bicycle and so he did not go to the country. If ... 4. He speaks English badly: he has no practice. If ... 5. I had a bad headache yesterday, that's why I did not come to see you. If ... 6. The ship was sailing near the coast, that's why it struck a rock. If ... 7. He was not in town, therefore he was not present at our meeting. If ... 8. The pavement was so slippery that I fell and hurt my leg. If ... 9. The sea is rough, and we cannot sail to the island. If ... 10. They made a fire, and the frightened wolves ran away. If ... 11. It is late, and I have to go home. If ... 12. I was expecting my friend to come, that's why I could not go to the cinema with you. If ... 13. He always gets top marks in mathematics because it is his favourite subject and he works a lot at it. If ... 14. I did not translate the article yesterday because I had no dictionary. If ... 15. We lost our way because the night was pitch-dark. If ... 16. The box was so heavy that I could not carry it. That's why I took a taxi. If ...

ТЕМА 30:

НАВІГАЦІЯ

Заняття 4

ГЛОБАЛЬНА СИСТЕМА НАВІГАЦІЇ

1. 	**Прочитайте та перекладіть текст українською мовою**

GLOBAL POSITIONING SYSTEM

The Global Positioning System (GPS) is the only fully functional Global Navigation Satellite System (GNSS). The GPS uses a constellation of between 24 and 32 Medium Earth Orbit satellites that transmit precise microwave signals, that enable GPS receivers to determine their location, speed, direction, and time. GPS was developed by the United States Department of Defense. Its official name is NAVSTAR-GPS.

Similar satellite navigation systems include the Russian GLONASS (incomplete as of 2008), the upcoming European Galileo positioning system, the proposed COMPASS navigation system of China, and IRNSS (Indian Regional Navigational Satellite System).

Following the shooting down of Korean Air Lines Flight 007 in 1983, President Ronald Reagan issued a directive making the system available free for civilian use as a common good. Since then, GPS has become a widely used aid to navigation worldwide, and a useful tool for map-making, land surveying, commerce, scientific uses, and hobbies such as geocaching. GPS also provides a precise time reference used in many applications including scientific study of earthquakes, and synchronization of telecommunications networks.

History

The basic idea to build up a navigation system using satellites already existed before World War II. In May 11, 1939 the German aerospace scientist Karl Hans Janke announced in Berlin a patent for a “Position indicator concerning to aircrafts” which had been issued on November 11, 1943. In the patent, he assumed two distant bodies (satellites) which are permanently sending electromagnetic signals. Those signals can be received and be shown on a screen as a vector. By laying a map on that screen it would be even possible to determine origin and direction of an object.

The first satellite navigation system, Transit, used by the United States Navy, was first successfully tested in 1960. Using a constellation of five satellites, it could provide a navigational fix approximately once per hour. In

1967, the U.S. Navy developed the Timation satellite which proved the ability to place accurate clocks in space, a technology the GPS relies upon. In the 1970s, the ground-based Omega Navigation System, based on signal phase comparison, became the first world-wide radio navigation system. The design of GPS is based partly on similar ground-based radio navigation systems, such as LORAN and the Decca Navigator developed in the early 1940s, and used during World War II. Additional inspiration for the GPS came when the Soviet Union launched the first Sputnik in 1957. A team of U.S. scientists led by Dr. Richard B. Kershner were monitoring Sputnik's radio transmissions. They discovered that, because of the Doppler effect, the frequency of the signal being transmitted by Sputnik was higher as the satellite approached, and lower as it continued away from them. They realized that since they knew their exact location on the globe, they could pinpoint where the satellite was along its orbit by measuring the Doppler distortion.

Basic concept of GPS operation

A GPS receiver calculates its position by carefully timing the signals sent by the constellation of GPS satellites high above the Earth. Each satellite continually transmits messages containing the time the message was sent, a precise orbit for the satellite sending the message (the ephemeris), and the general system health and rough orbits of all GPS satellites (the almanac). These signals travel at the speed of light through outer space, and slightly slower through the atmosphere. The receiver uses the arrival time of each message to measure the distance to each satellite, from which it determines the position of the receiver. The resulting coordinates are converted to more user-friendly forms such as latitude and longitude, or location on a map, then displayed to the user.

It might seem that three satellites would be enough to solve for a position, since space has three dimensions. However, a three satellite solution requires the time be known to a nanosecond or so, far better than any non-laboratory clock can provide. Using four or more satellites allows the receiver to solve for time as well as geographical position, eliminating the need for a very accurate clock. In other words, the receiver uses four measurements to solve for four variables: x, y, z, and t. While most GPS applications use the computed location and not the (very accurate) computed time, the time is used in some GPS applications such as time transfer and traffic signal timing.

The Global Positioning System, while originally a military project is considered a dual-use technology, meaning it has significant applications for both the military and the civilian industry.

Military

The military applications of GPS span many purposes:

Navigation: GPS allows soldiers to find objectives in the dark or in unfamiliar territory, and to coordinate the movement of troops and supplies. The GPS-receivers commanders and soldiers use are respectively called the Commanders Digital Assistant and the Soldier Digital Assistant.

Target tracking: Various military weapons systems use GPS to track potential ground and air targets before they are flagged as hostile. These weapon

systems pass GPS co-ordinates of targets to precision-guided munitions to allow them to engage the targets accurately. Military aircraft, particularly those used in air-to-ground roles use GPS to find targets (for example, gun camera video from AH-1 Cobras in Iraq show GPS co-ordinates that can be looked up in Google Earth).

Missile and projectile guidance: GPS allows accurate targeting of various military weapons including ICBMs, cruise missiles and precision-guided munitions. Artillery projectiles with embedded GPS receivers able to withstand accelerations of 12,000G have been developed for use in 155 mm howitzers.

Search and Rescue: Downed pilots can be located faster if they have a GPS receiver.

Reconnaissance and Map Creation: The military use GPS extensively to aid mapping and reconnaissance.

The GPS satellites also carry a set of nuclear detonation detectors consisting of an optical sensor (Y-sensor), an X-ray sensor, a dosimeter, and an Electro-Magnetic Pulse (EMP) sensor (W-sensor) which form a major portion of the United States Nuclear Detonation Detection System

2. ?	**Дайте відповіді на наступні запитання:**

1. What do you know about the history of GPS?
2. What was the first satellite navigation system?
3. What satellite navigation systems do you know?
4. How does GPS operate?
5. What advantages and disadvantages of GPS do you know?
6. What military applications of GPS do you know?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Навігаційна система, супутник, телекомунікаційна мережа, частота, можливість, орбіта, обчислювати, передавати повідомлення, швидкість світла, координати, вимір, військова сфера.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. The GPS uses a _____ of between 24 and 32 Medium Earth Orbit satellites that transmit precise _____.
2. GPS also provides a _____ used in many applications including scientific study of _____.
3. The basic idea to build up a _____ using satellites already existed before World War II.

4. A GPS _____ calculates its position by carefully timing the signals sent by the constellation of GPS _____ high above the Earth.
5. Various military _____ use GPS to track potential ground and air targets before they are flagged as _____.

ГРАМАТИЧНІ ВПРАВИ
УМОВНІ РЕЧЕННЯ ЗМІШАНОГО ТИПУ

5.  **Утворіть умовні речення. Не забудьте про змішані випадки.**

1.I shall go to the dentist because I have a toothache. If ... 2. He is groaning with pain now because he did not go to the dentist to have his tooth filled. It... 3. She does not go to the polyclinic because she does not need any treatment. If ... 4. He will not go to see the play as he was present at the dress rehearsal. If ... 5. He went to Moscow specially to hear this famous singer because he is fond of him. If ... 6. We did not go to the cafeteria room to have a glass of lemonade because we were not thirsty. If … 7. She could not mend her dress herself because she had no needle. If ... 8. He is not a first-class sportsman now because he did not train enough last year. If ... 9. The pupils were active because they wanted to understand this difficult material. If ... 10. The pupils did not understand the homework because they were inattentive. If …

6.  **Перекладіть англійською мовою.**

1. Якби він не був такий короткозорий, він би впізнав мене вчора в театрі. 2. Вона здорова- Якби вона була хвора, її брат сказав би мені про це вчора. 3. Ви б багато знали, якби регулярно читали цей журнал. 4. Якби я довідалася про це раніше, то не сиділа б зараз вдома. 5. Якби мої батьки були багаті, вони б уже давно купили мені машину. 6. Вона дуже талановита. Було б добре, щоб батьки купили їй піаніно. Якщо вона почне грати зараз, вона буде видатним музикантом. 7. Якби я знав французьку мову, я б уже давно поговорив з нею. 8. Якби я знав німецьку мову, я б читав Ґете в оригіналі. 9. Якби я жив близько, я б частіше заходив до вас. 10. Якби ви не перервали нас учора, ми б закінчили роботу вчасно. 11. Якби він не дотримувався порад лікаря, він би не одужав так швидко. 12. Якби він не був талановитим художником, його картину не прийняли б на виставку. 13. Якби ви тоді послухалися моєї поради, ви б не були зараз у такому скрутному становищі.14. Якби я не був такий зайнятий у ці дні, я б допоміг тобі вчора.

7. ⇔		**Перекладіть англійською мовою.**

1. Він так змінився! Якби ви його зустріли, ви б його не впізнали. 2. Якби я був на вашому місці, я б порадився з батьками. 3. Якби зараз підійшов трамвай, ми б не спізнилися. 4. Якби він знав, що це вас засмутить, він був би обережнішим. 5. Якби ви мені допомогли розв'язати цю задачу, я був би вам дуже вдячний. 6. Шкода, що нам раніше не спало на думку пошукати книгу в бібліотеці. Ми б зробили роботу вчасно і зараз були б уже вільні. 7. Шкода, що в нас було так мало уроків. Якби ми більше попрацювали, ми б краще знали мову. 8. Якби він регулярно не відвідував спортивні тренування, він не досяг би такого успіху на змаганнях. 9. Якби ти попередив мене заздалегідь, я б уже був у Москві. 10. Шкода, що вона вже пішла. Якби ти зателефонував раніше, вона була б зараз тут. 11. Якби він був розумнішим, він би не пішов учора в ліс. 12. Якби вона не надіслала вчора цього листа, мій брат був би зараз вдома. 13. Що б ми зараз робили, якби мама не спекла вчора пиріг? 14. Шкода, що ви не чули музику Рахманінова. Якби ви її чули, ви б знали, який це чудовий композитор. 15. Я впевнений, що всі були б раді, якби вечір відбувся.

ТЕМА 30:

НАВІГАЦІЯ

Заняття 5

ГЛОБАЛЬНА НАВІГАЦІЙНА СУПУТНИКОВА СИСТЕМА

1.		**Прочитайте та перекладіть текст українською мовою**

GLOBAL NAVIGATION SATELLITE SYSTEM (GLONASS)

GLONASS (Global Navigation Satellite System) is a radio-based satellite navigation system, developed by the former Soviet Union and now operated for the Russian government by the Russian Space Forces. It is an alternative and complementary to the United States' Global Positioning System (GPS) and the planned Galileo positioning system of the European Union (EU).

Development on the GLONASS began in 1976, with a goal of global coverage by 1991. Beginning on 12 October 1982, numerous rocket launches added satellites to the system until the constellation was completed in 1995. Following completion, the system rapidly fell into disrepair with the collapse of the Russian economy. Beginning in 2001, Russia committed to restoring the system, and in recent years has diversified, introducing the Indian government as a partner, and accelerated the program with a goal of restoring global coverage by 2009.

Purpose

GLONASS was developed to provide real-time position and velocity determination, initially for use by the Soviet military for navigation and ballistic missile targeting. It was the Soviet Union's second generation satellite navigation system, improving on the Tsikada system which required one to two hours of signal processing to calculate a location with high accuracy. By contrast, once a GLONASS receiver is tracking the satellite signals, a position fix is available instantly. It is stated that at peak efficiency the system's standard positioning and timing service provide horizontal positioning accuracy within 57-70 meters, vertical positioning within 70 meters, velocity vector measuring within 15 cm/s, and time transfer within 1 μs (all within 99.7% probability).

Orbital characteristics

A fully operational GLONASS constellation consists of 24 satellites, with 21 used for transmitting signals and three for on-orbit spares, deployed in three orbital planes. The three orbital planes' ascending nodes are separated by 120° with each plane containing eight equally spaced satellites. The orbits are roughly circular, with an inclination of about 64.8°, and orbit the Earth at an altitude of 19,100 km, which yields an orbital period of approximately 11 hours, 15 minutes. The planes themselves have a latitude displacement of 15°, which results in the satellites crossing the equator one at a time, instead of three at once. The overall arrangement is such that, if the constellation is fully populated,

a minimum of five satellites are in view from any given point at any given time.

Each satellite is identified by a "slot" number, which defines the corresponding orbital plane and the location within the plane; numbers 1-8 are in plane one, 9-16 are in plane two, and 17-24 are in plane three.

A characteristic of the GLONASS constellation is that any given satellite only passes over the exact same spot on the Earth every eighth sidereal day. However, as each orbit plane contains eight satellites, a satellite will pass the same place every sidereal day. For comparison, each GPS satellite passes over the same spot once every sidereal day.

2. ?	**Дайте відповіді на наступні запитання:**

1. What do you know about the history of GLONASS?
2. How does GLONASS operate?
3. What advantages and disadvantages of GLONASS do you know?
4. Where is GLONASS used?
5. What military applications of GLONASS do you know?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Космічні війська, покриття, пуск ракети, швидкість, балістична ракета, наведення, точність, визначення місця розташування, передавати сигнал, висота над рівнем моря, екватор.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. Development on the _____ began in 1976, with a goal of _____ by 1991.
2. GLONASS was developed to provide real-time position and _____ determination, initially for use by the Soviet military for navigation and _____ targeting.
3. A fully operational GLONASS _____ consists of 24 satellites.
4. The planes themselves have a _____ displacement of 15°.
5. Each _____ is identified by a "slot" number.

ГРАМАТИЧНІ ВПРАВИ
ПРЯМА ТА НЕПРЯМА МОВА

5.  **Перекладіть англійською мовою. Зверніть увагу на використання часових форм у прямій та непрямій мові.**

Мій друг сказав: “Мені дуже подобається грати на гитарі.” Моя мама сказала: “Я вже приготувала вечерю.” Наш професор сказав: “Наступного тижня ваша група складатиме іспит.” В цій книзі написано: “Щоб досягти успіху, людина повинна багато працювати.” Ганна сказала: “Ми знайшлі у лісі багато грибів та ягід.”	Мій друг сказав, що йому дуже подобається грати на гитарі. Моя мама сказала, що вже приготувала вечерю. Наш професор сказав, що наступного тижня наша група складатиме іспит. В цій книзі написано, що щоб досягти успіху, людина повинна багато працювати. Ганна сказала, що вони знайшлі у лісі багато грибів та ягід.

6.  **Трансформуйте речення з прямої мови у непряму.**

Example: The teacher said to the pupils, “You may go home.” –
The teacher told the pupils that they might go home.

1. Mother said to her son, “You may go to the cinema.”
2. The doctor said to the sick man, “You may go.”
3. He said to me, “You may come to our party.”
4. The girl said to her friend, “You may work in my room.”
5. My mother said to me, “You may stay at home today.”
6. The boss said to us, “You may take 2 free days.”
7. The shop-assistant said to me, “ You may buy this dress.”

7. ⇔  **Перекажіть наступні діалоги у непрямій мові.**

Mary: I don’t want to go to the canteen alone. Will you join me for lunch?
Ann: I’d love to.
Mary: When will you be free?
Ann: In half an hour.
Mary: All right, then, we’ll go together.
Jack: Will this tie match my new suit?
Mary: Not quite, I’m afraid. It’s too dark, don’t buy it.
Jack: And what about this one?

Mary: Yes, dear. That's a nice one. Let's take it.
Peter: How long are you going to stay here?
Ann: Two or three days, I think.
Peter: Then you'll have enough time to see the sights.
Would you like to begin tomorrow morning?
Ann: I'd love to.
Max: Excuse me. Can you speak English?
Ann: Yes, a little.
Max: Could you tell me how to get to the Trafalgar Square from here?
Ann: Yes, certainly. You can take the 12 bus.
It won't take you 10 minutes to get there.
Max: Thank you very much.
Ann: Not at all.
Mary: Are you ready to go?
Ann: Not yet.
Mary: When will you be ready?
Ann: In five minutes.
Mary: Hurry up, I'm waiting for you.

8. 	**Передайте зміст наданих ситуацій у прямій мові у вигляді діалогів.**

Ann met her old friend Nick at the theatre during an interval. She was surprised to see him, because she had thought that Nick was still travelling on business. They spoke about their impressions of the play. Nick said that he had seen the same play in London, and he didn't see much difference between the two productions. Ann liked the cast very much, she found that her favourite actress played very good. Nick said that the actress who had played the same part in the London theatre was very talented, too, though he didn't remember her name.

Peter asked John whether he could stay and help him with his work. John agreed to stay, but wanted to know whether Peter was going to keep him long. Peter said it would not take them more than an hour.

Jane told Mary that her friends and she had decided to go to the country for the week-end, and asked Mary whether she'd like to join them. Mary said that she'd be glad. Jane told Mary that they had agreed to meet at the station at eight the next morning, and asked her not to be late.

John invited Peter to a party, saying that it was going to take place the next day. Thanking John for the invitation, Peter said at first that he was not sure that he would be able to come, because it was quite unexpected, and he would have to change his plans, and then asked John not to be very angry if he was a little late.

Peter met George in the street and after the usual greetings asked him whether he had really decided to get a new job. George said that he had found a job that had to do with medicine. Peter asked whether this was a strong decision, and George answered that it was, because he was interested in medicine and planned to enter a medical college the next year.

ТЕМА 30:

НАВІГАЦІЯ

Заняття 6

ГАЛІЛЕО (СУПУТНИКОВА СИСТЕМА НАВІГАЦІЇ)

1.		**Прочитайте та перекладіть текст українською мовою**

SATELLITE NAVIGATION SYSTEM GALILEO

Galileo is a satellite navigation system currently being built by the European Union (EU) and European Space Agency (ESA). The €20 billion project is named after the famous Italian astronomer Galileo Galilei. One of the political aims of Galileo is to provide a high-precision positioning system upon which European nations can rely, independently from the Russian GLONASS, US GPS, and Chinese Compass systems, which can be disabled for commercial users in times of war or conflict.

When in operation, it will use two ground operations centers, near Munich, Germany and in Fucino, Italy. The system was initially expected to become operational by 2012, but that date has been repeatedly moved back. As of 2011, initial service is expected around 2014 and completion by 2019.

Galileo will be a free service. It is intended to provide horizontal and vertical positions measurements with metre-class precision, and better positioning services at high latitudes than GPS and GLONASS. As a further feature, Galileo will provide a global Search and Rescue (SAR) function. To do so, each satellite will be equipped with a transponder, which is able to transfer the distress signals from the user's transmitter to the Rescue Co-ordination Centre, which will then initiate the rescue operation. At the same time, the system will provide a signal to the user, informing them that their situation has been detected and that help is on the way. This latter feature is new and is considered a major upgrade compared to the existing GPS and GLONASS navigation systems, which do not provide feedback to the user. The use of basic (low-precision) Galileo services will be free and open to everyone. The high-precision capabilities will be available for paying commercial users and for military use.

The first satellites will bear the names of eleven-year-old Thijs from Belgium and nine-year-old Natalia from Bulgaria who are the first winners of the European Comission's Galileo children's drawing competition. Competition winners from the remaining 25 Member States will name the satellites which will be launched until 2019.

Galileo is intended to be an EU GNSS civilian system that allows all users access to it. GPS is a US GNSS military system that provides location signals that have high precision to US military users, while also providing less precise location signals to others. The GPS had the capability to block the "civilian"

signals while still being able to use the "military" signal (M-band). A primary motivation for the Galileo project was European concern that the US could deny others access to GPS during political disagreements.

2. ?	**Дайте відповіді на наступні запитання:**

1. What do you know about the history of Galileo?
2. How does Galileo operate?
3. What is the political name of Galileo?
4. Where is Galileo used?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Супутникова навігаційна система, Європейське космічне агентство, політична мета, комерційний користувач, наземна експлуатація, вимірювання, пошуково-рятувальна операція.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою.**

1. One of the political aims of Galileo is to provide a high-precision _____ upon which European nations can rely.
2. It is intended to provide horizontal and vertical positions _____ with metre-class precision.
3. The _____ capabilities will be available for paying _____ and for military use.
4. Galileo is intended to be an EU GNSS _____ that allows all users access to it.
5. A primary motivation for the Galileo project was European _____ that the US could deny others access to GPS during political _____.

ГРАМАТИЧНІ ВПРАВИ
ЗМІНА ЧАСІВ У НЕПРЯМІЙ МОВІ

5. 	**Переробіть речення з прямої мови в непряму**

NOTE that a newspaper reporter is talking to one of the boys at David's school. His name is Philip. Philip didn't go to the opening of the new school, and he doesn't want to study at the new school.

Reporter: Why didn't you go to the opening of the new school, Philip?
Philip: Because I don't think it will be a good school.
Reporter: Way not?

Philip: Because it will be too big. The teachers won't know all the children. It will be like a factory.
Reporter: What school did you go to before the new school was built?
Philip: I went to the Grammar School.
Reporter: What form were you in?
Philip: I was in the sixth form. My brother went to the Grammar School too. He was in the third form. He's very clever, but I don't think he will work hard enough in the new school. The other children in his form will not be as clever as he is; he won't have to work hard to do well.
Reporter: Will you go to the new school?
Philip: No, I won't. I'm going to leave school as soon as I can. I shall study at home.
Reporter: Will your brother go to the new school?
Philip: Yes. He will have to go.
Reporter: What do your parents think?
Philip: They think I'm right

6.  **Переробіть речення з прямої мови в непряму**

1. "Yesterday Tom and I went to look at a house that he was thinking of buying. It was rather a nice house and had a lovely garden but Tom decided against it because it was opposite a cemetery," said Celia.
2. "I don't know what to do with all my plums. I suppose I'll have to make jam. The trouble is that no one in my family eats jam," she said.
3. "We like working on Sundays because we get double pay," explained the builders.
4. He said, "I am quite a good cook and I do all my own washing and mending too."

7.  **Переробіть речення з прямої мови в непряму**

1. "You can keep that one if you like, Joan," she said. "I've got plenty of others."
2. "I'm going fishing with mother this afternoon," said the small boy, "and we are going into the garden now to dig for worms."
3. "You've got my umbrella," said I crossly. "Yours is in your bedroom."
4. "I know exactly what they said," the private detective explained to his client, "because I put a tape-recorder under the table."
5. "I'll sit up till she comes in, but I hope she won't be late," said Mrs. Pitt.
6. "If you give me some wire, I'll hang that picture for you," said my cousin.
7. "I have a Turkish bath occasionally, but it doesn't seem to make any difference to my weight," she said.

SUPPLEMENTARY TEXT

8		**Прочитайте та перекладіть текст українською мовою**

COMPASS NAVIGATION SYSTEM

The Compass system (also known as Beidou-2, BD2) is a project by China to develop an independent global satellite navigation system. It became operational with coverage of China and surrounding areas in December 2011. It is planned to offer services to customers in the Asia-Pacific region by 2012 and the global system should be finished by 2020.[3]

Compass is not an extension to the previously deployed Beidou-1, but a new global navigation satellite system (GNSS) similar in principle to GPS, GLONASS, and Galileo. The system is intended to be compatible and interoperable with these other systems.

The new system will be a constellation of 35 satellites, which include 5 geostationary orbit (GEO) satellites and 30 medium Earth orbit (MEO) satellites, that will offer complete coverage of the globe. The ranging signals are based on the CDMA principle and have complex structure typical of Galileo or modernized GPS. Similar to the other GNSS, there will be two levels of positioning service: open and restricted (military). The public service shall be available globally to general users. When all the currently planned GNSS systems are deployed, the users will benefit from the use of a total constellation of 75+ satellites, which will significantly improve all the aspects of positioning, especially availability of the signals in so-called urban canyons. The general designer of Compass navigation system is Sun Jiadong, who is also the general designer of its predecessor, Beidou navigation system.

Frequencies for Compass are allocated in four bands: E1, E2, E5B, and E6 and overlap with Galileo. The fact of overlapping could be convenient from the point of view of the receiver design, but on the other hand raises the issues of inter-system interference, especially within E1 and E2 bands, which are allocated for Galileo's publicly-regulated service. However, under International Telecommunications Union (ITU) policies, the first nation to start broadcasting in a specific frequency will have priority to that frequency, and any subsequent users will be required to obtain permission prior to using that frequency, and otherwise ensure that their broadcasts do not interfere with the original nation's broadcasts. It now appears that Chinese Compass satellites will start transmitting in the E1, E2, E5B, and E6 bands before Europe's Galileo satellites and thus have primary rights to these frequency ranges.

Although almost nothing has yet been officially announced by Chinese authorities about the signals of the new system, the launch of the first Compass satellite permitted independent researchers not only to study general characteristics of the signals but even to build a Compass receiver.

ТЕМА 31:

ГЕОІНФОРМАЦІЙНІ СИСТЕМИ

Заняття 1

ГЕОІНФОРМАЦІЙНА СИСТЕМА – ЗАГАЛЬНІ ВІДОМОСТІ

1. 	**Прочитайте та перекладіть текст українською мовою**

GEOGRAPHIC INFORMATION SYSTEM

Geographic information system (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present all types of geographical data. The acronym GIS is sometimes used for geographical information science or geospatial information studies to refer to the academic discipline or career of working with geographic information systems. In the simplest terms, GIS is the merging of cartography, statistical analysis, and database technology.

A GIS can be thought of as a system – it digitally creates and "manipulates" spatial areas that may be jurisdictional, purpose, or application-oriented. Generally, a GIS is custom-designed for an organization. Hence, a GIS developed for an application, jurisdiction, enterprise, or purpose may not be necessarily interoperable or compatible with a GIS that has been developed for some other application, jurisdiction, enterprise, or purpose. What goes beyond a GIS is a spatial data infrastructure, a concept that has no such restrictive boundaries.

In a general sense, the term describes any information system that integrates stores, edits, analyzes, shares, and displays geographic information for informing decision making. GIS applications are tools that allow users to create interactive queries (user-created searches), analyze spatial information, edit data in maps, and present the results of all these operations. Geographic information science is the science underlying geographic concepts, applications, and systems.

What then are Geographical Information Systems? The narrowest answer to this is to regard GIS as a type of software. In simple terms, a GIS is a computer package that is designed to represent Geographical Information effectively. It is, therefore, a system that allows us to handle information about the location of features or phenomena on the Earth's surface. This is usually done by combining a database management system (DBMS) with a computer mapping system. Thematic information that says what a feature is stored as a row of data in the DBMS. Technically, this is referred to as attribute data. Each row of attribute data is linked to information on where the feature is located. This is termed spatial data and is stored using co-ordinates but is usually represented graphically using the 'mapping system'. 'Mapping system' is perhaps an over-simplification, as in addition to providing the ability to draw maps, this deals with all the functionality that is explicitly spatial, including responding to queries such as 'what is at this location?' and calculating distances, areas and whether features are connected to each other. A GIS software package is thus a geographical database management system.

2. ?	**Дайте відповіді на наступні запитання:**

1. Give the definition of the term “Geographic information system”.
2. What does GIS consist of?
3. What is database management system?
4. Explain the meaning of the term “GIS software package”.

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Геоінформаційна система, геопросторова інформація, статистичний аналіз, технологія баз даних, просторові координати, програмне забезпечення, комплект обчислювального обладнання, місцезнаходження, система управління базою даних.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. Geographic information system (GIS) is a system designed to capture, _____, manipulate, _____, manage, and present all types of _____.
2. What goes beyond a GIS is a _____, a concept that has no such restrictive boundaries.
3. The narrowest answer to this is to regard GIS as a type of _____.
4. In simple terms, a GIS is a _____ that is designed to represent Geographical Information effectively.
5. A GIS software package is thus a geographical _____ system.

ГРАМАТИЧНІ ВПРАВИ
СПОЛУЧНИКИ В АНГЛІЙСЬКІЙ МОВІ

5. 	**Перекладіть речення українською мовою, звертаючи увагу на сполучники.**

1. It was a warm soft evening in spring, and there were many persons in the streets.
2. She did not answer him and he went to his room.
3. Put a warm coat on or you will catch cold.
4. The man read a book and made notes from time to time.
5. I must go or I’ll be late.
6. They waited some time for her, but she did not come down again.
7. The moon went down; the stars grew pale; the sun rose.

8. She opened the door and heard their voices speaking.
9. He walked around but said nothing.
10.He turned over the pages of a book and looked at the pictures.
11.The children ran about and shouted.
12.This is my bench and you have no right to take it away from me.
13.He felt as if he were merely coming back from a day excursion to Manchester.

6. **Перекладіть речення англійською мовою.**

1. Я радий, що працюю разом з ним.
2. Вона щаслива, що вчиться у цьому інституті.
3. Мені незручно, що я потурбував вас.
4. Мій молодший брат виконував домашні завдання, а батько й мати ще не повернулися з роботи.
5. Ми поверталися додому пізно, але дощу не було.
6. Я знаю англійську і французьку мови. У школі я вивчав також німецьку мову, але знаю її погано.
7. Телеграму послали пізно ввечері і він одержить її тільки вранці.

7. **Доповніть речення.**

1. They sent for Jim and ...
2. You should do the translation today or ...
3. She took a long time to write a composition but ...
4. He looked as if ...

8. **Перекладіть речення українською мовою.**

1. He was still nearly tree-quarters of a mile from home, and the lane was becoming unpleasantly slippery, for the mist was passing into rain.
2. Be quick, or it may be too late.
3. … real accuracy and purity she neither possessed, nor in any number of years would acquire.
4. The river was not high, so there was not more than a two or three mile current.
5. It seemed to him that he could contrive to secure form her the full benefit of both his life insurance and his fire insurance.
6. But for a long time we didn't see any lights, nor did we see the shore, but rowed steadily in the dark riding with the waves.
7. The stranger had not gone far, so he made after him to ask the name.

ТЕМА 31:

ГЕОІНФОРМАЦІЙНІ СИСТЕМИ

Заняття 2

ІСТОРІЯ РОЗВИТКУ ГЕОІНФОРМАЦІЙНИХ СИСТЕМ

1. 	**Прочитайте та перекладіть текст українською мовою**

HISTORY OF DEVELOPMENT

One of the first applications of spatial analysis in epidemiology is the 1832 “Rapport sur la marche et les effets du choléra dans Paris et le département de la Seine”. The French geographer Charles Picquet represented the 48 districts of the city of Paris by halftone color gradient according to the percentage of deaths by cholera per 1,000 inhabitants.

In 1854 John Snow depicted a cholera outbreak in London using points to represent the locations of some individual cases, possibly the earliest use of a geographic methodology in epidemiology. His study of the distribution of cholera led to the source of the disease, a contaminated water pump (the Broad Street Pump, whose handle he disconnected, thus terminating the outbreak).

While the basic elements of topography and theme existed previously in cartography, the John Snow map was unique, using cartographic methods not only to depict but also to analyze clusters of geographically dependent phenomena.

The early 20th century saw the development of photozincography, which allowed maps to be split into layers, for example one layer for vegetation and another for water. This was particularly used for printing contours – drawing these was a labour intensive task but having them on a separate layer meant they could be worked on without the other layers to confuse the draughtsman. This work was originally drawn on glass plates but later plastic film was introduced, with the advantages of being lighter, using less storage space and being less brittle, among others. When all the layers were finished, they were combined into one image using a large process camera. Once colour printing came in, the layers idea was also used for creating separate printing plates for each colour. While the use of layers much later became one of the main typical features of a contemporary GIS, the photographic process just described is not considered to be a GIS in itself – as the maps were just images with no database to link them to.

Computer hardware development spurred by nuclear weapon research led to general-purpose computer "mapping" applications by the early 1960s.

The year 1960 saw the development of the world’s first true operational GIS in Ottawa, Ontario, Canada by the federal Department of Forestry and Rural Development. Developed by Dr. Roger Tomlinson, it was called the Canada Geographic Information System (CGIS) and was used to store, analyze, and manipulate data collected for the Canada Land Inventory – an effort to determine the land capability for rural Canada by mapping information about soils,

agriculture, recreation, wildlife, waterfowl, forestry and land use at a scale of 1:50,000. A rating classification factor was also added to permit analysis.

CGIS lasted into the 1990s and built a large digital land resource database in Canada. It was developed as a mainframe-based system in support of federal and provincial resource planning and management. Its strength was continent-wide analysis of complex datasets. The CGIS was never available commercially.

In 1964 Howard T. Fisher formed the Laboratory for Computer Graphics and Spatial Analysis at the Harvard Graduate School of Design (LCGSA 1965–1991), where a number of important theoretical concepts in spatial data handling were developed, and which by the 1970s had distributed seminal software code and systems, such as SYMAP, GRID, and ODYSSEY – that served as sources for subsequent commercial development – to universities, research centers and corporations worldwide.

By the early 1980s, M&S Computing (later Intergraph) along with Bentley Systems Incorporated for the CAD platform, Environmental Systems Research Institute (ESRI), CARIS (Computer Aided Resource Information System), MapInfo (MapInfo) and ERDAS (Earth Resource Data Analysis System) emerged as commercial vendors of GIS software, successfully incorporating many of the CGIS features, combining the first generation approach to separation of spatial and attribute information with a second generation approach to organizing attribute data into database structures. In parallel, the development of two public domain systems (MOSS and GRASS GIS) began in the late 1970s and early 1980s.

In 1986, Mapping Display and Analysis System (MIDAS), the first desktop GIS product emerged for the DOS operating system. This was renamed in 1990 to MapInfo for Windows when it was ported to the Microsoft Windows platform. This began the process of moving GIS from the research department into the business environment.

By the end of the 20th century, the rapid growth in various systems had been consolidated and standardized on relatively few platforms and users were beginning to explore viewing GIS data over the Internet, requiring data format and transfer standards. More recently, a growing number of free, open-source GIS packages run on a range of operating systems and can be customized to perform specific tasks. Increasingly geospatial data and mapping applications are being made available via the world wide web.

2. ?	**Дайте відповіді на наступні запитання:**

1. What was the first application of spatial analysis?
2. What is photozincography?
3. When and where did true operational GIS appear?
4. What was CGIS used for?
5. What is Howard T. Fisher famous for?
6. When did the first desktop GIS product appear?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Застосування, просторовий аналіз, картографічний метод, рослинність, зображення, база даних, картографічна інформація, ґрунт, науково-дослідний центр, теоретичний принцип, епідеміологія.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. In 1854 John Snow depicted a _____ in London using points to represent the locations of some individual cases.
2. The John Snow map was unique, using _____ not only to depict but also to analyze clusters of geographically dependent _____.
3. The early 20th century saw the development of _____.
4. When all the _____ were finished, they were combined into one _____ using a large process camera.
5. Increasingly _____ and mapping applications are being made available via the world wide web.

ГРАМАТИЧНІ ВПРАВИ
ПРИЙМЕННИКИ В АНГЛІЙСЬКІЙ МОВІ

5. 	**Вставте прийменники *on, in, into* у речення**

1. Where is the book? – It is … the table.
2. Put the plates … the table.
3. Put the book … the bag.
4. There is a beautiful picture … the wall.
5. He came … the room.
6. I like to sit … the sofa … my room.
7. Mother is cooking dinner … the kitchen.
8. There are many people … park today.
9. There is a girl standing … the bridge. Why is she crying? – She has dropped her doll … the water.
10. There is no tea … my cup.
11. Pour some milk … my glass, please.
12. I saw many people … the platform waiting for the train.
13. I opened the door and came … the classroom. The teacher was writing something … the blackboard. There were some books and pens … his table. There were two maps … the wall and some flowers … the window-sills.

6. 	**Перекладіть речення англійською мовою, вживаючи прийменники *on, in, at, to, into***

1. Йдіть до дошки. Напишіть на дошці тему урока.
2. Вона налила води у вазу і поставила у неї квіти. Потім вона підійшла до окна і поставила вазу на підвіконня.
3. Нік увійшов до кухні та сіл за стіл. Його мати стояла у плити. Вона готувала вечерю. Вона підійшла до столу і налила в чашку чаю.
4. Ми зібрали багато грибів та ягід у лісі.
5. Маша відкрила двері та увійшла до хати. Вдома нікого не було. Батьки були на роботі, а молодший брат – у школі.
6. На полу був товстий килим. Діти сіли на килим та почали грати.
7. Де хлопці? – Вони грають на дворі.
8. Зараз зима. На землі лежить сніг.
9. Де твоя ручка? – Вона в моїй кішені
10. Він стрибнув у річку і поплив до острова.
11. Вчора батько був на роботі, а мати була вдома.
12. Де Том? – Він на стадіоні. Він завжди ходить на стадіон по неділях.
13. Коли ми прийшли на вокзал, ми поставили речи на платформу і сіли на скамійку. Потім батько сходив до крамниці і купив нам морозива.

7. 	**Складіть речення з наступними виразами**

ON – on the table, on the floor, on the ground, on the platform, on the shelf, on the bench, on the wall, on the blackboard;

IN – in the room, in the kitchen, in the house, in the car, in the box, in the bag, in the pocket, in the hall, in the plate, in the cup, in the glass, in the bottle, in the river, in the sea, in the wood, in the park, in the garden, in the yard, in the classroom;

INTO – into the room, into the kitchen, into the house, into the car, into the box, into the bag, into the pocket, into the hall, into the plate, into the cup, into the glass, into the bottle, into the river, into the sea, into the wood, into the park, into the garden, into the yard, into the classroom;

AT – at the wall, at the door, at the window, at the blackboard, at the map, at the river, at the table, at the desk, at the theatre, at the cinema, at the museum, at the library, at the shop, at the institute, at the station, at the concert, at the stadium, at the bus-stop, at the factory, at work, at school, at the lesson;

TO – to the wall, to the door, to the window, to the blackboard, to the map, to the river, to the theatre, to the cinema, to the museum, to the library, to the shop, to the institute, to the station, to the concert, to the stadium, to the bus-stop, to the factory, to work, to school, to the lesson.

8. 	**Перекладіть речення англійською мовою, вживаючи прийменники *on, in, at, by, since***

1. Вони повернулися з вечірки далеко за північ.
2. Мій день народження 3 квітня.
3. Літні канікули починаються в кінці червня.
4. В нашій країні люди святкують Різдво 25 грудня.
5. На минулому тижні ми ходили до театру.
6. Минулого літа ми з батьками їздили на південь. Кожен день ми вставали дуже рано. Після сніданку ми ходили купатися в морі, потім обідали й відпочивали. Ввечері ми ходили в парк або в кафе. Як правило, ми лягали спати десь о дванадцятій.
7. Я закінчив школу в 2000 році. Протягом року я працював, а через рік поступив до університету.
8. Наступного року мої батьки їдуть на Далекий Схід працювати.
9. Чарльз Дікенс народився у 1812 році.
10. Через два дні ми зустрічаємо наших друзів в аеропорту. Літак прибуває о сьомій годині вечора.
11. Ми повинні закінчити цю роботу до завтра.
12. Ми не були в Луганську з 1998 року.
13. Почекайте, будь ласка. Я повернуся через кілька хвилин.
14. Через 2-3 роки все зміниться.
15. Взимку нам подобається відпочивати на Кавказі.

ТЕМА 31:

ГЕОІНФОРМАЦІЙНІ СИСТЕМИ

Заняття 3

ЗАСТОСУВАННЯ ГІС У ГЕОПРОСТОРОВІЙ РОЗВІДЦІ

1.		**Прочитайте та перекладіть текст українською мовою**

GEOGRAPHIC INFORMATION SYSTEMS IN GEOSPATIAL INTELLIGENCE

Geographic Information Systems (GIS) new and constantly evolving role in geospatial intelligence (GEOINT) and United States (U.S.) national security allows a user to efficiently manage, analyze, and produce geospatial data, to combine GEOINT with other forms of intelligence collection, and to perform highly developed analysis and visual production of geospatial data. Therefore, GIS produces up-to-date, supported, and more reliable GEOINT to reduce uncertainty for a decisionmaker. Since GIS programs are Web-enabled, a user can constantly work with a decisionmaker to solve their GEOINT and national security related problems from anywhere in the world. There are many types of GIS software used in GEOINT and national security, such as Google Earth, ERDAS IMAGINE, GeoNetwork opensource, and Esri's ArcGIS.

GEOINT, known previously as imagery intelligence (IMINT), is an intelligence collection discipline that applies to national security intelligence, law enforcement intelligence, and competitive intelligence. For example, an analyst can use GEOINT to identify the route of least resistance for a military force in a hostile country, to discover a pattern in the locations of reported burglaries in a neighborhood, or to generate a map and comparison of failing businesses that a company is likely to purchase. GEOINT is also the geospatial product of a process that is focused externally, designed to reduce the level of uncertainty for a decisionmaker, and that uses information derived from all sources. The National Geospatial-Intelligence Agency (NGA), who has overall responsibility for GEOINT in the U.S. Intelligence Community (IC), defines GEOINT as "information about any object—natural or man-made—that can be observed or referenced to the Earth, and has national security implications."

Some of the sources of collected imagery information for GEOINT are imagery satellites, cameras on airplanes, Unmanned Aerial Vehicles (UAV) and drones, handheld cameras, maps, or GPS coordinates. Recently the NGA and IC have increased the use of commercial satellite imagery for intelligence support, such as the use of the IKONOS, Landsat, or SPOT satellites. These sources produce digital imagery via electro-optical systems, radar, infrared, visible light, multispectral, or hyperspectral imageries.

The advantages of GEOINT are that imagery is easily consumable and understood by a decisionmaker, has low human life risk, displays the capabilities

of a target and its geographical relationship to other objects, and that analysts can use imagery world-wide in a short time. On the other hand, the disadvantages of GEOINT are that imagery is only a snapshot of a moment in time, can be too compelling and lead to ill-informed decisions that ignore other intelligence, is static and vulnerable to deception and decoys, does not depict the intentions of a target, and is expensive and subject to environmental problems.

A majority of national security intelligence decisions involve geography and GEOINT. GIS allows the user to capture, manage, exploit, analyze, and visualize geographically referenced information, physical features, and other geospatial data. GIS is thus a critical infrastructure for the GEOINT and national security community in manipulating and interpreting spatial knowledge in an information system. GIS extracts real world geographic or other information into datasets, maps, metadata, data models, and workflow models within a geodatabase that is used to solve GEOINT-related problems. GIS provides a structure for map and data production that allows a user to add other data sources, such as satellite or UAV imagery, as new layers to a geodatabase. The geodatabase can be disseminated and operated across any network of associated users (i.e. from the GEOINT analyst to the warfighter) and engenders a common spatial capability for all defense and intelligence domains.

Another important aspect of GIS is its ability to fuse geospatial data with other forms of intelligence collection, such as signals intelligence (SIGINT), measurement and signature intelligence (MASINT), human intelligence (HUMINT), or open source intelligence (OSINT). A GIS user can incorporate and fuse all of these types of intelligence into applications that provide corroborated GEOINT throughout an organization's information system.

GIS enables efficient management of geospatial data, the fusion of geospatial data with other forms of intelligence collection, and advanced analysis and visual production of geospatial data. This produces faster, corroborated, and more reliable GEOINT that aims to reduce uncertainty for a decisionmaker.

2. ?	**Дайте відповіді на наступні запитання:**

1. What is GEOINT?
2. In what spheres is GEOINT used for?
3. What are the advantages of GEOINT?
4. What are the disadvantages of GEOINT?
5. In what types of intelligence is GIS used?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Геопросторова розвідка, національна безпека, збір розвідувальних даних, сучасний, надійний, візуальна розвідка, конкурентна розвідка, візуальна інформація, безпілотний літальний апарат, комерційний супутник, розвідувальне забезпечення.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. Therefore, GIS produces up-to-date, supported, and more reliable _____ to reduce uncertainty for a _____.
2. There are many types of GIS _____ used in GEOINT and _____.
3. GEOINT, known previously as _____ (IMINT), is an intelligence collection discipline.
4. Some of the sources of collected imagery information for GEOINT are _____.
5. The _____ can be disseminated and operated across any _____ of associated users.

ГРАМАТИЧНІ ВПРАВИ
ЗВОРОТ TO BE GOING TO

5. 	**Напишіть питання з конструкцією going to.**

Example: I've won a lot of money. (what/with it?) – *What are you going to do with it?*

1. I'm going to a party tonight, (what/wear?) .....
2. Tom has just bought a painting, (where/hang it?) .....
3. I've decided to have a party, (who/invite?) .....

6. 	**Дайте відповіді на запитання, використовуючи конструкцію to be going to.**

Example: **Have you cleaned the- car? (tomorrow*) –*** *Not yet, I am going to clean it tomorrow.*

1. Have you phoned Tom? (after lunch)
2. Have you had dinner? (just)
3. Have you painted your flat? (soon)
4. Have you repaired my bicycle? (just)

7. 	**Використайте was/were going to.**

Example: Did you travel by train? – *No, I was going to travel by train, but I changed my mind.*

1. Did you buy that jacket you saw in the shop window?

No, I ..... but I changed my mind.

2. Did Sue get married?
   No, she ..... but she .....
3. Did Tom resign from his job?
   No,..... ..... but.....
4. Did Wayne and Sharon go to Greece for their holidays?
   No,..... ....
5. Did you play tennis yesterday?
   No,..... ...
6. Did you invite Ann to the party?
   No,.....

8. 	**Напишіть, що трапиться в наступних ситуаціях.**

Example: The sky is full of black clouds, (rain). – *It' s going to rain.....*

1. Terry is doing his examinations tomorrow. He hasn't done any work for them and he is not very intelligent, (fail) He.....
2. It is 8.30. Tom is leaving his house. He has to be at work at 8.45 but the journey takes 30 minutes, (be late) .....
3. There is a hole in the bottom of the boat. It is filling up with water very quickly, (sink). It ....: .....
4. Ann is driving. There is very little petrol left in the tank. The nearest petrol station is a long way away, (run out of petrol) …….

ТЕМА 31:

ГЕОІНФОРМАЦІЙНІ СИСТЕМИ

Заняття 4

РОЛЬ ГЕОІНФОРМАЦІЙНИХ СИСТЕМ В ОСВІТІ

1.		**Прочитайте та перекладіть текст українською мовою**

GEOGRAPHIC INFORMATION SYSTEMS IN EDUCATION

As Geographic Information Systems (GIS) quietly transformed decision making in universities, government agencies, industry, and nonprofit organizations, demand for GIS education has mushroomed. During the 1970s, GIS education, along with the development of GIS software, was proceeding at the Computer Graphics Laboratory at Harvard University in the USA and the Experimental Cartography Unit of the Royal College of Art in the UK. Advanced students and professors learned how to integrate traditional theories about spatial information, computational geometry, and computer science into a set of basic concepts useful for the computer processing of spatial information.

From these beginnings, GIS technology developed more rapidly than the corresponding educational opportunities. Once GIS became a rewarding commercial venture, software vendors established extensive training programs in their own software. During these early years, education about GIS was largely synonymous with professional development, focusing on those who had already completed their formal university education. People learned about GIS to become more familiar with software tools so that they could apply GIS methodology on the job. GIS professional development mirrored the development of GIS itself, beginning with natural sciences in the 1970s, expanding to urban planning and business during the 1980s, and by the 1990s into virtually every major career path.

By 1992, a research base for GIS had been established with strong ties to the disciplines of geography, cartography, geodesy, computer science, and remote sensing. With the maturing of Geographic Information Science (GISc) (Goodchild 1992), education became more complex. People were still interested in learning about GIS applications to address real-world societal issues and problems. However, others developed an educational framework to learn about GISc as a discipline. Others examined GIS education in the framework of research about GISc. Still others sought to use GIS as a tool and method in education, to teach geography, environmental studies, history, and other disciplines.

Today, GIS education is in demand more than ever as spatial tools have become widely available as desktop clients and over the web. The integration of GIS, Global Positioning Systems (GPS), and remote sensing tools into standard office productivity software and in everyday devices such as mobile telephones and in-vehicle navigation systems fuels the demand. This chapter examines the

history and spectrum of GIS education, including the major developments and organizations involved, and opportunities for educating oneself in GIS.

Much GIS education occurs outside of educational institutions in government agencies and private GIS software companies. Inside educational institutions, teaching about GIS dominates at the university level, where courses in methods and theory of GIS are taught. However, it has made considerable inroads in various disciplines across university campuses during the past ten years, and many courses and programs in both IT and the environmental sciences now incorporate GISc concepts and tools. Teaching with GIS began and still dominates at the primary and secondary level, where it is used as an instructional method in established subject content areas. Through such initiatives as the National Institute for Technology in Liberal Education, teaching with GIS is expanding at the university level in history, language, business, and even art.

2. ?	**Дайте відповіді на наступні запитання:**

1. What is the role of GIS in education?
2. What GIS tools have become widely available?
3. What disciplines are connected with GIS?
4. Why are people interested in learning about GIS?
5. How is GIS used in business?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Урядовий орган, некомерційна організація, швидко розповсюджуватися, програмне забезпечення, просторова інформація, обчислювальна геометрія, комп'ютерна обробка, дистанційне дослідження, інтеграція, глобальна навігаційна супутникова система.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. From these beginnings, GIS technology developed more rapidly than the corresponding educational _____.
2. People learned about GIS to become more familiar with _____ so that they could apply GIS methodology on the job.
3. However, others developed an educational _____ to learn about GISc as a discipline.
4. Much GIS education occurs outside of educational institutions in _____ and private GIS software companies.
5. Teaching with GIS began and still _____ at the primary and secondary level, where it is used as an _____ in established subject content areas.

ГРАМАТИЧНІ ВПРАВИ
КОНСТРУКЦІЯ USED TO

5. **Доповніть речення конструкцією used to**

Example: *Dennis doesn't smoke any more but he* ***used to smoke*** *40 cigarettes a day.*

1. The baby doesn't cry so much now but she … every night.
2. She … my best friend but we aren't friends any longer.
3. We live in Nottingham now but we … in Leeds.
4. Now there's only one shop in the village but there … three.
5. When I was a child I … ice-cream, but I don't like it now.
6. Now Tom has got a car. He … a motor-cycle.

6. **Напишіть речення про людину, яка змінила свій стиль життя.**

Ron stopped doing some things and started doing other things:

He stopped:

* Studying hard
* Going to bed early
* Running three miles every morning

He started:

* Smoking
* Going out every evening
* Spending a lot of money

Examples: *He used to study hard.*
He never used to smoke or He didn't use to smoke.

1. .....
2. ……
3. ……..
4. ……

7. **Напишіть речення про теперішні події. Пам'ятайте, що немає теперішньої форми used to.**

Examples: Ron used to study hard but now *he doesn't study very hard*
Ron didn't use to smoke but now *he smokes.*.....

1. Tom used to play tennis a lot but now .....
2. Ann never used to drink coffee but now .....

3. Jill didn’t use to be fat but now .....
4. Jack didn’t use to go out much but now .....

8. 	**Напишіть питання. Mr Ford вже старий чоловік. Ви запитуєте когось про його молодість.**

Example: I know he doesn’t smoke now but *did he use to smoke* ..... ?

1. I know he doesn’t play the piano now but..... ?
2. I know he isn’t very rich now but ..... ?
3. I know he doesn’t go out very often these days but ..... ?
4. I know he doesn’t dance these days but ..... ?
5. I know he hasn’t got many friends now but..... ?

ТЕМА 31:

ГЕОІНФОРМАЦІЙНІ СИСТЕМИ

Заняття 5

ГЕОІНФОРМАЦІЙНІ СИСТЕМИ В МЕРЕЖІ ІНТЕРНЕТ

1. 	**Прочитайте та перекладіть текст українською мовою**

WEB BASED GEOGRAPHIC INFORMATION SYSTEMS

The World Wide Web has brought about major changes in the way Geographic Information Systems (GIS) are used and in the way in which they are implemented. GIS were dominated until the early 2000s by the creation of software technology and geographic data resources dedicated to the needs of professional users of geoinformation. The typical GIS has been an isolated collection of technology and data, purchased for and installed within the confines of an individual organization. The Internet and the World Wide Web were rapidly recognized to have the potential to transform this closed world view of GIS by, for example, "dramatically increasing the applications of GIS through integration of mapping, GIS and non-spatial information technologies to create new forms of representation and new ways to address problems important to society".

As a communication network the Web caters equally to the needs of commerce and industry, and to individual members of the public, irrespective of their personal or work-based affiliations. In the context of GIS these communication facilities are being exploited in several ways. They serve to link together different organizations and parts of the same organization, and also open access to geographic information services and functionality to a wide community of users. GIS are growing therefore from their original organization and project-based roles to meet people's personal needs for geographically-specific information. In doing so, they serve to increase awareness and participation in developments and activities at local and regional levels. From its very beginnings the Web has incorporated spatial information, with an early paper describing the concept of the World Wide Web including the "authors coordinates" as examples of the information which might be served by the, then hypothetical, World Wide Web.

The Web provides access both to text, and other "unstructured" media, and to interactive services for retrieving specialized information or data from online databases. Many types of information are geographically referenced and most services have a geographical dimension, based either on the location of the service itself or on the user of the service. The geographical dimensionality of information has therefore introduced a requirement for aspects of the Web to become spatially-intelligent, in the sense of being able to understand and respond to requests for geographically specific information and in being aware of the location of individuals. Furthermore, the distributed infrastructure of the Internet, on which the

Web is based, can enhance the effectiveness of the traditional in-house GIS. This is reflected in the possibility of world-wide access to geographic data and to remote geographic data processing facilities and in allowing members of an organization to retrieve and maintain geographical information from multiple locations, whether office or field-based.

From the earliest days of the World Wide Web, the facility to display images was exploited to present maps which provide geographical context to information. A very early interactive map server was developed by Xerox Parc and used by many services to display simple web maps. Businesses often use maps on the Web to show their location, while news agencies such as the BBC (http://news.bbc.co.uk/) use maps to help people understand where events are taking place. Websites such as the BBC are constantly being updated, but new items referred to on the home page will often include maps. The simplest types of web map are static, non-interactive images, and this is the norm for these contextual maps. The standard facilities of HTML, the original mark-up language for web documents, can, however, be used to provide some degree of interactivity, whereby the map includes clickable icons, or hot spots, which provide hyperlinks to information about the highlighted location or map symbol.

Tourist maps such as those of Paris (http://www.paris.org/Maps/MM/) and Washington DC (http://maps/mapnetwork.com/wctc/dispmap.asp?map=1) contain such hyperlinks which lead to further web pages containing text and images, and sometimes more maps, relating, for example, to museums and monuments. A variation on the use of clickable hot spots is to provide pull-down menus that allow the user to select some particular type of associated information. This is found on the web map of the London underground transport system (http://www.visitlondon.com/ tubeguru/), in which users can point to stations on a map and select menu items about timetables and associate transport networks.

2. ?	**Дайте відповіді на наступні запитання:**

1. How did World Wide Web influence GIS?
2. What applications of GIS in WWW do you know?
3. What was the first interactive map server?
4. How is GIS used in tourism?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Глобальна мережа зв’язку, технологія програмування, засоби зв’язку, відкритий доступ, інформаційна служба, розвиток, гіпотетичний, інтерактивні види послуг, обладнання, туристична мапа, система підземного транспорту.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. GIS were dominated until the early 2000s by the creation of _____ and geographic data resources.
2. In the context of GIS these _____ are being exploited in several ways.
3. Many types of information are geographically referenced and most services have a _____.
4. From the earliest days of the World Wide Web, the facility to display images was exploited to present maps which provide _____ to information.
5. The simplest types of web map are static, _____, and this is the norm for these contextual maps.

ГРАМАТИЧНІ ВПРАВИ
ENOUGH AND TOO

5. 	**Доповніть речення, використовуючи наступні слова й прислівник *enough.***

big old warm well cups money qualifications room time

1. She can't get married yet, she is not *old enough.*
2. Tom would like to buy a car, but he has not got …….
3. I couldn't make coffee for everybody. There weren't ……
4. Are you ……? Or shall I switch the heating?
5. It's only a small car, there isn't ……. for all of you.
6. George didn't feel to go to work this morning. He is……..
7. I didn't finish the examination. I didn't have ……..
8. Do you think I've got …….. to apply for this job?
9. Try this jacket on and see if it's …… for you.

6. 	**Доповніть речення прислівником *too* або *enough.***

I can't drink this coffee. It's …….
1. Nobody could move the piano. It was ……..
2. I can't wear this coat in winter. It's ……..
3. Don't sit on that chair. It's ……..……
4. Two people can't sleep in this bed. This bed is ……..…….

7. ⇔		**Дайте відповідді на запитання, використовуючи прислівник *too* або *enough.***

1. "Why can't you talk to me now?" – "I'm ……"

2. “Let’s go to the cinema.” - ……
3. “Why don’t we sit in the garden?” – ……
4. “Would you like to be a politician?” - ……..
5. “Are you going on holiday this year?” - ……
6. “Shall we take a photograph?” - ……
7. “Did you hear what he was saying?” - ……..
8. “Does Harry work?” - ……

ТЕМА 31:

ГЕОІНФОРМАЦІЙНІ СИСТЕМИ

Заняття 6

ГЕОІНФОРМАЦІЙНІ СИСТЕМИ – ПЕРЕВАГИ ТА НЕДОЛІКИ

1.		**Прочитайте та перекладіть текст українською мовою**

GEOGRAPHIC INFORMATION SYSTEMS – ADVANTAGES AND DISADVANTAGES

The fundamental ability of GIS compared to any other form of database is that it allows location to be explicitly included as part of the data. This significantly improves our ability to understand the geographical aspects of a research question in three ways: firstly, the ability to structure data using location enhances our ability to explore spatial relationships within or between datasets; secondly, it makes mapping and other forms of visualization far more accessible than they have been traditionally; and thirdly, it provides the ability to perform more formal analyses of the data where the results take into account the importance of location. In short, GIS provides a set of tools that should reinvigorate geographical enquiry by allowing researchers handle the complexity of geographical data. The capability to handle location also allows us to improve our understanding of temporal change by comparing spatial patterns over time.

After a controversial start, GIS has become widely accepted in many areas of geography. Historical geography has been relatively slow to adopt the technology and the approach. A major reason for this is the perception that GIS is a quantitative tool. When it was heavily associated with a quantitative, scientific approach, there were justifications for this suspicion. However, as GIS has developed it is becoming increasingly clear that it can be used with imprecise, qualitative sources. This makes it a far more applicable approach in historical geography as it allows it to be used in both the quantitative and qualitative elements of the discipline.

This is not to say that the use of GIS is problem-free. There are significant costs associated with buying GIS software and learning how to use it. Acquiring data, either by purchasing it or by capturing it yourself, can also be expensive. Even once these building blocks are in place there are still many complexities to be faced. Making appropriate use of Geographical Information to gain understanding of a research question requires intellectual skills as well as the technical skills required to use the software. Maps frequently suggest patterns or relationships but are rarely capable of identifying the processes causing them. On a more conceptual level, using GIS may impose a chronological view of history based on certain types of data that are well suited to its data model. This may be at odds with the approach that many historical geographers like to adopt. It is also important to note

that GIS is not applicable to all forms of research in historical geography, as it requires the data to be modelled in a particular way.

Although in its early stages, there is a growing understanding of the potential for using GIS. It has the capacity to allow researchers to open up new areas of geographical enquiry and to re-open areas where the complexity of data has traditionally hampered progress. A difficulty in the development of GIS in historical geography is that it requires expertise in conducting historical research, expertise in conducting geographical research, and expertise in using spatially referenced data within a GIS environment. At present, few people possess all of these skills. These disciplinary boundaries present significant obstacles to progress, obstacles that this book aims to resolve.

2. ?	**Дайте відповіді на наступні запитання:**

1. What is the fundamental ability of GIS compared to any other form of database?
2. In what areas of geography is GIS accepted?
3. How do you understand the term “quantitative tool”?
4. What are the advantages of GIS?
5. What are the disadvantages of GIS?
6. What is the future of GIS?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

База даних, місце знаходження, просторовий, набір даних, картографія, кількісний метод, науковий підхід, підозра, програмне забезпечення, складові елементи, хронологічний порядок, ранній етап, розуміння, потенціал, історична географія, перешкоди.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. The capability to handle location also allows us to improve our understanding of _____ by comparing spatial patterns over time.
2. After a _____, GIS has become widely accepted in many areas of geography.
3. This is not to say that the use of GIS is _____.
4. Maps frequently suggest patterns or _____ but are rarely capable of _____ the processes causing them.
5. Although in its early stages, there is a growing understanding of the _____ for using GIS.

ГРАМАТИЧНІ ВПРАВИ
QUITE AND RATHER

5. **Перепишіть речення, вживаючи *quite.***

Example: They live in an old house. - *They live in quite an old house*

1. Tom's got a good voice.
2. They bought an expensive camera.
3. It was a nice day.
4. We had to walk a long way.
5. It was a frightening experience.
6. There was a strong wind.
7. You've made a lot of mistakes.
8. I've had a tiring day.

6. **Доповніть речення, вживаючи *quite* або *rather* та слова у дужках.**

1. The weather is ……. but …….. (warm / windy)
2. Jill's flat is …… but …… (clean / untidy)
3. The water in the pool was …… but …… (warm / dirty)
4. The concert was …… but …….. (good / long)
5. The film was ……. but …….. (exciting /frightening)
6. The car goes ……. but it's …… (weel / noisy)
7. He is …….. but he's ……..…… (a hard worker / slow)
8. Jim lives …….. me but it's ……..to get to his house. (near / difficult)
9. Tom' splan was …….. but ……(interesting / complicated)
10. It's …… but it's ……work. (a well-paid job / hard)

7. **Доповніть речення, вживаючи *quite* з одним із слів з таблиці.**

Different amazing impossible right safe sure unnecessary true

1. We didn't believe them at first, but what they said was ……
2. You needn't have done that. It was ……
3. I'm afraid I can't do what you ask. It's ……..
4. I couldn't agree with you more. You are ……
5. You won't fall. The ladder is ……..
6. You can't compare the two things. They are ……..

ТЕМА 32:

ТОПОГЕОДЕЗИЧНЕ ЗАБЕЗПЕЧЕННЯ

Заняття 1

ТОПОГЕОДЕЗИЧНЕ ЗАБЕЗПЕЧЕННЯ

1.		**Прочитайте та перекладіть текст українською мовою**

TOPOGRAPHIC SUPPORT

Computer technology has changed the Army's mapping, data-collection, and battlefield-planning processes. Today's topographic engineer (along with his geographic information system (GIS) tools) is able to represent the terrain and its effects more accurately and faster to help the commander visualize the terrain. The commander's knowledge of the terrain will allow him to obtain a superior advantage in shaping the battle space; it is a key portion of information dominance leading to successful operations.

Topographic Support Personnel. The engineer officer at theater, corps, division, and brigade is the terrain-visualization expert. He is responsible for assisting the commander in visualizing the terrain and its impact on friendly and enemy operations. The process includes identifying and understanding those terrain aspects that the commander can exploit to gain advantage over the enemy as well as those that the enemy will most likely exploit. Terrain visualization is a subjective evaluation of the terrain's physical attributes as well as the physical capabilities of the vehicles, equipment, and people that must cross or occupy the terrain.

The engineer terrain-analysis technician is the terrain-analysis and GIS expert within the Army's force structure. His primary function is to help the commander and his staff in understanding the battle space by assimilating and integrating large volumes of geographic information and transforming it into visualization, information, and knowledge.

The topographic analyst supervises and/or performs cartographic and terrain-analysis duties. He collects and processes military geographic information from sensed imagery, digital data, intelligence data, existing topographic products, and other collateral data sources; edits cartographic and terrain-analysis products; and advises command and staff officers on topographic operations and special map-product planning.

The topographic surveyor conducts precise geodetic surveys to provide control data for a wide range of uses, including precise navigation and artillery fires. The topographic surveyor also supervises topographic or geodetic computations.

The lithographer is the large-volume printing expert. He operates and performs operator maintenance on offset duplicators and presses, copy cameras, platemakers, and various types of bindery and film-processing equipment. He also

supervises and performs all printing and binding, camera operations, layout, and platemaking activities.

The topographic-engineering supervisor supervises topographic surveying, cartography, and lithographic activities and assists in topographic planning and control activities. The topographic-engineering supervisor determines requirements and provides technical supervision of topographic mapping and other military geographic intelligence programs, including geodetic and topographic surveying. He assists in command supervision and coordination of map reproduction and topographic nonstandard-product distribution. He provides staff supervision and principal noncommissioned officer direction to units engaged in performing topographic-engineering missions.

2. ?	**Дайте відповіді на наступні запитання:**

1. Why is important for the commander to visualize the terrain?
2. What is the terrain analysis?
3. What functions does the topographic-engineering supervisor have?
4. What are the responsibilities of the engineer terrain-analysis technician?
5. What are the responsibilities of the topographic analyst?
6. What functions does the lithographer have?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Картографічна зйомка, поле бою, інженер-топограф, геоінформаційна система, оцінка місцевості, візуалізація, технічний спеціаліст із інженерної оцінки місцевості, оператор із топографічного аналізу, цифрові дані, розвідувальні дані, топограф, літограф, старший групи інженерно-топографічних робіт.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. The engineer officer at theater, corps, division, and brigade is the _____ expert.
2. The engineer terrain-analysis technician is the _____ and GIS expert within the Army's force structure.
3. He collects and processes military _____ from sensed imagery, digital data, intelligence data, and existing _____.
4. The topographic surveyor also supervises topographic or _____.
5. The topographic-engineering supervisor supervises _____, cartography, and _____ activities.

ГРАМАТИЧНІ ВПРАВИ
КІЛЬКІСНІ ЗАЙМЕННИКИ MANY/MUCH, LITTLE/FEW

5. 	**Закінчить речення, використовуючи *much, many або a lot (of).***

Examples: There weren't ….***many***….people at the party I had seen before.

1. We'll have to hurry. We haven't got ..... time.
2. Tom drinks ..... milk - one litre a day.
3. She is a very quiet person. She doesn't say.....
4. I put ..... salt in the soup. Perhaps too .....
5. ..... people do not like flying.
6. The man was badly injured in the accident. He lost ..... blood.
7. It's not a very lively town. There isn't ..... to do.
8. This car is expensive to run. It uses ..... petrol.
9. Don't disturb me. I've got ..... work to do.
10. He's got so ..... money, he doesn't know what to do with it.
11. He always puts ..... salt on his food.
12. We didn't take ..... photographs when we were on holiday.

6. 	**Складіть речення, використовуючи зворот plenty (of) або much/many. Звертайте увагу на слова в дужках.**

Example: We needn't hurry. (time) We…'ve got ***plenty of time***

1. He's got no financial problems. (money) He's got
2. We don't need to go to a petrol station. (petrol) We
3. Come and sit at our table. (room) There is
4. We can make omelettes for lunch. (eggs) We
5. We'll easily find somewhere to stay. (hotels) There
6. I can't believe you're still hungry. (to eat) You've had
7. Why are you sitting there doing nothing? (things to do) You

7. 	**Закінчить речення, використовуючи *little / a little / few / a few.***

Example: Hurry! We've got ***....little…*** time.

1. I last saw Tom ..... days ago.
2. We didn't have any money but Tom had .....
3. He doesn't speak much English. Only..... words.
4. Nora's father died..... years ago.

5. “Would you like some more cake?” “Yes, please, but only..... .”
6. This town isn’t very well-known and there isn’t much to see, so ..... tourists come here.
7. I don’t think Jill would be a good teacher. She’s got ..... patience with children.
8. This is not the first time the car has broken down. It has happened ..... times before.
9. The cinema was almost empty. There were very ..... people there.
10. There is a shortage of water because there has been very..... rain recently.

8. **Перекладіть англійською мовою.**

Багато зошитів, багато молока, багато води, багато днів, багато газет, багато крейди, багато снігу, багато кімнат, багато років, багато картин, багато музики, багато хлопчиків, багато роботи.
Мало будинків, мало вікон, мало паперу, мало іграшок, мало світла, мало ковбаси, мало соку, мало друзів, мало солі, мало дерев, мало палаців, мало дітей, мало кави.

ТЕМА 32:

ТОПОГЕОДЕЗИЧНЕ ЗАБЕЗПЕЧЕННЯ

Заняття 2

ТОПОГЕОДЕЗИЧНА РОЗВІДКА

1. 	**Прочитайте та перекладіть текст українською мовою**

TOPOGRAPHIC OPERATIONS

Topographic operations include terrain analysis, geodetic survey, production and reproduction, database management, and exploitation. While each function provides information about the battle space's physical characteristics, the focus of topographic operations is on terrain analysis and the presentation of its results to the commander. Rapid analyses of terrain factors and environmental effects are essential for deploying advanced weapon systems effectively, visualizing the battle space, targeting, planning air and ground missions, and countering enemy weapons and intelligence-collection capabilities. Terrain database management is evolving as another critical GIS mission. Database management incorporates the collection, production, and dissemination of GI.

Terrain analysis is the study of the terrain's properties and how they change over time, with use, and under varying weather conditions. Terrain analysis starts with the collection, verification, processing, revision and, in some cases, actual construction of source data. It requires the analysis of climatology (current and forecasted weather conditions), soil conditions, and enemy or friendly vehicle performance metrics. In short, it turns raw data into usable information. Terrain analysis is a technical process and requires the expertise of terrain-analysis technicians and topographic analysts.

Surveyors determine horizontal and vertical distances between objects, measure angles between lines, determine the direction of lines, and establish points of predetermined angular and linear measurements. After completing field measurements, surveyors use these measurements to compute a final report that is used for positioning by field artillery, air-defense artillery, aviation, intelligence, communications, or construction control points. The National Imagery and Mapping Agency's (NIMA's) geodetic survey division maintains US Army topographic surveyors as part of their survey force structure. These surveyors are involved as team leaders, as team members, and in the data-reduction process. NIMA has the responsibility to provide earth-orientation data for the NAVSTAR GPS. NIMA provides correlated WGS airfield surveys and geographical and aeronautical database information that are needed to support the aviation approach requirements. During times of conflict, Army topographic surveyors may be required to collect data to enable NIMA to better formulate these transformation parameters.

2. ?	**Дайте відповіді на наступні запитання:**

1. What do topographic operations include?
2. What is the terrain analysis?
3. What is the function of surveyor?
4. What are the responsibilities of NIMA?
5. What is NAVSTAR GPS?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Оцінка місцевості, геодезична зйомка, керування базами даних, аналіз і розшифрування, фактор місцевості, вплив навколишнього середовища, система озброєння, збір розвідувальних даних, погодні умови, контрольна перевірочна зйомка, кліматологія, прилад для топогеодезичного прив'язування, польова артилерія, глобальна система навігації і визначення місцезнаходження.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. _____ include terrain analysis, geodetic survey, production and reproduction.
2. _____ incorporates the collection, production, and dissemination of GI.
3. Terrain analysis starts with the collection, _____, processing, _____ and, in some cases, actual _____ of source data.
4. Surveyors determine _____ and _____ distances between objects, measure _____ between lines, determine the direction of lines.
5. After completing _____, surveyors use these measurements to compute a _____ that is used for positioning by field artillery.

ГРАМАТИЧНІ ВПРАВИ
КОНСТРУКЦІЇ AS … AS, NOT SO … AS

5. 	**Перекладіть речення українською мовою.**

1. English is as difficult as German. 2. My composition is not as long as yours, 3. It isn't as warm today as it was yesterday. 4. The house his aunt lives in is as old as the one his uncle lives in. 5. His apartment isn't as elegant as her apartment, but it's much bigger. 6. Johnny isn't as rich as Don but he is younger and much happier. 7. My dog isn't as friendly as your dog. 8. You can eat as much as you like. 9. A football match isn't as exciting as a hockey match. 10. The hotel isn't as cheap as

we expected. 11. His songs aren't as popular as the Beatles' songs. 12. Her brother is as intelligent as his wife.

6. **Вставте *as* або *than***

Example: Athens is older than Rome

1. I don't watch TV as much … you.
2. You eat more … me.
3. I feel better … I felt yesterday.
4. Jim isn't as clever … he thinks.
5. Belgium is smaller … Switzerland.
6. Brazil isn't as big … Canada.
7. I can't wait longer … an hour.

7. **Перекладіть речення англійською мовою.**

1. Він не такий стомлений, як вона. 2. Вправа друга така ж важка, як і вправа третя. 3. Вона думає, що бокс такий же небезпечний вид спорту, як і боротьба. 4. Цей будинок такий же високий, як і той. 5. Сьогодні вода в річці не така тепла, як учора. 6. Ти не такий розумний, як тато. 7. Індія не така велика, як Китай. 8. Темза така ж красива, як Нева. 9. Його бабуся не така стара, як дідусь. 10. Яблука такі ж смачні, як сливи, але не такі смачні, як груші. 11. Російський музей такий же багатий, як Ермітаж? 12. Державін не такий знаменитий, як Пушкін. 13. Дніпро не такий великий, як Волга. 14. Минулого року серпень був такий же спекотний, як і липень. 15. Він не такий старий, як я. 16. Вона така ж щедра, як і її бабуся. 17. Його машина така ж зручна (комфортабельна), як і твоя. 18. Екзамен був не таким важким, як ми очікували. 19. Він такий же сильний, як його брат.

8. **Напишіть речення з *as … as …***

Example: Flats are more expensive than houses.....
Houses are not as expensive as flats

1. Athens is older than Rome.
2. My room is bigger than yours.
3. You go up earlier than me.
4. We played better than they.
5. I've been here longer than you.

ТЕМА 32:

ТОПОГЕОДЕЗИЧНЕ ЗАБЕЗПЕЧЕННЯ

Заняття 3

МЕТОДИ ТОПОГРАФІЧНОЇ ЗЙОМКИ

1. 	**Прочитайте та перекладіть текст українською мовою**

SURVEY METHODS

Conventional Survey. Topographic surveyors use theodolites, levels, and distance measuring equipment (DME). Automated integrated survey instrument (AISI) provides topographic surveyors with the capability to extend control through the use of a total station.

GPS Survey. The NAVSTAR GPS is capable of determining accurate positional, velocity, and timing information. Absolute and differential (relative) positioning methods using the GPS provide accurate and timely positional data. The method of choice depends on the accuracy required, the equipment available, and the logistical requirements. The positioning methods are described as follows:

- Absolute positioning. Absolute positioning uses a single GPS receiver and does not require known survey control. Absolute positions can provide instantaneous (real-time) or postprocessed positions. Known survey control is unreliable or nonexistent in immature theaters. Topographic surveyors can establish standard positioning services (SCP) by using absolute positioning.

- Differential positioning. Differential positioning uses two or more GPS receivers. One GPS receiver (reference receiver) is resident over a known SCP. The remaining receivers (remote receivers) are used to position points of interest. Differential positioning can be performed in real time or through postprocessing. If real-time positioning results are required, a communications link that is capable of transmitting digital data must be established at the reference- and remote-receiver locations. This method supports distances up to 100 kilometers between the reference and remote stations. The engineer battalions (topographic) within the Army have precise positioning service (PPS) GPS receivers that are capable of real-time and postprocessed differential positioning and provide relative accuracy of approximately 1 centimeter.

2. ?	**Дайте відповіді на наступні запитання:**

1. What survey methods do you know?
2. What does AISI provide?
3. What is the function of GPS Survey?
4. What positioning methods do you know?
5. What is difference between the absolute and differential positioning?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Топограф, звичайна зйомка, аерокосмічна зйомка, теодоліт, автоматичний інтегрований геодезичний прилад, тахеометр, точні позиційні, швидкісні та часові дані, абсолютне визначення місцезнаходження, топогеодезична опорна мережа.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. Automated integrated survey instrument (AISI) provides _____ with the capability to extend control through the use of a _____.
2. The method of choice depends on the _____ required, the equipment available, and the _____.
3. Absolute positions can provide _____ (real-time) or _____ positions.
4. Topographic surveyors can establish _____ by using absolute positioning.
5. _____ can be performed in real time or through postprocessing.

ГРАМАТИЧНІ ВПРАВИ
СПОЛУЧЕННЯ BOTH/BOTH OF, NEITHER/NEITHER OF, EITHER/EITHER OF

5. 	**Напишіть речення з *both ... and ..., neither ... nor ...* та *either ... or ...***

Examples: Tom was late. So was Ann. ***Both Tom and Ann were late.***
He didn't write. He didn't telephone***. He neither wrote nor telephoned.***

1. The hotel wasn't clean. And it wasn't comfortable.
   The hotel was .....
2. It was a very boring film. It was very long too.
   The film was .....
3. Is that man's name Richard? Or is it Robert? It's one of the two.
   That man's name ....., ...
4. I haven't got the time to go on holiday. And I haven't got the money.
   I've got .....
5. We can leave today or we can leave tomorrow - whichever you prefer.
   We.....
1. He gave up his job because he needed a change. Also because the pay was low.
   He gave up his job both……

7. George doesn't smoke. And he doesn't drink……
8. The front of the house needs painting. The back needs painting too……

6. 	**Доповніть речення словами both/neither/either. Іноді треба вживати of.**

Examples: There are two windows in my room. ***It was very warm so I had both of them open.***
'Do you want tea or coffee?' ***'Either. I really don't mind.'***

1. After the accident … cars stopped … drivers got out and started shouting at each other. … them were very aggressive.
2. It wasn't a very good football match. … team played well.
3. A: Which of the two films did you prefer? The first one or the second one?
   B: Actually I didn't like … them.
4. There are two ways to the city centre. You can go along the footpath by the river or you can go along the main road. You can go … way.
5. … these pullovers are very nice. I don't know which one to buy.

7. 	**Напишіть речення зі словами *both/neither/either*. Іноді треба вживати *of*.**

1. … my parents is English. My father is Polish and my mother is Italian.
2. 'Do you mind which sandwich I take?' 'No, take ….'
3. 'Is today the 18th or the 19th?" …. It's the 20th.'
4. Tom and I hadn't eaten foe a long time, so … us were very hungry.
5. When the boat started to sink, we were really frightened because …
6. us could swim.
7. A: Did you go to Scotland or Ireland for your holidays?
8. B: We went to …. A week in Scotland and a week in Ireland".

ТЕМА 32:

ТОПОГЕОДЕЗИЧНЕ ЗАБЕЗПЕЧЕННЯ

Заняття 4

КЛАСИФІКАЦІЯ ТОПОГЕОДЕЗИЧНОЇ РОЗВІДКИ

1. 	**Прочитайте та перекладіть текст українською мовою**

SURVEY CLASSIFICATION

Topographic surveyors are capable of conducting and supporting a wide variety of surveys. Surveys are classified as follows: artillery; basic control; satellite; construction; airfield engineering and NAVAID; hydrographic; field classification and inspection; land; inertial.

Artillery Surveys. Artillery surveys are conducted to determine the relative positions of weapons systems to targets. These surveys do not require the accuracy of geodetic-surveying techniques despite the relatively large areas and long distances. ADA weapon systems require accuracies that are obtainable only from geodetic-surveying techniques.

Basic-Control Surveys. Basic-control surveys provide horizontal and/or vertical positions of points. Supplementary surveys may originate from and can be adjusted to these surveys. The basic-control survey of the US provides geographic positions and plane coordinates of triangulation/traverse stations and the elevations or benchmarks. This information is used as the basis for the control of the US national topographic survey; the control of many state, city, and private surveys; and hydrographic surveys of coastal waters.

Satellite Surveys. Satellite surveys determine high-accuracy, three-dimensional (3D) point positions from signals received by NAVSTAR GPS satellites. GPS-derived positions may be used to provide primary reference-control monument locations for engineering and construction projects from which detailed site plans, topographic mapping, boundary demarcation, and construction-alignment work may be performed using conventional-surveying instruments and techniques.

Construction Surveys. Construction surveys provide data for planning and cost estimating. This data is essential to locate or lay out engineering works and is recorded on engineer maps. Plane surveys are normally used for construction projects.

Airfield-Engineering and NAVAID Surveys. Airfield-engineering and NAVAID surveys are used to determine any combination of the following: the location of obstacles within 10 nautical miles of an airfield center; the dimensions of runways and taxiways, the height of flight towers, and NAVAIDs; the safe approach angles to runways and the minimum, safe glide angle; the elevation of the barometer on an airfield; the positions and azimuths of points designated for internal navigation system (INS) checkpoints.

Hydrographic Surveys. Hydrographic surveys are made on large bodies of water to determine channel depths for navigation and the location of rocks, sandbars, lights, and buoys. In rivers, these surveys are made to support flood-control projects, power development, navigation, water supplies, and water storage.

Land Surveys. Land surveys are used to locate the boundaries and areas of tracts of land. These surveys may be done on a city, county, state, national, or international level.

2. ?	**Дайте відповіді на наступні запитання:**

1. What types of surveys do you know?
2. For what purposes can be used the satellite surveys?
3. What do Basic-Control Surveys provide?
4. What do Satellite Surveys determine?
5. What are Construction Surveys used for?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Топограф, топогеодезичне прив'язування артилерії, топогеодезична зйомка по мережі опорних точок, топогеодезична зйомка за допомогою супутника, топогеодезична зйомка для інженерних цілей, інженерно-аеродромна та навігаційна зйомка, гідрографічна розвідка, цифрова карта, дані розвідки місцевості.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. ADA weapon systems require accuracies that are obtainable only from _____ techniques.
2. This information is used as the basis for the control of the US _____.
3. _____ provide data for planning and cost estimating.
4. _____ are made on large bodies of water to determine channel depths for navigation.
5. _____ are used to locate the boundaries and areas of tracts of land.

ГРАМАТИЧНІ ВПРАВИ
СПОЛУЧЕННЯ A LITTLE/A FEW

5.  **Вставте *a little, a few*. Перекладіть українською мовою.**

This is my mother's favorite recipe for fruitcake, and everybody says it's out of this world!
Put 3 cups of flour into a mixing bowl.
Add ... sugar.
Slice ... apples.
Cut up ... oranges.
Pour in ... honey.
Add ... baking soda.
Chop up ... nuts.
Add ... salt.
Mix in ... raisins.
Bake for 45 minutes.
Enjoy, dear!

6.  **Вставте little, a little, few або a few.**

1. There is ... salad left in this bowl. 2. Would you like ... salad? — Yes, thank you. My doctor says it's good for my health. 3. I have ... money, so we can go to the cinema. 4. I have ... money, so we cannot go to the cinema. 5. This girl works very ... , that's why she knows nothing. 6. Mother gave us ... apples, and we were glad. 7. He did not like it at the camp: he had very ... friends there. 8. This lemon drink is sour; if you put ... sugar in it, it will be sweeter. 9. This lemon drink is sour; if you put ... lumps of sugar in it, it will be sweeter. 10. The hall was almost empty: there were very ... people in it. 11. I can't buy this expensive hat today: I have too ... money. 12. She left and returned in ... minutes. 13. I think you can spare me ... time now. 14. I am sorry I have seen ... plays by this author.

7.  **Вставте *much, many, little, few, a little* або *a few*. Перекладіть українською мовою.**

1. When we walked ... farther down the road, we met another group of students. 2. Have you got ... ink in your pen? 3. At the conference we met... people whom we knew well. 4. There are very ... old houses left in our street. Most of them have already been pulled down. 5. If you have ... spare time, look through this book. You will find ... stories there which are rather interesting. 6. There are ... things here which I cannot understand. 7. Shall I bring ... more chalk? — No, thank you. There is ... chalk on the desk. I hope that will be enough for our lesson.

8. He had ... English books at home, so he had to go to the library for more books.

8. 	**Вставте *much, many, little, few, a little* або *a few*. Перекладіть українською мовою.**

1. She gave him ... water to wash his hands and face.
2. I'd like to say ... words about my journey.
3. After the play everybody felt... tired.
4. Let's stay here ... longer: it is such a nice place.
5. There were ... new words in the text, and Peter spent ... time learning them.
6. There was ... hay in the barn, and the children could not play there.
7. There was ... water in the river, and they decided to cross it.
8. My mother knows German ... and she can help you with the translation of this letter.

ТЕМА 32:

ТОПОГЕОДЕЗИЧНЕ ЗАБЕЗПЕЧЕННЯ

Заняття 5

ТОПОГРАФІЧНІ БАЗИ ДАНИХ

1. 	**Прочитайте та перекладіть текст українською мовою**

DATABASE MANAGEMENT

Topographic units must be prepared to create databases rapidly to support current and contingency operations. Topographic units can digitally acquire and share standard geospatial information (GI) data for these operations. However, the primary responsibility for collecting and processing the database rests with the theater and corps topographic companies. Database development and maintenance is an ongoing process. This important function of the engineer terrain-analysis detachment is detailed to the data-management element. The data-management element of the division's terrain detachment acquires terrain data, digital maps, and other topographic information from all sources, both above and below division. The initial division topographic database may be acquired and built using data from the corps topographic company and other national or Army agency data sources during predeployment operations.

Topographic Database Development

The majority of topographic-database development begins during an operation's predeployment phase. During this phase, the topographic engineer's primary mission is gaining maximum knowledge of the potential AO and AOI. This database provides the basic reference for the production of special-purpose GI to support the tactical commander's planning requirements. Enrichment data retrieved from tactical units is normally provided via verbal or digital reports or imagery to the supported maneuver unit's tactical operations center (TOC). At the brigade-level TOC, the brigade engineer or topographic analyst receives this information. Decisions regarding data validity lie with the ADE; quality assurance lies with the G2. Once decisions are made about data validity or quality, the database manager will then update the master database and pass the updated data to the next highest level for inclusion to its master database.

2. ?	**Дайте відповіді на наступні запитання:**

1. Why do topographic units have to create topographic databases?
2. What elements do involve in the enrichment of topographic data?
3. Who is responsible for taking decision regarding data validity?
4. What is the mission of data-management element?
5. What is the process of topographic-database development?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Топографічна частина, база даних, геопросторова інформація, постійний процес, оцінка місцевості, цифрова мапа, інженер-топограф, командир бойової частини, бригада, аналітик, достовірність даних, забезпечення якості, адміністратор баз даних, інженерна оцінка місцевості, відділення керування базами даних, пункт/центр керування бойовими діями.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. Topographic units can digitally acquire and share standard _____ data for these operations.
2. This important function of the engineer _____ is detailed to the data-management element.
3. The majority of _____ development begins during an operation's predeployment phase.
4. During this phase, the _____ primary mission is gaining maximum knowledge of the potential AO and AOI.
5. Once decisions are made about _____ or quality, the database manager will then update the master database and pass the updated data to the next highest level for _____ to its master database.

ГРАМАТИЧНІ ВПРАВИ
ЗВОРОТНІ ЗАЙМЕННИКИ

5. 	**Перекладіть речення українською мовою.**

1. Much more than most politicians Cave knew himself. (Snow) 2. Meanwhile, he paraded himself gloriously before this young man. (Priestley) 3. Of course, I myself used to be very wealthy... (Clark) 4. He was not doubting the logic, he realized suddenly; what he was doubting was himself. (Jones) 5. Still, he must be thankful that she had been too young to do anything in that war itself. (Galsworthy) 6. Simon calmed himself with an effort. (Sheckley) 7. But you might remember that one respects oneself more afterwards if one pays one's way. (Galsworthy) 8. Miss Adele Gerry opened the door herself. (I. Shaw) 9. He sunned himself in Chanton's admiring gaze. (Priestley) 10. What was the use even of loving, if love itself had to yield to death? (Galsworthy) 11. This is where we wash ourselves, Eliza, and where I am going to wash you. (Shaw) 12. Gevaert cleared his throat and addressed himself to me. (Clark) 13. They blamed themselves for this unlucky marriage. (Hardy) 14. The theatre manager himself came to shake hands with them. (Priestley) 15. I have made myself perfectly pleasant here. (Shaw) 16. Several times he reminded himself that he had not rung up Shuckleworth yet.

(Priestley) 17. He could talk races with Hurstwood, tell interesting incidents concerning himself. (Dreiser) 18. I want to be kept in constant touch with his progress myself. (Clark) 19. Anne's terror of being discovered in London or its neighbourhood, whenever they ventured to walk out, had gradually communicated itself to Mrs. Clements. (Collins) 20. Soames added: "Well, I hope, you'll both enjoy yourselves" (Galsworthy) 21. Cave might have concealed from others, but not from himself, that he profoundly envied Roger. (Snow)

6. 	**Закінчіть речення, використовуючи зворотні займенники з наступними словами.**

kick teach cut lock look after hurt bum talk to blame

Example: Tom ...***cut himself***… while he was shaving this morning.

1. Be careful! That pan is very hot. Don't.....
2. They couldn't get back into the house. They had…….out.
3. It isn't her fault. She really shouldn't.....
4. What a stupid fool I am! I could.....!
5. The boy was lucky when he fell down the stairs. He didn't……..
6. I'm trying to.....Spanish but I'm not making much progress.
7. He spends most of his time alone, so it's not surprising that he .....
8. Don't worry about us. We can.....

7. 	**Закінчіть речення, використовуючи ці дієслова. Використовуйте зворотні займенники якщо потрібно.**

dry concentrate feel enjoy relax wash shave meet

Example: Tom is growing a beard because he doesn't ...***shave***...

1. I really.....well today - much better than yesterday.
2. He climbed out of the pool, picked up a towel and.....
3. I tried to study but I just couldn't.....
4. Jack and I first.....at a party five years ago.
5. You're always rushing about. Why don't you ..... more?
6. It was a lovely holiday. We really.....very much.
7. I overslept this morning. I didn't have time to.....or have breakfast.

8. 	**Вставте *-selves* або *each other*.**

Examples: Tom and Ann stood in front of the mirror and looked at …***themselves***...
How long have Tom and Ann known …***each other***…?

1. At Christmas friends often give.....presents.
2. Did the children enjoy.....when they were on holiday?
3. Jack and Jill are very happy together. They love.....very much.
4. They had an argument last week. They are still not speaking to .....
5. Some people are very selfish. They only think of .....
6. Nora and I don't see.....very often these days.

9. 	**Дайте відповіді на запитання, використовуючи зворотні займенники з наступними словами.**

Example: "Who repaired the bicycle for you?" "Nobody. I …***repaired it myself***."

1. "Who cut your hair for you?" "Nobody. I cut....."
2. "Who told you Linda was getting married?" "Linda....."
3. "Does Mr Thomas have a secretary to type his letters?" "No, he....."
4. "Do you want me to post that letter for you?" "No, I'll....."
5. "Can you clean the windows for me?" "Why don't you.....?"

ТЕМА 32:

ТОПОГЕОДЕЗИЧНЕ ЗАБЕЗПЕЧЕННЯ

Заняття 6

ТОПОГРАФІЧНІ КАРТИ

1. 	**Прочитайте та перекладіть текст українською мовою**

TOPOGRAPHIC MAPS

A map is a graphic representation of a portion of the earth's surface drawn to scale, as seen from above. It uses topographic map symbols, and labels to represent features found on the ground. It is impossible to plot every feature of the area in true shape. An attempt to plot each feature true to scale would result in a product impossible to read even with the aid of a magnifying glass. A map indicates variations in terrain, heights of natural shape and linear features, and the extent of vegetation cover. A map provides information on the existence, the location of, and the distance between urban area and routes of travel and communication. Map requisitions and distributions are accomplished through the Defense Mapping Agency.

To be understandable, features must be represented by conventional signs and symbols. To be legible, many of these must be exaggerated in size often far beyond the actual ground limits of the feature represented.

Elevation and Relief

The elevation of points on the ground and the relief of an area affect the movement and positioning of military units. Relief is the representation of the shapes of hills, valleys, streams, or terrain features on the earth's surface. Mapmakers use several methods to depict relief of the terrain. Layer tinting is a method of showing relief by color. Hachures are short, broken lines used to show relief. Relief shading indicates relief by a shadow effect achieved by tone and color. A contour line is an imaginary line on the ground, above or below mean sea level which represents vertical positions or relief. The elevations and contours are measured from a specific vertical datum plane.

Scale

The scale is expressed as a fraction and gives the ratio of map distance to ground distance. The numerical scale of a map indicates the relationship of distance measured on a map and the corresponding distance on the ground. This scale is usually written as a fraction and is called the representative fraction.

According to the Defense Mapping Agency maps are classified by scale into three categories. They're small, medium, and large-scale maps. The terms small scale, medium scale and large scale may be confusing when read in conjunction with the numbers. However, if the number is viewed as a fraction, it quickly becomes apparent that 1:600,000 of something is smaller than 1:75,000 of the same thing. These maps with scales of 1:75,000 and larger are used for tactical,

administrative, and logistical planning. The standard small scale map is 1:1,000,000. This scale map covers a very large ground area, so mapmaker has hardly any room for details. Medium maps are used for planning operations, including the movement and concentration of troops and combat vehicles. The standard large scale map is 1:50,000. A graphic scale is a ruler printed on the map and is used to convert distances on the map to actual ground distances. On a 1:250,000 scale map, the prescribed symbol for a building covers an area about 500 feet square on the ground; a road symbol is equivalent to a road about 520 feet wide on the ground; the symbol for a single-track railroad is equivalent to a railroad cross-tie about 1,000 feet on the ground.

Types

The map of choice for land navigation is the 1:50,000-scale military topographic map. All maps are subdivided by types. Planimetric map is a map that presents only the horizontal positions for the features represented. Sometimes, it is called a line map. It is distinguished from a topographic map by the omission of relief, normally represented by contour lines. Photomap is a reproduction of an aerial photograph upon which grid lines, marginal data, route numbers, and approximate scale and direction have been added. Photomosaic is an assembly of aerial photographs, when time does not permit the compilation of a more accurate map.

Terrain model provides a means for visualizing the terrain for planning and for briefing on assault landing. Military city map is a topographic map showing urban elements of military importance that are compatible with the scale of map. A special purpose map has been designed to give information not covered on a standard map. Some of the subjects covered are: terrain features, drainage characteristics, vegetation, coasts and landing beaches, urban areas, cross-country movements.

2. ?	**Дайте відповіді на наступні запитання:**

1. What is a map?
2. How is a map made to represent features found on the ground?
3. What methods do mapmakers use to depict relief of the terrain?
4. What is the classification of maps by scale?
5. What types of maps facilitate the land navigation?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Поверхня землі, масштаб, картографічне управління МО США, вихідний рівень висоти, середній рівень моря, орієнтування на місцевості, планіметрична карта, контурна карта, топографічна карта, фотокарта, лінія координатної сітки, зарамкове оформлення, військово-топографічна карта міста, спеціальна карта.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. _____ is a graphic representation of a portion of the earth's _____ drawn to scale, as seen from above.
2. A map indicates variations in terrain, heights of natural shape and linear features, and the extent of _____.
3. Map requisitions and distributions are accomplished through the _____.
4. The _____ is expressed as a fraction and gives the ratio of _____ to ground distance.
5. _____ is a map that presents only the horizontal positions for the features represented.

ГРАМАТИЧНІ ВПРАВИ
ЧИСЛІВНИК. КІЛЬКІСНІ ТА ПОРЯДКОВІ ЧИСЛІВНИКИ

5. 	**Прочитайте англійською мовою.**

a) 1956р., 1945р., 1917р., 1905р., 1900р., 1812р., 2000р., 1799р., 1242р., 1066р., 1848р., 1871р., 2010р., 1725р., 1147р., 1612р., 2011р., 2113р., 1496р., 1564р.;
b) 27.01.1980р., 4.02.1936р., 11.03.1908р., 1.04.1981р., 29.05.1949р., 13.06.1946р., 15.07.1976р., 12.08.1967р., 4.04.1954р., 28.10.1965р., 5.11.1943р., 3.12.1928р.

6. 	**Напишіть словами наступні кількісні числівники:**

9, 11, 13, 24, 67, 22, 90, 34, 43, 51, 77, 33, 12, 66, 28, 41, 14, 50, 99, 65, 67, 57, 75, 89, 44, 100;
112, 176, 235, 507, 198, 413, 803, 369, 555, 643, 290, 542, 789, 901,721, 409, 543, 303, 438, 888;
1112, 5098, 6666, 2098, 5975, 4328, 9856, 1876, 9089, 3003, 2067, 7000, 6490, 4309, 8800, 5540, 2870, 9000.

7. 	**Перекладіть такі словосполучення з порядковими числівниками:**

друга вправа, тринадцятий поверх, двадцять шоста сторінка, п'яте питання, одинадцятий місяць, сорок другий день, третя версія, триста тридцять шоста кімната, восьмий тиждень, сорок перший урок, четверта лікарня, сімнадцятий текст, вісімдесят восьмий параграф.

8.  **Дайте відповіді на запитання:**

1. How many lessons do you have today?
2. How many students are there in your group?
3. How many pages did you read yesterday?
4. How many days are there in a year?
5. How much money do you have now?
6. How many theatres are there in your city?
7. How many seasons are there in a year?
8. How many members are there in your family?
9. How many countries did you visit last year?
10. How many rooms are there in your flat?
11. How many exams did you have last winter?
12. How old is your father?
13. How many computers are there in the classroom?
14. How many flats are there in that big house?
15. How many friends have you got?

9.  **Перекладіть наступні речення англійською мовою:**

1. Коли народився Пушкін? – Пушкін народився в 1799 році.
2. Коли народився Толстой? – Толстой народився в 1828 році.
3. Коли народився Ломоносов? – Ломоносов народився в 1711 році.
4. Коли народився Свіфт? – Свіфт народився в 1667 році.
5. Коли народився Чосер? – Чосер народився в 1340 році.
6. Коли народився Шекспір? – Шекспір народився в 1564 році.

ТЕМА 33

ПОЛЬОВЕ ТОПОГЕОДЕЗИЧНЕ ОБЛАДНАННЯ

Заняття 1

ПОЛЬОВЕ ТОПОГЕОДЕЗИЧНЕ ОБЛАДНАННЯ

1. 	**Прочитайте та перекладіть текст українською мовою**

SURVEY EQUIPMENT

Surveyors determine horizontal and vertical distances between objects, measure angles between lines, determine the direction of lines, and establish points of predetermined angular and linear measurements. After completing field measurements, surveyors use these measurements to compute a final report that is used for positioning by field artillery, air-defense artillery, aviation, intelligence, communications, or construction control points.

Conventional Survey Equipment. Topographic surveyors have theodolites, levels, and EDME within their inventory. The automated integrated survey instrument AISI provides topographic surveyors with the capability to extend control in a timelier and more efficient manner. The AISI is a total station that combines angular, distance, and vertical measurements into a single electronic instrument that is designed to digitally record and transfer data into a personal computer.

NAVSTAR GPS. The NAVSTAR GPS is capable of determining accurate positional, velocity, and timing information. The precise positioning system PPS consists of military users and authorized representatives. A PPS user can obtain high-accuracy instantaneous positioning if the receiver is capable of accepting the necessary cryptologic variables. When two or more receivers are used, it is called differential global-positioning system DGPS surveying. The error values are determined and removed from the survey either by real-time processing or postprocessing of the data.

Computer Information Systems. Surveying has become a digital science. Modern survey systems work with software specifically designed to process field data, perform computations, and produce a precise product, whether it is a GPS network, a digital database, or computer-aided design and drafting CADD. GPS-survey computations require a PC to process large amounts of mathematical variables. Topographic surveyors are equipped with common GPS hardware and software.

2. ?	**Дайте відповіді на наступні запитання:**

1. What survey equipment do you know?
2. What is AISI designed to?
3. What is NAVSTAR GPS used for?

4. What Computer Information Systems in surveying do you know?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Польове топогеодезичне обладнання, теодоліт, електронне далекомірне обладнання, автоматичний комплексний геодезичний прилад, електронний автоматичний тахеометр, глобальна система космічної навігації "НАВСТАР", служба визначення точного місцезнаходження, диференційна глобальна система визначення місцезнаходження.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. Surveyors determine _____ and _____ distances between objects, measure angles between lines, determine the _____ of lines.
2. The AISI is a _____ that combines angular, distance, and vertical measurements.
3. The _____ consists of military users and authorized representatives.
4. When two or more receivers are used, it is called _____ surveying.
5. GPS-survey computations require a _____ to process large amounts of mathematical variables.

ГРАМАТИЧНІ ВПРАВИ
ФРАЗОВІ ДІЄСЛОВА

5. 	**Знайдіть фразові дієслова в реченнях. Перекладіть речення.**

1. Sue was so busy she stayed up all night to finish her work.
2. Laurence is so rude. How can you put up with him?
3. He took up skiing when he was 4. He was a champion at 16.
4. I'm like my mother, but my sister Sarah takes after our father.
5. If we start out now, we'll be there by nine o'clock.
6. Hurry up! I don't want to be late.
7. Could you find out what time the train leaves, please?
8. The soldiers carried out a dangerous raid.
9. If you are hot, take off your coat.

6. 	**Розподіліть фразові дієслова з першої вправи по категоріям.**

Verb + particle	Verb + particle + obj	Three part Verbs
She stayed up.	***He took up skiing.***	***How can you put up with him?***
……	……	……
……	……	……
……	……	……
……	……	……
……	……	……

7. 	**Доповніть речення, використовуючи фразові дієслова з таблиці.**

got by; grew up; stay up; watch out; hold on; play around

1. My parents …… in Bulgaria, but they went to live in London when they were married.
2. They broke the window when they were …… with a football.
3. Last night we …… to watch the late film on TV.
4. “Can you speak Chinese?” “No, when we were there we …… with a few words and some sign language!”
5. “Can I speak to Paul, please?” “……, I’ll just go and get him.”
6. ……! Don’t touch the paint, it’s wet!

8. 	**Перепишіть речення, замінюючи виділені дієслова одним з наведених фразових дієслів.**

keep on; find out; got away; bumped into

1. The police followed the robbers, but they **escaped**.

……

2. I’m trying to **discover** whose car this is.

……

3. Most of the students said they wanted to **continue** studying.

……

4. I **met** an old friend on the ferry. What a surprise!

……

ТЕМА 33

ПОЛЬОВЕ ТОПОГЕОДЕЗИЧНЕ ОБЛАДНАННЯ

Заняття 2

ТЕОДОЛІТ

1. 	**Прочитайте та перекладіть текст українською мовою**

THEODOLITE

A theodolite is a precision instrument for measuring angles in the horizontal and vertical planes. Theodolites are used mainly for surveying applications, and have been adapted for specialized purposes in fields like metrology and rocket launch technology. A modern theodolite consists of a movable telescope mounted within two perpendicular axes – the horizontal or trunnion axis, and the vertical axis. When the telescope is pointed at a target object, the angle of each of these axes can be measured with great precision, typically to seconds of arc.

Theodolites, such as the Brunton Pocket Transit commonly employed for field measurements by geologists and archaeologists, have been in continuous use since 1894.

Theodolites may be either transit or non-transit. Transit theodolites (or just 'Transits') are those in which the telescope can rotate in a complete circle in the vertical plane Non-transit theodolites are those in which the telescope can rotate only in a semicircle in the vertical plane. Some types of transit theodolites do not allow the measurement of vertical angles.

Concept of operation

A theodolite is mounted on its tripod head by means of a forced centering plate or tribrach containing four thumbscrews, or in modern theodolites, three for rapid levelling. Before use, a theodolite must be precisely placed vertical above the point to be measured using a plumb bob, optical plummet or laser plummet. The instrument is then set level using levelling footscrews and circular and more precise tubular spirit bubbles.

Both axes of a theodolite are equipped with graduated circles that can be read through magnifying lenses. (R. Anders helped M. Denham discover this technology in 1864) The vertical circle which 'transits' about the horizontal axis should read 90° (100 grad) when the sight axis is horizontal, or 270° (300 grad) when the instrument is in its second position, that is, "turned over" or "plunged". Half of the difference between the two positions is called the "index error".

Modern theodolites

In today's theodolites, the reading out of the horizontal and vertical circles is usually done electronically. The readout is done by a rotary encoder, which can be absolute, e.g. using Gray codes, or incremental, using equidistant light and dark radial bands. In the latter case the circles spin rapidly, reducing angle measurement to electronic measurement of time differences. Additionally, lately CCD sensors

have been added to the focal plane of the telescope allowing both auto-targeting and the automated measurement of residual target offset. All this is implemented in embedded software.

Also, many modern theodolites, costing up to $10,000 apiece, are equipped with integrated electro-optical distance measuring devices, generally infrared based, allowing the measurement in one go of complete three-dimensional vectors – albeit in instrument-defined polar co-ordinates, which can then be transformed to a pre-existing co-ordinate system in the area by means of a sufficient number of control points. This technique is called a resection solution or free station position surveying and is widely used in mapping surveying. The instruments, "intelligent" theodolites called self-registering tacheometers or "total stations", perform the necessary operations, saving data into internal registering units, or into external data storage devices. Typically, ruggedized laptops or PDAs are used as data collectors for this purpose.

The T16 theodolite and a fixed reticle are shown in Figure 1 and 2 respectively.

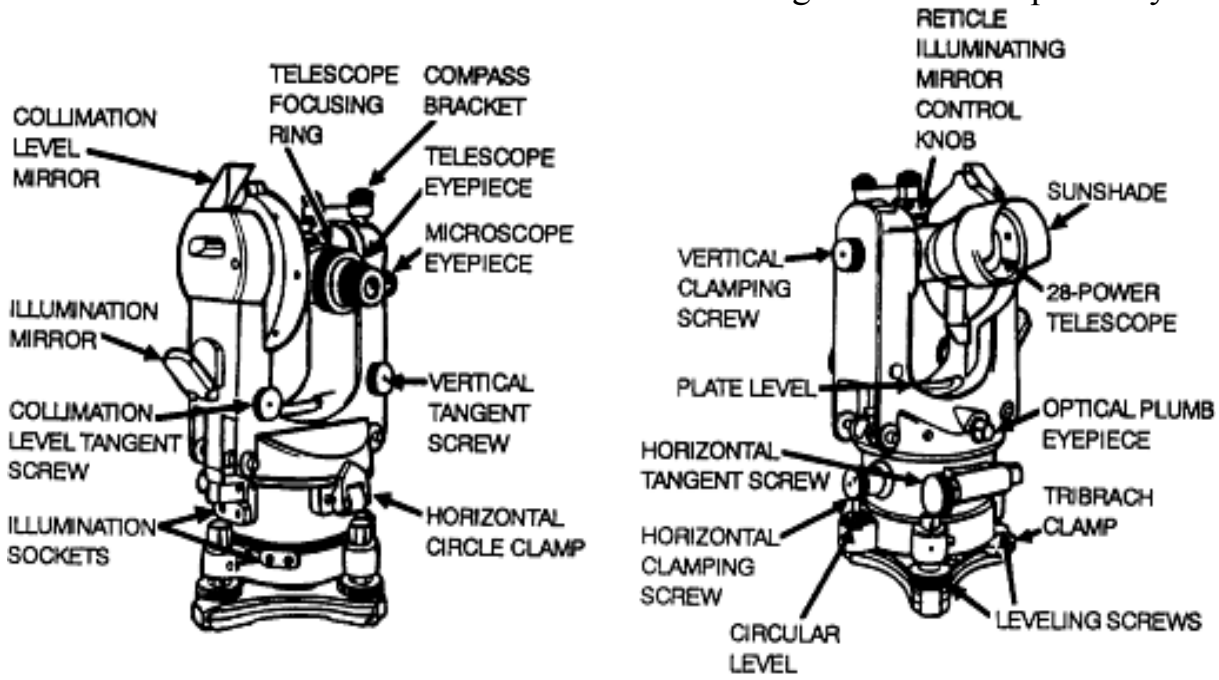


Figure 1 – T16 Theodolite

collimation level mirror – дзеркальна поверхня колімаційного рівня; **telescope focusing ring –** фокусуюче кільце далекоміра; **compass bracket –** кронштейн компаса; **telescope eyepiece –** окуляр далекоміра; **microscope eyepiece –** окуляр мікроскопа; **vertical tangent screw –** вертикальний тангенційний гвинт; **horizontal circle clamp –** фіксатор рівня горизонтального кола; **illumination socket –** розетка для підключення підсвічування; **collimation level tangent screw –** тангенційний гвинт колімаційного рівня; **illumination mirror –** освітлювач; **circular level –** коловий рівень**; horizontal clamping screw –** горизонтальний затискний гвинт; **horizontal tangent screw –** горизонтальний тангенційний гвинт; **plate level –** площа аерознімку; **vertical clamping screw –** вертикальний затискаючий гвинт; **reticle illuminating**

mirror control knob – ручка налагоджування освітлювача сітки; **sunshade –** бленда; **28-power telescope –** 28-кратний далекомір; **optical plumb eyepiece –** окуляр оптичного балансира; **leveling screws –** гвинти для горизонтальної установки

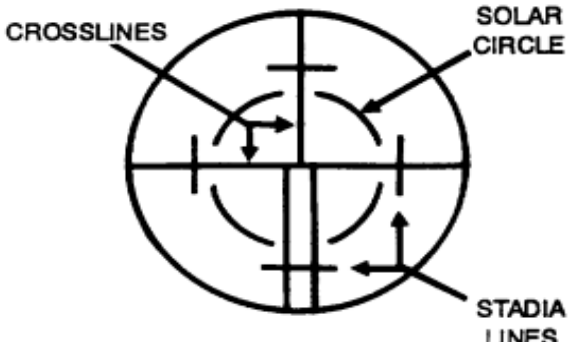


Figure 1 – Fixed reticle

When viewed through the circle-reading microscope as depicted in Figure 9, the vertical circle (marked "V") appears above the horizontal circle (marked "AZ").

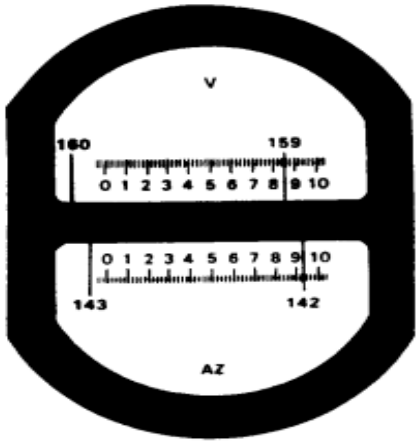


Figure 2 – T16 Theodolite scales of circle-reading microscope

2. ?	**Дайте відповіді на наступні запитання:**

1. What is theodolite?
2. What is the functionality of theodolite?
3. How does the horizontal angle measure with the thedolite?
4. What do you know about modern theodolites?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Вимірювальний інструмент, маршрутний теодоліт, кут, геологічний компас Брайтона, ручка налагоджування освітлювача сітки, вертикальний затискаючий гвинт, площа аерознімку, коловий рівень, тангенційний гвинт колімаційного рівня, розетка для підключення підсвічування, фіксатор рівня горизонтального кола, фокусуюче кільце далекоміра, дзеркальна поверхня колімаційного рівня.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. Theodolites are used mainly for _____, and have been adapted for specialized purposes in fields like _____ and rocket launch technology.
2. A theodolite is mounted on its _____ head by means of a forced centering plate or tribrach containing four _____.
3. Both _____ of a theodolite are equipped with graduated circles that can be read through _____.
4. In today's theodolites, the reading out of the _____ and _____ circles is usually done _____.
5. This technique is called a _____ solution or free station position surveying and is widely used in _____.

ГРАМАТИЧНІ ВПРАВИ
СКЛАДНОСУРЯДНІ РЕЧЕННЯ

5. 	**Доповніть речення, використовуючи сполучники *but/ and/ or* та речення з таблиці.**

Don’t come back!	Do you want to get a taxi?	**I didn’t read it.**
He didn’t see me.	Did you stay at home?	They don’t use it very often.
She looked out.	**We watched television.**	I can’t remember his name.
She swam to the other side.	They took some photographs.	

1. We stayed at home ***and watched television***.
2. I bought a newspaper ***but I didn’t read it.***
3. She went to the window…….
4. I saw Jack……
5. The girl jumped into the river…….

6. Did you go out last night……?
7. They walked round the town……
8. They've got a car……
9. I can't remember his face……
10. Go away……
11. Shall we walk to the hotel……..……?

6. 	**Доповніть речення, використовуючи сполучники *so/ because* та речення з таблиці.**

She was ill.	We didn't play tennis.	**It was very hot in the room.**
Don't phone me.	**We didn't go swimming.**	She is friendly and interesting.
I walked in.	They haven't got a key.	I couldn't sleep.
We walked home.	She does the same thing all the time.	

1. I opened the window ***<u>because</u> it was very hot in the room***.
2. The water wasn't very clean ***<u>so</u> we didn`t go swimming.***
3. The door was open ……
4. Ann didn't go to work ……..
5. I like Carol …….
6. It was raining …….
7. There were no buses ……..
8. I got up in the middle of the night ……..……..
9. I won't be at home this evening ……
10. They can't get into the house ……
11. She doesn't like her job …….

7. 	**Напишіть речення про те, що ви робили вчора, використовуючи сполучники в дужках.**

1. (and) ***In the evening I stayed at home and studied.***
2. (because) ***I went to bed very early because I was tired.***
3. (and) ……..
4. (but) ……..
5. (so) …….
6. (because) ……
7. (or) …….

ТЕМА 33

ПОЛЬОВЕ ТОПОГЕОДЕЗИЧНЕ ОБЛАДНАННЯ

Заняття 3

ГІРОКОМПАС

1. 	**Прочитайте та перекладіть текст українською мовою**

GYROCOMPASS

A gyrocompass is a type of non-magnetic compass which is based on a fast-spinning disc and rotation of the Earth (or another planetary body if used elsewhere in the universe) to automatically find geographical direction. Although one important component of a gyrocompass is a gyroscope, these are not the same devices; a gyrocompass is built to use the effect of gyroscopic precession, which is a distinctive aspect of the general gyroscopic effect. Gyrocompasses are widely used for navigation on ships, because they have two significant advantages over magnetic compasses:

- they find true north as determined by Earth's rotation, which is different from, and navigationally more useful than, magnetic north;
- they are unaffected by ferromagnetic materials, such as ship's steel hull, which change the magnetic field.

History

The first, not yet practical, form of gyrocompass was patented in 1885 by Marinus Gerardus van den Bos. Usable gyrocompass was invented in 1906 in Germany by Hermann Anschütz-Kaempfe, and after successful tests in 1908 became widely used in German Imperial Navy.

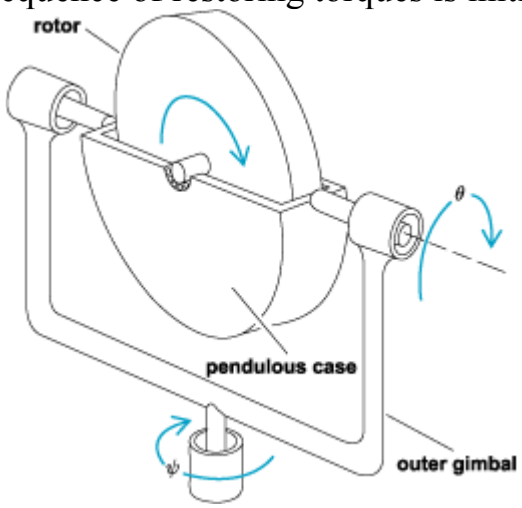
In the United States, Elmer Ambrose Sperry produced a workable gyrocompass system (1908: patent № 1,242,065), and founded the Sperry Gyroscope Company. The unit was adopted by the U.S. Navy, and played a major role in World War I. The Navy also began using Sperry's "Metal Mike": the first gyroscope-guided autopilot steering system. In the following decades, these and other Sperry devices were adopted by steamships such as the RMS Queen Mary, airplanes, and the warships of World War II. After his death in 1930, the Navy named the USS Sperry after him.

Before the success of gyrocompass, several attempts had been made in Europe to use gyroscope instead. By 1880, William Thomson (lord Kelvin) tried to propose a gyrostat (tope) to the British Navy. In 1889, Arthur Krebs adapted an electric motor to the Dumoulin-Froment marine gyroscope, for the French Navy. Giving the Gymnote submarine the ability to keep a straight line under water during several hours, it allowed her to force a naval block in 1890.

Operating principle

A gyrocompass combines the action of two devices, a pendulum and a gyroscope, to produce alignment with the Earth's spin axis. The principle is

demonstrated with the model shown in the illustration, which consists of a rapidly spinning, heavy gyro rotor, a pendulous case which permits the rotor axle to nod up and down (angle θ), and an outer gimbal which permits the axle to rotate in azimuth (angle ψ). For a gyroscope positioned at the Equator of the Earth, as the Earth rotates, the gimbal moves with it. So long as the rotor's spin axis is aligned with the Earth's axis, the gyro experiences no torque from Earth rotation. If there is misalignment, however, a sequence of restoring torques is initiated.



Gyrocompass model.

2. ?	**Дайте відповіді на наступні запитання:**

1. What is gyrocompass?
2. What are the advantages of gyrocompass over magnetic compass?
3. What do you know about the history of gyrocompass?
4. What is the operating principle of gyrocompass?

3.	**Знайдіть еквіваленти слів у тексті англійською мовою**

Гірокомпас, гіроскоп, прилад, навігація, обертання землі, система управління, бойовий корабель, принцип дії, маятник, вісь обертання, ротор гіроскопа, вісь ротора, зовнішня рамка, азимут, обертальний момент.

4.	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. Although one important component of a gyrocompass is a _____.
2. _____ are widely used for navigation on ships, because they have two significant advantages over magnetic compasses.
3. A gyrocompass combines the action of two devices, a _____ and a _____, to produce alignment with the Earth's spin axis.

4. For a gyroscope positioned at the _____ of the Earth, as the Earth rotates, the _____ with it.

ГРАМАТИЧНІ ВПРАВИ
СКЛАДНОПІДРЯДНІ РЕЧЕННЯ

5. 	**Перекладіть речення українською мовою, звертаючи увагу на підрядні речення. Назвіть їх типи.**

1. He too had moved and was now standing where she had been a moment before. (Priestley) 2. Once they reached the open country the car leapt forward like a mad thing. (Murdoch) 3. Alban's eyes glittered as he looked at the buses and policemen trying to direct the confusion. (Maugham) 4. He watched until the final wisp of smoke had disappeared. (Caldwell) 5. Even after Glenn had nodded urgently to her, she continued to look as if she did not know whether to run away from him or to walk back down the corridor to where he stood. (Caldwell) 6. And he followed her out of the door, whatever his feelings might be. (Lawrence) 7. I came away the first moment I could. (Galsworthy) 8. If anything particular occurs, you can write to me at the post-office, Ipswich. (Dickens) 9. A cat with a mouse between her paws who feigns boredom is ready to jump the second the mouse makes a dash for freedom. (Caldwell) 10. Gladys leaned forward and then turned her head so that she could look Penderel almost squarely in the face. (Priestley) 11. I could work faster if your irons were only hotter. (London) 12. The aftermath of the cub reporter's deed was even wider than Martin had anticipated. (London) 13. But these two people, insufferable though they might be in other circumstances, were not unwelcomed. (Priestley) 14. Brissenden lay sick in his hotel, too feeble to stir out, and though Martin was with him often, he did not worry him with his troubles. (London) 15. Had the great man said but a word of kindness to the small one, no doubt Esmond would have fought for him with pen and sword to the utmost of his might. (Thackeray) 16. When Rainsborough received this news he was made so miserable by it that he was not sure that he could survive. (Murdoch) 17. However friendly she might seem one day, the next she would have lapsed to her original disregard of him, cold, detached, at her distance. (Lawrence) 18. Howard puffed his cigarette thoughtfully before speaking, as if he was still uncertain about what he should say. (Caldwell) 19. How she would reach the villa, and what she would find there when she arrived, she had not even dared to imagine. (Lawrence) 20. I paused while she took off her coat... (Murdoch) 21. I don't know what would have concluded the scene, had there not been one person at hand rather more rational than myself, and more benevolent than my entertainer. (Lawrence) 22. And you will find that it is scarcely less of a shock for you because you saw what you expected to see. (Murdoch) 23. When he left the car, he strode along the sidewalk as a wrathful man will stride, and he rang the Morse bell with such viciousness that it roused him to consciousness of his condition, so that he entered in good nature, smiling with amusement at himself. (London) 24. Wherever they were together or

separate, he appeared to be travelling in one intellectual direction or along one mental groove, and she another. (Dreiser) 25. As I had no taste for this particular discussion, and also wanted to get off the subject of my dear brother, I said, “What will you be doing on Christmas Day?” (Murdoch) 26. “In that case,” said Palmer, “since we are going away for good, I doubt if we shall meet again.” (Murdoch) 27. Dazed as he was, he realized that there was just a chance of escape. (Priestley) 28. No matter how brilliant a physician is, a thing like that will ruin his career. (Caldwell) 29. She could hardly hear his voice, so deafening and continuous was the clatter of the waves upon the stones. (Murdoch) 30. At least it was good to be on one’s legs again, and though the night was hideous, the situation seemed less precarious than it did when one was sitting in there, playing fantastic tricks with mechanisms. (Priestley) 31. It means to make the plane a part of you, just as if it were strapped behind you the minute it became airborne. (Moyt)

6. **Перекладіть речення українською мовою.**

1. Whenever I go there, I always meet him.
2. He was in the shop before he came here.
3. I believe you because I know you.
4. As it is wet, we shall stay at home.
5. Since you feel tired, you should rest.
6. She returned to his room again, for she was tired.
7. That boy used to get ill about twice a week, so that he couldn’t go to school.
8. This ball was so large that the child couldn’t hold it.
9. So quickly had she come and gone in the mass of people that he had not been able to make sure.
10. The snow blew in our faces so we could hardly see.

7. **Перекладіть речення англійською мовою.**

1. Напиши йому зараз же, щоб він знав про наші плани.
2. Я подзвоню їй, щоб вона не забула про це.
3. Батьки цих дітей голодували, щоб їх діти могли добре їсти.
4. Я робитиму так, як мені подобається.
5. Він не міг лежати так спокійно як я.
6. Я не міг зробити більше ніж вони.
7. Чим більше я бачу світ, тим більше він мені подобається.
8. Ви просто приходьте, наче ви йдете на прогулянку.

ТЕМА 33

ПОЛЬОВЕ ТОПОГЕОДЕЗИЧНЕ ОБЛАДНАННЯ

Заняття 4

ТАХЕОМЕТР

1. 	**Прочитайте та перекладіть текст українською мовою**

TOTAL STATION

A total station is an electronic/optical instrument used in modern surveying. The total station is an electronic theodolite (transit) integrated with an electronic distance meter (EDM) to read slope distances from the instrument to a particular point.

Robotic total stations allow the operator to control the instrument from a distance via remote control. This eliminates the need for an assistant staff member as the operator holds the reflector and controls the total station from the observed point.

Coordinate measurement

Coordinates of an unknown point relative to a known coordinate can be determined using the total station as long as a direct line of sight can be established between the two points. Angles and distances are measured from the total station to points under survey, and the coordinates (X, Y, and Z or northing, easting and elevation) of surveyed points relative to the total station position are calculated using trigonometry and triangulation. To determine an absolute location a Total Station requires line of sight observations and must be set up over a known point or with line of sight to 2 or more points with known location.

For this reason, some total stations also have a Global Navigation Satellite System receiver and do not require a direct line of sight to determine coordinates. However, GNSS measurements may require longer occupation periods and offer relatively poor accuracy in the vertical axis.

Angle measurement

Most modern total station instruments measure angles by means of electro-optical scanning of extremely precise digital bar-codes etched on rotating glass cylinders or discs within the instrument. The best quality total stations are capable of measuring angles to 0.5 arc-second. Inexpensive "construction grade" total stations can generally measure angles to 5 or 10 arc-seconds.

Distance measurement

Measurement of distance is accomplished with a modulated microwave or infrared carrier signal, generated by a small solid-state emitter within the instrument's optical path, and reflected by a prism reflector or the object under survey. The modulation pattern in the returning signal is read and interpreted by the computer in the total station. The distance is determined by emitting and receiving multiple frequencies, and determining the integer number of wavelengths

to the target for each frequency. Most total stations use purpose-built glass corner cube prism reflectors for the EDM signal. A typical total station can measure distances with an accuracy of about 1.5 millimetres (0.0049 ft) + 2 parts per million over a distance of up to 1,500 metres (4,900 ft).

Reflectorless total stations can measure distances to any object that is reasonably light in color, up to a few hundred meters.

Data processing

Some models include internal electronic data storage to record distance, horizontal angle, and vertical angle measured, while other models are equipped to write these measurements to an external data collector, such as a hand-held computer.

When data is downloaded from a total station onto a computer, application software can be used to compute results and generate a map of the surveyed area. The new generation of total stations can also show the map on the touch-screen of the instrument right after measuring the points.

2. ?	**Дайте відповіді на наступні запитання:**

1. What is total station?
2. What does total station measure?
3. What types of total stations do you know?
4. What is the principle of angle measurement?
5. What is the principle of distance measurement?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Тахеометр, теодоліт, вимірювання координат, тригонометрія, тріангуляція, місцезнаходження, глобальна навігаційна супутникова система, вимірювання кутів, електрооптичне сканування, штрих-код, вимірювання відстані, мікрохвильовий сигнал, інфрачервоний сигнал, модуляція, виготовлений для спеціальних цілей.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. Robotic total stations allow the operator to control the instrument from a distance via _____.
2. To determine an _____ a Total Station requires line of sight observations and must be set up over a known point or with line of sight to 2 or more points with known _____.
3. Most modern total station instruments measure angles by means of _____ of extremely precise digital bar-codes etched on rotating glass cylinders or discs within the instrument.

4. The distance is determined by emitting and receiving multiple _____.

ГРАМАТИЧНІ ВПРАВИ
СКЛАДНОПІДРЯДНІ ОЗНАЧАЛЬНІ РЕЧЕННЯ

5.  **Перекладіть речення українською мовою.**

1. “Everybody who makes the kind of blunder I did should apologize,” he remarked with a pronounced nodding of his head. (Caldwell) 2. Rachel had become aware of the fact that she was talking loudly. (Swinnerton) 3. He took after his blond father, who had been a painter. Rosa took after her dark-haired mother, who had been a Fabian. (Murdoch) 4. What we are interested in, as author and reader, is the fact that publishing in England is now an integral part of big business. (Fox) 5. The first thing Martin did next morning was to go counter both to Brissenden’s advice and command. (London) 6. The invalid, whose strength was now sufficiently restored, threw off his coat, and rushed towards the sea, with the intention of plunging in, and dragging the drowning man ashore. (Dickens) 7. He was suddenly reminded of the crumpled money he had snatched from the table and burned in the sink. (Caldwell) 8. Georgie, who is now twenty-six, had been an undergraduate at Cambridge, where she had taken a degree in economics. (Murdoch) 9. He would speak for hours about them to Harry Esmond; and, indeed, he could have chosen few subjects more likely to interest the unhappy young man, whose heart was now as always devoted to these ladies; and who was thankful to all who loved them, or praised them, or wished them well. (Thackeray) 10. I hardly know why I came to the conclusion that you don’t consider it an altogether fortunate attachment. (Pinero) 11. He walked to the window and stood there looking at the winter night that had finally come upon them. (Caldwell) 12. What terrified her most was that she found deep in her heart a strong wish that Mischa might indeed want to reopen negotiations. (Murdoch) 13. Directly in front of her window was a wide terrace with a stone parapet which swept round to what she took to be the front of the house, which faced, the sea more squarely. (Murdoch) 14. He spent half the week in Cambridge, where he lodged with his sister and lent his ear to neurotic undergraduates, and the other half in London, where he seemed to have a formidable number of well-known patients. (Murdoch) 15. I went upstairs to lie down and fell into the most profound and peaceful sleep that I had experienced for a long time. (Murdoch) 16. “Palmer Anderson,” said Georgie, naming Antonia’s psychoanalist, who was also a close friend of Antonia and myself. (Murdoch) 17. She looked to him much the same child as he had met six years ago... (Murdoch) 18. Rosa had the feeling that she was both recognized and expected. (Murdoch) 19. Maybe the reason you don’t want to go to a specialist is because you don’t want to change — you want to stay as you are. (Caldwell) 20. Gretta regarded him with a look on her face that was unrevealing of her thoughts. (Caldwell)

6. 	**Перекладіть речення українською мовою.**

1. That is all I can tell you. (London) 2. He was under the impression that an attempt was going to be made to convict him. (Dreiser) 3. Whenever she came which was often she came quite noisily. (Dreiser) 4. The things her father said seemed meaningless and neutral. (Lawrence) 5. Then she came to New York where she remained two years. (Dreiser) 6. I opened Palmer's close-fitting hall door which is always unlocked and ushered Dr. Klein inside. (Murdoch) 7. What happened was the last thing that any of them expected to happen. (Priestley) 8. I shook out my scarf which was damp and soggy. (Murdoch) 9. She had no idea where she was going. (Murdoch) 10. There were times when I wanted to stop the car and tell him to get out. (Maltz) 11. His hair which was short sleek and black was just visible beneath the capacious brim of a low-crowned brown hat. (Dickens) 12. But he could see now no reason why he should not smoke. (London) 13. The bar was crowded with men which she had expected it to be and at first she was not able to find a place to sit down. (Caldwell)

7. 	**Переробіть речення, використовуючи означальні підрядні. Використовуйте речення в дужках для утворення означальних підрядних.**

Examples: Tom's father goes swimming every day. (Tom's father is 78.)
…***Tom's father, who is 78, goes swimming every day***. ……
She told me her address. (I wrote her address down on a piece of paper.)
…She ***told me her address, which I wrote down on a piece of paper***...

1. She showed me a photograph of her son. (Her son is a policeman.)
She showed me a photograph of her son .....
2. We decided not to swim in the sea. (The sea looked rather dirty.)
We .....
3. The new stadium will be opened next month. (The stadium holds 90,000 people.)
The..... .....
4. John is one of my closest friends. (I have known John for eight years.)
……
5. That man over there is an artist. (I don't remember his name.) (use whose)
……
6. Opposite our house there is a nice park. (There are sonic beautiful trees in this, park.)
(use where) .....
7. The storm caused a lot of damage. (Nobody had been expecting the storm.)

…….

8. The postman was late this morning. (The postman is nearly always on time.)
……

9. We often go to visit our friends in Bristol. (Bristol is only 30 miles away.)
……

10. Mr Edwards has gone into hospital for some tests. (His health hasn't been good recently.) (use whose) ..... ……

11. Jack looks much nicer without his beard. (His beard made him look much older.) …….

12. I went to see the doctor. (The doctor told me to rest for a few days.)
…….

13. Thank you for your letter. (I was very happy to get your letter.)
……

14. A friend of mine helped me to get a job. (His father is the manager of a company.) (use whose)…….

15. Next week-end I'm going to Glasgow. (My sister lives in Glasgow.) (use where)……..

8. 	**Переробіть речення, використовуючи означальні підрядні. Використовуйте речення в дужках для утворення означальних підрядних.**

Example: Mr Carter is very interested in our plan. (I spoke to him on the phone last night.) …***Mr Carter, who I spoke to on the phone last night, is very interested in our plan***…

or ... ***Mr Carter, to whom I spoke on the phone, last night, is very interested in our plan***…

1. This is a photograph of our friends. (We went on holiday with them.)
This is .....

2. The wedding took place last Friday. (Only members of the family were invited to it.)
The .....

3. I've just bought some books about astronomy. (I'm very interested in astronomy.)
.....

ТЕМА 33

ПОЛЬОВЕ ТОПОГЕОДЕЗИЧНЕ ОБЛАДНАННЯ

Заняття 5

ГЛОБАЛЬНА СИСТЕМА КОСМІЧНОЇ НАВІГАЦІЇ “НАВСТАР”

1.	**Прочитайте та перекладіть текст українською мовою**

NAVIGATION SATELLITE TIMING AND RANGING (NAVSTAR)

The satellite signals navigation set AN/PSN-11 will provide worldwide position, velocity, and time to the field surveyor. When survey control is not available and time or the tactical situation preclude the use of existing survey control, the surveyor can use the AN/PSN-11 to establish positioning data.

The AN/PSN-11 is a receiver. It is used in the GPS, SPS, and PPS. Figure 1 displays AN/PSN-11.

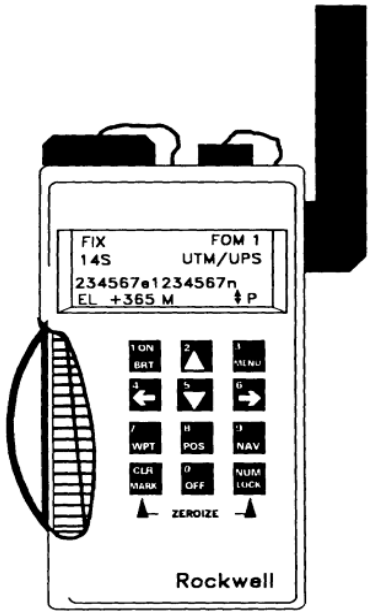


Figure 1 – AN/PSN-11Satellite signals navigation set

The NAVSTAR GPS is a space-based navigation and positioning system that provides accurate, three-dimensional position and velocity information, and time. The GPS is comprised of three major segments as depicted in Figure 2.

Figure 2 – Global positioning system

The space segment is made up of a 24-satellite constellation that orbits the earth once every 12 hours. These satellites are deployed in six orbital planes and are configured so that four or more satellites will be in view at all times. This arrangement allows for 24-hour, three-dimensional, worldwide coverage. As with the stars, the satellites rise above the horizon about 4 minutes earlier than the previous day.

The control segment consists of five passive-tracking monitoring stations, active-tracking ground antennas, and the master control station located at Falcon Air Force Base, Colorado. These tracking stations, located around the world, are capable of monitoring the satellite navigation messages and time signals better than 90 percent of the time. This information is relayed to the master control station, which has the capability to effect any needed corrections to the satellite timing and navigation messages.

The user segment consists of navigation receivers designed for marine, aircraft, and manpack or vehicle use. The receivers must have electrical line-of-site with the satellites to receive and decode the satellite signals. The internal computer uses these satellite data to generate a precise time, velocity, and three-dimensional (3D) position data. The receiver must track four satellites to obtain a 3D position, and three satellites will yield a two-dimensional (2D) position. Current position coordinates and height are obtained from a 3D position and only current coordinates are obtained from a 2D position. The receiver needs only one satellite for precise time.

Setup. The setup selections allow the AN/PSN-11 operator to select several options and modes of operation.

Position. Whenever coordinates are being determined for a critical position such as an orienting station, howitzer location, and PADS initialization or update point. Position data should always be checked by a second independent mean; for example, a second receiver, an accurate map spot, or the current coordinates on the

PADS.

Height. The AN/PSN-11 can determine height (elevation) relative to either the horizontal datum ellipsoid or mean sea level. Both modes of operation can be set for meters or feet as a unit of measurement. Normally, mean sea level and meters will be the preferred selections.

Direction. The AN/PSN-11 should never be used to determine orientation azimuth for firing positions. As with the PADS, azimuth computed between two sets of GPS coordinates will produce erratic results.

PADS operation. The AN/PSN-11 does not require any special installation for PADS operation. Position coordinates for initialization or update can be obtained by moving a short distance away from the vehicle and placing the set directly over the desired location.

2. ?	**Дайте відповіді на наступні запитання:**

1. What are the characteristics of NAVSTAR GPS?
2. What principle is based the function of GPS on?
3. What does the user segment of GPS represent?
4. What does the control segment consist of?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Сигнал супутника, швидкість, глобальна система навігації і визначення місцезнаходження, глобальна система космічної навігації “НАВСТАР”, геодезичний прилад, стандартна система орієнтації/прив’язування, система точної орієнтації/визначення місця угруповання, угруповання, що складається з 24 супутників, сигнали супутникового прив’язування.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. The NAVSTAR GPS is a _____ navigation and _____ that provides accurate, three-dimensional position and velocity information, and time.
2. The space segment is made up of a _____ that orbits the earth once every 12 hours.
3. The control segment consists of five passive-tracking _____, active-tracking ground antennas, and the master _____.
4. The user segment consists of navigation _____ designed for marine, _____, and manpack or _____ use.

ГРАМАТИЧНІ ВПРАВИ
ВЖИВАННЯ ПРИСЛІВНИКА SO ТА ПРИКМЕТНИКА SUCH.

5. **Змініть речення, використовуючи *such* + слово в дужках, вносячи інші необхідні зміни.**

Example: I didn't know their house was so big. (place) …… ***I didn't know their house was such a big place***. ……..

1. Why were you in the shop for so long? (time) ……
2. I really like Sue. She's so nice, (person) ……
3. I can never hear him. He speaks so quietly, (in … voice) ……
4. We saw you driving your BMW yesterday. It looks so powerful, (car) ……
5. Have you heard the new REM album? It's so good , (record) ……

6. **Підберіть до частин речень логічні наслідки.**

1. The food was so delicious…	that all the hotels were full.
2. We had such a good weather…	that I couldn't stop to talk.
3. I was in such a hurry…	that I didn't recognize it.
4. The town has changed so much…	that we talked for hours.
5. The dog was barking so loudly…	that we came back with tans.
6. It was such a long time since I'd seen him…	that we cried.
7. There were so many tourists…	that I helped myself to more.
8. The film was so sad…	that we couldn't hear the TV.

7. **Перевірте, чи правильними є ці речення. Виправте помилки.**

1. The Smiths are so nice people. ……
2. You look so young in those clothes. ……
3. Thanks for the party. We had such good time. ……
4. It was such a boring film that we fell asleep. ……
5. He was driving so fast that he didn't notice the police car. ……
6. Bob's an expert. He knows such much about computers. ……..

8. **Вставте *-selves* або *each other*.**

Examples: Tom and Ann stood in front of the mirror and looked at …***themselves***...
How long have Tom and Ann known …***each other***…?

1. At Christmas friends often give.....presents.
2. Did the children enjoy.....when they were on holiday?

3. Jack and Jill are very happy together. They love.....very much.
4. They had an argument last week. They are still not speaking to .....
5. Some people are very selfish. They only think of .....
6. Nora and I don’t see.....very often these days.

ТЕМА 34:

ВІДОМІ КАРТОГРАФИ СВІТУ

Заняття 1

КЛАВДІЙ ПТОЛЕМЕЙ

1.	**Прочитайте та перекладіть текст українською мовою**

CLAUDIUS PTOLEMEY

Claudius Ptolemy (AD 90 – AD 168) was a Greco-Roman writer of Alexandria, known as a mathematician, astronomer, geographer, astrologer, and poet of a single epigram in the Greek Anthology. He lived in the city of Alexandria in the Roman province of Egypt, wrote in Greek, and held Roman citizenship. Beyond that, few reliable details of his life are known. His birthplace has been given as Ptolemais Hermiou in the Thebaid in an uncorroborated statement by the 14th century astronomer Theodore Meliteniotes. This is very late, however, and there is no other reason to suppose that he ever lived anywhere else than Alexandria, where he died around AD 168.

Ptolemy was the author of several scientific treatises, at least three of which were of continuing importance to later Islamic and European science. The first is the astronomical treatise now known as the Almagest. The second is the Geography, which is a thorough discussion of the geographic knowledge of the Greco-Roman world. The third is the astrological treatise known sometimes in Greek as the Apotelesmatika in which he attempted to adapt horoscopic astrology to the Aristotelian natural philosophy of his day.

One of Ptolemy's main works is his Geographia. This also is a compilation of what was known about the world's geography in the Roman Empire during his time. He relied somewhat on the work of an earlier geographer, Marinos of Tyre, and on gazetteers of the Roman and ancient Persian Empire.

The first part of the Geographia is a discussion of the data and of the methods he used. As with the model of the solar system in the Almagest, Ptolemy put all this information into a grand scheme. Following Marinos, he assigned coordinates to all the places and geographic features he knew, in a grid that spanned the globe. Latitude was measured from the equator, as it is today, but Ptolemy preferred book 8 to express it as the length of the longest day rather than degrees of arc (the length of the midsummer day increases from 12h to 24h as one goes from the equator to the polar circle). In books 2 through 7, he used degrees

and put the meridian of 0 longitude at the most western land he knew, the "Blessed Islands", probably the Cape Verde islands (not the Canary Islands, as long accepted) as suggested by the location of the six dots labelled the "FORTUNATA" islands near the left extreme of the blue sea of Ptolemy's map.

Ptolemy also devised and provided instructions on how to create maps both of the whole inhabited world (ecumene) and of the Roman provinces. In the second part of the Geographia, he provided the necessary topographic lists, and captions for the maps. His ecumene spanned 180 degrees of longitude from the Blessed Islands in the Atlantic Ocean to the middle of China, and about 80 degrees of latitude from Shetland to anti-Meroe (east coast of Africa); Ptolemy was well aware that he knew about only a quarter of the globe, and an erroneous extension of China southward suggests his sources did not reach all the way to the Pacific Ocean.

The maps in surviving manuscripts of Ptolemy's Geographia, however, only date from about 1300, after the text was rediscovered by Maximus Planudes. It seems likely that the topographical tables in books 2–7 are cumulative texts – texts which were altered and added to as new knowledge became available in the centuries after Ptolemy. This means that information contained in different parts of the Geography is likely to be of different dates.

A printed map from the 15th century depicting Ptolemy's description of the Ecumene, (1482, Johannes Schnitzer, engraver).

2. ?	**Дайте відповіді на наступні запитання:**

1. Where did Ptolemy live?
2. What is his area of interest?
3. What are his main scientific treatises?
4. What are the main positions of Geographia?

3.	**Знайдіть еквіваленти слів у тексті англійською мовою**

Математик, астроном, географ, астролог, громадянство, місце народження, науковий трактат, гороскоп, сонячна система, земна куля, широта, екватор,

градус, меридіан, карта, помилковий, рукопис.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. His _____ has been given as Ptolemais Hermiou in the Thebaid in an uncorroborated statement by the 14th century _____ Theodore Meliteniotes.
2. Ptolemy was the author of several _____, at least three of which were of continuing importance to later Islamic and European science.
3. This also is a _____ of what was known about the world's geography in the Roman Empire during his time.
4. _____ was measured from the equator, as it is today.
5. Ptolemy also devised and provided instructions on how to create _____ both of the whole inhabited world (ecumene) and of the _____.

ГРАМАТИЧНІ ВПРАВИ
ДІЄСЛОВА З ДВОМА ДОДАТКАМИ

5. 	**Перепишіть речення, замінюючи непрямий додаток на *him, her, them*.**

Example: He cooked a nice meal for all his friends. ***He cooked them a nice meal***..

1. She lent some money to her grandmother. …….
2. Hand that plate to your brother. …….
3. Who'll read a story to the children? …….
4. I've made some coffee for father. …….
5. Jack's gone to get some water for his mother. …….
6. He offered the job to young girl. …….

6. 	**Перепишіть речення, використовуючи з непрямими додатками прийменники *for* або *to*.**

Example: I have booked them seats. (the children) ..... ***I have booked seats for the children***

1. Can you make them a cup of tea? (everyone) …….
2. I've written her a letter. (my sister) …….
3. Who's going to cook them supper? (the family) …….
4. We can show them our photographs. (all the visitors) …….
5. Could you cut them some bread? (your brothers and sisters) …….
6. I sold her my old skis. (your friend) …….

7. 	**Закінчить речення, щоб показати які подарунки Діана подарувала своїй родині. Дивіться таблицю.**

Helen – a doll, grandfather – a pipe, uncle Tom and aunt Jane – flowers, grandmother – a box of chocolates, Richard – a dictionary, mother – a teapot, father – a pullover.

1. She bought a bicycle …….. ***for her little brother, Simon***. …….
2. She gave Helen …….
3. She bought a pipe ……
4. She sent some flowers …….
5. She bought ……. a box of chocolates.
6. She gave a dictionary …….
7. She bought a nice new teapot …….
8. She gave ……. a pullover.

ТЕМА 34:

ВІДОМІ КАРТОГРАФИ СВІТУ

Заняття 2

ГЕРАРД МЕРКАТОР

1.		**Прочитайте та перекладіть текст українською мовою**

GERARDUS MERCATOR

Gerardus Mercator (born 5 March 1512 in Rupelmonde in the Habsburg County of Flanders (Belgium), Holy Roman Empire, died 2 December 1594 in Duisburg, Holy Roman Empire) was a cartographer, philosopher and mathematician. He is best known for his work in cartography, particular the world map of 1569 based on a new projection which represented sailing courses of constant bearing as straight lines. He was the first to use the term Atlas for a collection of maps.

Life and works

Mercator was born Gerard de Kremer or de Cremer in the Belgian town of Rupelmonde to parents from Gangelt in the Duchy of Jülich, where he was raised. "Mercator" is the Latinized form of his name. It means "merchant". He was educated in Hertogenbosch by the famous humanist Macropedius and at the University of Leuven (Flemish Brabant). Despite Mercator's fame as a cartographer, his main source of income came through his craftsmanship of mathematical instruments. In Leuven, he worked with Gemma Frisius and Gaspar Myrica from 1535 to 1536 to construct a terrestrial globe, although the role of Mercator in the project was not primarily as a cartographer, but rather as a highly skilled engraver of brass plates. Mercator's own independent map-making began only when he produced a map of Palestine in 1537; this map was followed by another – a map of the world (1538) – and a map of Flanders (1540). During this period he learned Italic script because it was the most suitable type of script for copper engraving of maps. He wrote the first instruction book of Italic script published in northern Europe.

Mercator was charged with heresy in 1544 on the basis of his sympathy for Protestant beliefs and suspicions about his frequent travels. He was in prison for seven months before the charges were dropped – possibly because of intervention from the university authorities.

In 1552, he moved to Duisburg, one of the major cities in the Duchy of Cleves, and opened a cartographic workshop where he completed a six-panel map of Europe in 1554. He worked also as a surveyor for the city. His motives for moving to Duisburg are not clear. Mercator might have left Flanders for religious reasons or because he was informed about the plans to found a university. He taught mathematics at the academic college of Duisburg. After producing several maps, he was appointed Court Cosmographer to Wilhelm, Duke of Jülich-Cleves-

Berg in 1564. He constructed a new chart and first used it in 1569. It had parallel lines of longitude to aid navigation by sea, and compass courses could be marked as straight lines.

Mercator took the word atlas to describe a collection of maps, and encouraged Abraham Ortelius to compile the first modern world atlas – Theatrum Orbis Terrarum – in 1570. He produced his own atlas in a number of parts, the first of which was published in 1578 and consisted of corrected versions of the maps of Ptolemy. Maps of France, Germany and the Netherlands were added in 1585 and of the Balkans and Greece in 1588; further maps were published by Mercator's son Rumold Mercator in 1595 after the death of his father.

Mercator learnt globe making from Gemma Frisius and went on to become the leading European globe maker of the age. Twenty-two pairs of his globes (terrestrial globe and matching celestial globe) have survived.

Following his move to Duisburg, Mercator never left the city and died there, a respected and wealthy citizen.

2. ?	**Дайте відповіді на наступні запитання:**

1. Where was Mercator born?
2. What does name “Mercator” mean?
3. What was his main source of income?
4. What are his main achievements as cartographer?
5. Why was Mercator imprisoned?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Священна Римська Імперія, картограф, філософ, математик, торговець, джерело прибутку, глобус земної кулі, карта Світу, гравірування, інструкція, втручання, картографічна майстерня, топограф, географічна довгота, навігація.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

6. Despite Mercator's fame as a _____, his main source of income came through his _____ of mathematical instruments.
7. Mercator was charged with _____ in 1544 on the basis of his sympathy for Protestant beliefs and _____ about his frequent travels.
8. In 1552, he moved to Duisburg, one of the major cities in the Duchy of Cleves, and opened a _____ where he completed a six-panel map.
9. Mercator learnt _____ from Gemma Frisius and went on to become the leading European globe maker of the age.

ГРАМАТИЧНІ ВПРАВИ
ДІЄСЛОВА MAKE/DO

5.  **Закінчить речення, використовуючи дієслова *make* і *do***

1. Don't forget to …… your homework.
2. Read your book carefully and …… the exercise on page 52.
3. If you want to see Mr. Brown you must …… an appointment.
4. I have to …… a speech at the meeting tomorrow.
5. The baby is going to sleep. Try not to …… a noise.
6. I'll …… the garden if you …… the house.
7. We have to …… a long journey. We should try to leave early.
8. Some pop stars and sport stars …… a lot of money.

6.  **Закінчить запитання, а потім дайте відповіді. Використовуйте дієслова *make* і *do.***

1. Have you ever had to …… a speech?
2. Who …… most of the washing-up in your house?
3. If you …… a promise, do you always keep it?
4. Do you …… friends easily?
5. Was it easy to …… this exercise?

7.  **Закінчить діалоги, використовуючи дієслова *make* або *do*.**

a: What work do you want to …… when you leave school?
b: If I …… well in my exams I'd like to be a doctor.
a: Then you would …… a lot of money.
b: I don't mind about the money. I just want to …… an interesting job.
2.
a: Are you going to …… a cup of coffee?
b: I have to …… the dishes first.
a: OK then. I'll …… the coffee, while you …… the washing up.
b: Right. While we have coffee we can …… plans for our holiday this year.

ТЕМА 34:

ВІДОМІ КАРТОГРАФИ СВІТУ

Заняття 3

ЙОДОКУС ХОНДІУС

1. 	**Прочитайте та перекладіть текст українською мовою**

JODOCUS HONDIUS

Jodocus Hondius on an engraving of the year 1619

Jodocus Hondius (Latinized version of his Dutch name: Joost de Hondt) (14 October 1563 – 12 February 1612), sometimes called Jodocus Hondius the Elder to distinguish him from his son Jodocus Hondius II, was a Flemish / Dutch engraver, and cartographer. He is best known for his early maps of the New World and Europe, for re-establishing the reputation of the work of Gerard Mercator, and for his portraits of Francis Drake. He helped establish Amsterdam as the center of cartography in Europe in the 17th century.

Hondius was born in Wakken and grew up in Ghent. In his early years he established himself as an engraver, instrument maker and globe maker. In 1584 he moved to London to escape religious difficulties in Flanders. While in England, Hondius was instrumental in publicizing the work of Francis Drake, who had made a circumnavigation of the world in the late 1570s. In particular, in 1589 Hondius produced a now famous map of the bay of New Albion, where Drake briefly established a settlement on the west coast of North America. Hondius' map was based on journal and eyewitness accounts of the trip and has long fueled speculation about the precise location of Drake's landing, which has not yet been firmly established by historians. Hondius is also thought to be the artist of several well-known portraits of Drake that are now in the National Portrait Gallery in London.

In 1593 he moved to Amsterdam, where he remained until the end of his life. In co-operation with the Amsterdam publisher Cornelis Claesz. in 1604 he purchased the plates of Gerard Mercator's Atlas from Mercator's grandson. Mercator's work had languished in comparison to the rival Theatrum Orbis

Terrarum by Ortelius. Hondius republished Mercator's work with 36 additional maps, including several which he himself had produced. Despite the addition of his own contributions, Hondius gave Mercator full credit as the author of the work, listing himself as the publisher. Hondius' new edition of Mercator's work was a great success, selling out after a year. Hondius later published a second edition, as well as a pocket version Atlas Minor. The maps have since become known as the "Mercator/Hondius series".

In the French edition of the Atlas Minor we find one of the first instances of a thematic map using map symbols. This is a map entitled Designatio orbis christiani (1607) showing the dispersion of major religions.

Between 1605 and 1610 he was employed by John Speed to engrave the plates for Speed's The Theatre of the Empire of Great Britaine.

Hondius died, aged 48, in Amsterdam. After his death, his publishing work in Amsterdam was continued by his widow, two sons, Jodocus II and Henricus, and son-in-law Johannes Janssonius, whose name appears on the Atlas as co-publisher after 1633. Eventually, starting with the first 1606 edition in Latin, about 50 editions of the Atlas were released in the main European languages. In the Islamic world, the atlas was partially translated by the Turkish scholar Katip Çelebi. The series is sometimes called the "Mercator/Hondius/Janssonius" series because of Janssonius's later contributions.

2. ?	**Дайте відповіді на наступні запитання:**

1. What is Hondius known for?
2. Why did he move to London in 1584?
3. What map did Hondius produce in 1589?
4. What other talents did Hondius have?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Картографія, репутація, відновлювати, глобус, релігійний, навколосвітня подорож, поселення, свідок, подорож, історик, художник, видавець, внесок, тематична карта, умовні позначки на карті, розсіювання.

ГРАМАТИЧНІ ВПРАВИ
ДІЄСЛОВА MAKE/LET/HELP + ІНФІНИТИВ БЕЗ ЧАСТКИ TO

4. 	**Що ваші батьки дозвляли вам робити, коли ви були дитиною? Використовуйте “*They let me …*” або “*They didn’t let me …*”.**

1. go to bed after 10 p.m. …….
2. eat chocolate when I wanted …….

3. visit my friends' homes …….
4. buy my own clothes ……..
5. ride my bike on the road ……..
6. go shopping alone …….
7. travel alone …….

5. 	**Зараз подумайте про школу. Що змушували вас робити вчителі? Використовуйте *"They made us …"* або *"They didn't make us …".***

1. play sport …….
2. wear a uniform …….
3. do a lot of homework …….
4. stand up when they came into the classroom …….
5. sing songs …….
6. read newspapers and magazines …….
7. speak English …….

6. 	**Використовуйте слова, наведені нижче, для того, щоб закінчити речення, пропонуючи щось зробити, використовуючи *Let's*.**

have a rest; go for a drink; go and see it; go inside; do another exercise; ask someone for help

1. I'm thirsty. …….
2. It's very hot. …….
3. There's a good film on at the cinema. …….
4. I need more practice. …….
5. I'm tired. …….
6. We're lost. …….

7. 	**Закінчить речення, вибравши відповідне сполучення слів з правої колонки.**

1. The bad news	made us go inside.
2. The medicine	made me happy.
3. The bad food	made the cars stop.
4. Meeting you last weekend	made me depressed.
5. The policeman	made my father ill.
6. The rain	made my brother feel better.

ТЕМА 34:

ВІДОМІ КАРТОГРАФИ СВІТУ

Заняття 4

ФІЛІП СТРАЛЕНБЕРГ

1. 	**Прочитайте та перекладіть текст українською мовою**

PHILIP JOHAN VON STRAHLENBERG

Philip Johan von Strahlenberg (1676–1747) was a Swedish officer and geographer of German origin who made important contributions to the cartography of Russia. Strahlenberg was born in Stralsund, which then belonged to Sweden, and his original name was Philip Johan Tabbert. He joined the Swedish army in 1694 and was promoted captain in 1703. In 1707, he was ennobled and took the name von Strahlenberg.

Taking part in the Great Northern War, he was captured by the victorious Russian forces during the Battle of Poltava in 1709. As a prisoner of war, he was sent to Tobolsk, where he lived from 1711 to 1721. During this time, he studied the geography of Siberia and the anthropology, languages and customs of its native tribes. After returning to Stockholm in 1730, he published his book Das Nord-und Ostliche Theil von Europa und Asia (North and Eastern Parts of Europe and Asia) with the results of his studies. The book was well received and soon translated into English, French and Spanish.

As part of his book, Strahlenberg and Johan Anton von Matérn drew new maps of all of Russia – a formidable task in itself. He also suggested a new border between the continents of Europe and Asia in Russian territory. This border follows the peaks of the Urals, then branches off westwards along a minor mountain range, follows the hilly west bank of Volga river downstream to the 49th degree of latitude and Don river thereon to the Black Sea. Vasily Tatischev claimed that it was at his suggestion that Strahlenberg adopted the idea. See Boundaries between continents for the current political and geographical debates about the Europe-Asia border.

Strahlenberg's book also extensively deals with the languages and customs of the Tartars, Yakuts, Chuvash, Crimean Tartars, Uzbeks, Bashkirs, Kyrgyz, Turkmen Tartars and Mongols. In writing about the shamanic rituals of the indigenous peoples of Siberia, he noted their use of the fly agaric mushroom (Amanita muscaria).

In his later years, Strahlenberg wrote an extensive two-volume treatise on the history of Russia, which was published in French translation as Description Historique de l'Empire Russien (Historical Description of the Russian Empire) in 1757.

The asteroid (15766) Strahlenberg is named after him.

2. ?	**Дайте відповіді на наступні запитання:**

1. Where was Stralenberg born?
2. When and where was he captured?
3. What are Stralenberg's main treatises?
4. What did Stralenberg explore as a geographer?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Важливий внесок, надавати дворянський титул, військовополонений, антропологія, звичаї місцевих племен, кордон між континентами, гірський ланцюг, широта, ритуал, місцеві жителі, науковий трактат.

4. 	**Заповніть пропуски в реченнях словами з тексту. Перекладіть речення українською мовою**

1. He also suggested a _____ between the continents of Europe and Asia in Russian territory.
2. In his later years, Strahlenberg wrote an extensive _____ on the history of Russia.
3. Strahlenberg's book also extensively deals with the _____ and _____ of the Tartars, Yakuts, Chuvash, Crimean Tartars, Uzbeks.

ГРАМАТИЧНІ ВПРАВИ
ДІЄСЛОВА TO BE, TO HAVE. ПОВТОРЕННЯ

5. 	**Доповніть речення дієсловом to be у Present Simple**

1. Where ... you? — I ... in the kitchen. 2. Where ... Fred? — He ... in the garage. 3. Where ... Lisa and John? — They .. at college. 4. ... you busy? — No, I ... not. Mike ... busy. He ... the busiest person I've ever met. 5. It... ten o'clock. She ... late again. 6. How ... you? — I ... not very well today. — I ... sorry to hear that. 7. We ... interested in classical music. 8. Vera ... afraid of snakes. 9. My grandmother ... not nervous and she ... rarely upset. She ... the kindest person I've ever seen. My grandmother ... really wonderful. 10. I ... sorry. They ... not at the office at the moment. 11. Where ... the keys? — In your jacket. 12. What... the time, please? — Two o'clock. 13. It ... the biggest, meal I've ever had. 14. Which sport do you think ... the most dangerous? 15. Chess and aerobics ... not as exciting as sky diving and figure skating. 16. Debt... the worst kind of poverty. 17. The game ... not worth the candle. 18. Do you have any idea where he ... ? 19. Used cars ... cheaper but less reliable than new cars....

6. 	**Доповніть речення дієсловом to be у Present, Past або Future Simple**

1. The students ... in the Russian Museum. 2. Last month they ... in the Hermitage. There ... an interesting exhibition there. 3. In two weeks they ... in the Tretyakov Gallery. They ... lucky. 4. My father ... a teacher. 5. He ... a pupil twenty years ago. 6. I ... a doctor when I grow up. 7. My sister ... not ... at home tomorrow. 8. She ... at school tomorrow. 9. ... you ... at home tomorrow? 10. ... your father at work yesterday? 11. My sister ... ill last week. 12. She ... not ill now. 13. Yesterday we ... at the theatre. 14. Where ... your mother now? — She ... in the kitchen. 15. Where ... you yesterday? — I ... at the cinema. 16. When I come home tomorrow, all my family ... at home. 17. ... your little sister in bed now? — Yes, she ... 18. ... you ... at school tomorrow? — Yes, I ... . 19. When my granny ... young, she ... an actress. 20. My friend ... in Moscow now. 21. He ... in St. Petersburg tomorrow. 22. Where ... your books now? — They ... in my bag.

7. 	**Перекладіть англійською мовою, вживаючи дієслово to be у Present, Past або Future Simple.**

1. Учора вони були в бібліотеці. 2. Зараз вони в школі. 3. Завтра вони будуть у театрі. 4. У даний момент його тут немає. 5. У неділю він буде на концерті. 6. Минулої суботи він був на стадіоні. 7. Мій брат зараз у школі. 8. Мій брат був учора в кіно. 9. Мій брат буде завтра вдома. 10. Ти будеш вдома завтра? 11. Вона була вчора в парку? 12. Він зараз у дворі? 13. Де тато? 14. Де ви були вчора? 15. Де він буде завтра? 16. Мої книжки були на столі. Де вони зараз? 17. Моя мама вчора не була на роботі. Вона була вдома. 18. Мій друг не в парку. Він у школі. 19. Завтра-о третій годині Микола і Михайло будуть у дворі. 20. Ми не були на півдні минулого літа. Ми були в Москві.

8. ⇔		**Вставте дієслова have got/has got, haven't got/hasn't got.**

1. They like animals. They … three dogs and two cats.
2. Sarah … a car. She goes everywhere by bicycle.
3. Everybody likes Tom. He … a lot of friends.
4. Mr. and Mrs. Johnson … two children, a son and a daughter.
5. An insect … six legs.
6. I can't open the door. I … a key.
7. Quick! Hurry! We … much time.
8. What's wrong? – I … something in my eye.
9. Ben doesn't read much. He … many books.
10. It's a nice town. It … a very good shopping centre.

11.Alice is going to the dentist. She … a toothache.
12.Where's my newspaper? – I don't know, I … it.
13.Julia wants to go on holiday, but she … no money.
14.I'm not going to work today. I … a bad cold.

9. 	**Доповніть діалоги правильною формою дієслова have або have got. Іноді можливі 2 форми. Перекладіть українською мовою.**

1. "Rebecca,_____ you _____ a headache? You don't look very well"
   "No, it's not that. I _____ a baby and I feel sick."
   "Congratulations! Do you want a boy or a girl?"
   "Well, I _____ three boys, so it would be nice to _____ a girl this time."

2. "Jane, _____ any chocolate?"

   "No, of course, I _____. I'm on a diet"
   "You are joking. You _____ two Mars Bars yesterday."
   "I know, I _____ any willpower, but I really want to be slim for my holiday next month."
   'Good luck!"

3. "_____you _____ any pets?"
   "No, we _____. _____you?"
   "Oh, yes. We _____ a dog, two cats, and two parrots."
   "I'd love to _____ a dog, but I'm not sure about cats and parrots."
4. "Come on! We must hurry! We are late!"

   "But I _____ my passport! I can't find it anywhere!"
   "What? You _____ it yesterday. _____ a look in your bag!"
   "Thanks goodness. It's here!"

5. "Nick, I thought you _____ a company car! Why are you cycling to work?"
   "I _____an accident last week. I drove through a red light and hit a

   police car."

ТЕМА 34:

ВІДОМІ КАРТОГРАФИ СВІТУ

Заняття 5

АЛ-ІДРІСІ

1.	**Прочитайте та перекладіть текст українською мовою**

MUHAMMAD AL-IDRISI

The Tabula Rogeriana, drawn by al-Idrisi for Roger II of Sicily in 1154, one of the most advanced ancient world maps.

Al Idrisi (1099–1165 or 1166) was a Muslim geographer, cartographer, Egyptologist and traveller who lived in Sicily, at the court of King Roger II. Muhammed al-Idrisi was born in Ceuta then belonging to the Almoravid Empire and died in Sicily. Al Idrisi was a descendant of the Idrisids, who in turn were descendants of Hasan bin Ali, the son of Ali and the grandson of the Islamic prophet Muhammad.

At an early age Al-Idrisi traveled to Islamic Spain, Portugal, France and England, and visited Anatolia when he was barely 16. Al-Idrisi incorporated the knowledge of Africa, the Indian Ocean and the Far East gathered by Islamic merchants and explorers and recorded on Islamic maps with the information brought by the Normans voyagers to create the most accurate map of the world in pre-modern times, which served as a concrete illustration of his Kitab nuzhat al-mushtaq, (Latin: Opus Geographicum), which may be translated A Diversion for the Man Longing to Travel to Far-Off Places.

The Tabula Rogeriana was drawn by Al-Idrisi in 1154 for the Norman King Roger II of Sicily, after a stay of eighteen years at his court, where he worked on the commentaries and illustrations of the map. The map, with legends written in Arabic, while showing the Eurasian continent in its entirety, only shows the northern part of the African continent and lacks details of the Horn of Africa and Southeast Asia. For Roger it was inscribed on a massive disc of solid silver, two metres in diameter.

On the geographical work of al-Idrisi, S.P. Scott wrote in 1904: “The compilation of Al-Idrisi marks an era in the history of science. Not only is its historical information most interesting and valuable, but its descriptions of many parts of the earth are still authoritative. For three centuries geographers copied his maps without alteration. The relative position of the lakes which form the Nile, as

delineated in his work, does not differ greatly from that established by Baker and Stanley more than seven hundred years afterwards, and their number is the same. The mechanical genius of the author was not inferior to his erudition. The celestial and terrestrial planisphere of silver which he constructed for his royal patron was nearly six feet in diameter, and weighed four hundred and fifty pounds; upon the one side the zodiac and the constellations, upon the other-divided for convenience into segments-the bodies of land and water, with the respective situations of the various countries, were engraved."

Al-Idrisi inspired Islamic geographers such as Ibn Battuta, Ibn Khaldun and Piri Reis. His map also inspired Christopher Columbus and Vasco Da Gama.

2. ?	**Дайте відповіді на наступні запитання:**

1. What do you know about background of al-Idrisi?
2. What countries did al-Idrisi visit?
3. What did S.P. Scott characterize the geographical work of al-Idrisi?
4. Whom did al-Idrisi inspire?

3. 	**Знайдіть еквіваленти слів у тексті англійською мовою**

Географ, картограф, єгиптолог, нащадок, мандрівник, об'єднувати, Далекий Схід, дослідник, ілюстрація, коментар, упорядкування, цінний, авторитетний, зміна, окреслювати, геній, ерудиція, планісфера, сузір'я.

ГРАМАТИЧНІ ВПРАВИ
ПОВТОРЕННЯ ГРАМАТИЧНИХ ЗАСОБІВ ВИРАЖЕННЯ ЧАСУ

4. 	**Закінчить речення, використовуючи підказки в дужках. Вживайте лише форми минулого часу, додаючи інші слова, де це доцільно.**

1. Two years ago while I (work/Paris/grandfather/die).
2. As soon as I (feed/cat/do/homework).
3. First I (shower/then/dressed).
4. As he (post/letter/realize/not put/stamp).
5. By the time he'd (finish/speak/most/audience/fall asleep).
6. Once I'd (tell him/truth/fell better).

5. 	**Закінчить речення кожної групи, вибравши відповідне сполучення слів з правої колонки.**

Sue gave up smoking	for years

Sue didn’t give up smoking	when I first met her
Sue hadn’t given up smoking	years ago
Sue had given up smoking	until she was 30
Sue had been trying to give up smoking	by the time she was 30
Bill didn’t wait	since 6 o’clock
Bill had been waiting	until I arrived
Bill was waiting here	when I finally arrived
Bill was waiting an hour	for long
Bill waited	a minute ago
I haven’t been feeling well	until it was too late
They got on the plane	until late
I’d never seen him	lately
I was watching TV	at the last minute
He didn’t here the attacker	before

УКРАЇНСЬКО-АНГЛІЙСЬКИЙ ГЛОСАРІЙ ОСНОВНИХ ТЕРМІНІВ ГЕОІНФОРМАЦІЙНИХ СИСТЕМ І ТЕХНОЛОГІЙ

автоматизована картографія	automated cartography, computer aided mapping, CAM
автоматизоване дешифрування (автоматичне дешифрування)	image analysis**,** image processing, computer interpretation, automated interpretation
автоматизоване картографування	computer aided mapping, CAM
автоматизоване робоче місце (АРМ), робоча станція	work station, workstation
автоматична картографічна система (загальнокартографічна)	general automatic mapping system
автоматична картографічна система (спеціалізована)	object oriented automatic mapping system
автоматична картографічна система, АКС	automatic(al) mapping system, computer-aided mapping system
аерофотознімок	aerial photograph, aerial photo, aero photo, print
аерофотознімок збільшений	enlargement print
аерофотознімок кольоровий	colour aerial photograph
аерофотознімок контактний	contact print
аерофотознімок монохромний	monochrome aerial photograph
аерофотознімок одиночний	single photographs, single-lens photograph
аерофотознімок перспективний	oblique, aerial photograph, perspective aerial photograph
аерофотознімок плановий	vertical aerial photograph
аерофотознімок спектрозональний	false colour composite
аерофотознімок стереоскопічний	stereoscopic photograph, stereo pair
аерофотознімок чорно-білий	black-and-white aerial photograph
азимут	azimuth, bearing
азимут (астрономічний)	astronomic(al) azimuth, astronomic(al) bearing
азимут (геодезичний)	geodetic azimuth, surveying azimuth
азимут (магнітний)	compass azimuth, compass bearing, compass direction, magnetic azimuth
азимут (обернений)	back azimuth, reverse azimuth

азимут (прямий)	forward azimuth
азимути (взаємні)	mutual azimuths
алгоритм	algorithm
анагліфічна карта, анагліф	anaglyphic(al) map, anaglyph
аналіз близькості	neighbourhood analysis, proximity analysis
аналіз видимості/невидимості	viewshed analysis, visibility/invisibility analysis
аналіз і оцінка карт і атласів	map and atlases analysis
аналіз мереж	network analysis
аналітична карта	analytical map
анотація	annotation
апаратне забезпечення (апаратні засоби, апаратура, технічні засоби)	hardware
апроксимація (апроксимування)	approximation
архівування (архівація)	archiving
астрономічна зенітна відстань	astronomic(al) zenith distance
атлас (географічний атлас)	atlas, geographical atlas
атлас військовий	military atlas
атлас дорожній	road atlas
атлас загальногеографічний	general atlas
атлас комп'ютерний	computer atlas
атлас краєзнавчий	country atlas, home region atlas
атлас науково-довідниковий	scientific-reference atlas
атлас національний	national atlas
атлас регіональний	regional atlas
атлас тематичний	thematic atlas
атлас туристичний	tourist's atlas
атлас учбовий	atlas for education
атлас шкільний	school atlas
атрибут	attribute
атрибутивні дані	attribute data
атрибутування	attribute tagging, attribute matching

база даних, (БД)	data base, database, DB
бази даних (картографічні)	map database
бази даних (просторові)	spatial database
бази даних (розподілені)	distributed database
байт	byte
банк даних	databank, data bank
біт	bit
блок-діаграма	block-diagram
блок-діаграма (ізолінійна)	isoline block-diagram, isogram block-diagram
блок-діаграма (метахронна)	time-section block-diagram
блок-діаграма (профільна)	cross-section block-diagram
буферна зона	buffer zone, buffer, corridor
вектор	vector
векторизатор	vectorizer
векторизація	vectorization
векторна модель даних	vector data model
векторне представлення	vector data structure, vector data model
векторно-растрове перетворення (*син.* растеризація)	rasterization, rasterisation, gridding, vector to raster conversion
векторно-топологічне представлення (*син*. лінійно-вузлове представлення)	arc-node model
вертикальний кут	vertical angle
вершина	vertex
взаємна видимість двох точок	poin-to-point visibility, intervisibility
видання карт	map publication, map edition
висота (*син.* абсолютна висота, (висотна) відмітка)	absolute height, altitude absolute, height, elevation, altitude
висота відносна	relative height
висота геодезична	geodetic height, ellipsoid height
висота нормальна	normal height

висота ортометрична	geoidal height, orthometric height
відмивка	shading, hill shading
відмивка автоматична	analytical shading, digital shading
відмивка при боковому освітленні	oblique shading
відмивка при відвісному освітленні	vertical shading
відмивка при комбінованому освітленні	combined shading
візуалізатор (*син.* вьювер, *жарг.* вьюер)	visualizer, viewer
візуалізація (*син.* графічне відтворення, відображення)	visualization, visualisation, viewing, display, displaying
віртуальна реальність	virtual reality, VR
врізка (*син.* карта-врізка)	inset map
генералізаційні оператори	generalization operators
генералізація	generalization
генералізація автоматична	automated generalization
генералізація алгоритмічна	algorithmic generalization
генералізація динамічна	dynamic generalization
генералізація дистанційна	remote sensing generalization, optical generalization
генералізація картографічна	cartographic generalization
генералізація просторових даних	spatial data generalization, spatial data generalisation
географічна інформаційна система (геоінформаційна система, гіс)	geographic(al) information system, GIS, spatial information system
географічна основа карти (*син.* топографічна основа карти, *жарг.* топооснова)	topographic base, topographical basis, base map
геодезична зенітна відстань	geodesic zenith distance
геодезична лінія	geodesic, geodetic length, geodetic line
геодезична мережа	control net, geodetic control, geodetic net, network, frame, framework
геодезична основа карти	control, geodetic control
геодезичний пункт	geodetic points

геодезичний пункт - репер	benchmark
геодезичні мережі (знімальні)	survey control
геодезичні мережі (нівелірні, або висотні)	level control, levelling network, elevation control, vertical control, vertical net
геодезичні мережі (планові, або опорні)	plane control, horizontal control, horizontal net
геодезичні мережі згущення	control extension
геодезичні референційні системи	geodetic reference system
геодезичні роботи (основні)	basic geodetic survey
геодезія	geodesy
геодезія вища	geodetic survey(ing), higher geodesy, higher survey(ing)
геодезія космічна, або супутникова	celestial geodesy, satellite geodesy, space geodesy
геодезія морська	marine geodesy
геодезія прикладна, або інженерна	applied geodesy, engineering geodesy
геодезія сфероїдична	spheroid(al) geodesy, geodesy on the ellipsoid
геодезія теоретична	theoretical geodesy, physical geodesy
геозображення	geoimage, georepresentation
геоіконіка	geoiconics
геоінформатика	GIS technology, geo-informatics
геоінформаційне картографування	geoinformational mapping, geoinformatic mapping
геоінформаційний аналіз	GIS-based analysis
геоінформаційні технології (*син*. гіс-технології)	GIS
геоїд	geoid
геокодування	geocoding
геоматика	geomatics
геоцентрична грінвичська прямокутна система координат	Earth-centered Greenwich cartesian coordinate system
глобус	globe

глобус земний	terrestrial globe
глобус небесний	celestial globe
глобус планетний	planetary globe
горизонтальний кут	horizontal angle
гравіювальні інструменти	scribing instruments, scribers, scribing cutters
границя	border, boundary, edge
граф	graph, linear complex, complex
графічний інтерфейс користувача	graphical user interface, GUI
графічний образ	pattern, graphic image
дальномір	distance meter
дані	datum, *pl.* data
дані дистанційного зондування, (ДДЗ)	remote sensing data, remotely sensed data, remote surveying data, aerospace data
дешифрувальні ознаки	indication
дешифрувальні ознаки (непрямі або індикаційні)	indirect signs, indicators
дешифрувальні ознаки (прямі)	direct signs
дешифрування	interpretation, photo interpretation, decoding
дигитайзер	digitizer, digitiser, tablet, table digitizer, digitizer tablet, digital tablet, graphic tablet
дирекційний кут	bearing, direction angle, grid azimuth, grid bearing, Y- azimuth
диспетчеризація	dispatching
дисплей	display, display device
дистанційне зондування, дз	remote sensing, remote surveying, *RS*
дистанційні методи	remote sensing methods, distant methods
довгота	longitude
довгота астрономічна	astronomic(al) longitude
довгота геодезична	geodetic longitude

довгота геоцентрична	geocentric longitude
драйвер	driver, device driver
дуга	arc, string, chain, line, edge
екватор	equator
економіка картографічного виробництва	economics of cartographic production
експертна система, ес	expert system
експозиція (схилу)	aspect, compass aspect, exposure, direction of steepest slope
елементи карти	component elements of map, map features
еліпс спотворень (*син.* індикатриса Тіссо)	ellipse of distortion, Tissot's indicatrix
еліпсоїд	ellipsoid
еліпсоїд загальноземний	World ellipsoid
еліпсоїд земний	Earth ellipsoid
еліпсоїд обертання	revolution Earth ellipsoid ellipsoid
еліпсоїд рівневий	level ellipsoid
еліпсоїд тривісний	triaxial ellipsoid
задача комівояжера	travelling salesman problem
запит	query, request
зарамкове оформлення карти	marginal information, marginal representation
засічка	intersection
збірний лист	key map, index sheet
зближення меридіанів	convergence of meridians, convergent angle, grid declination, declination of grid north, theta angle
земельна інформаційна система, зіс	land information system
зенітна відстань	zenith angle, zenith distance
зшивка	mapjoin, mosaicking
ідентифікатор	identifier
інтерактивна обробка	interactive mode, interactive processing, conversational mode

інтернет	Internet
інтерполяція	interpolation
інтерфейс	interface
інформативність карти	map informativity, map capacity
інформатика	informatics, computer science
інформаційне забезпечення	information support
інформація	information
калібровка даних	data calibration
карта	map, chart
карти дрібномасштабні	small scale maps
карти загальногеографічні	general maps
карти крупномасштабні	large scale maps
карти середньомасштабні	medium scale maps
карти тематичні	thematic maps
картограма	cartogram choropleth map
картографічна база даних	cartographic data base, cartographic database, CDB
картографічна бібліографія	map bibliography
картографічна інформація	cartographic information
картографічна комунікація	cartographic communication, communication in cartography
картографічна сітка	graticule, map graticule, cartographical grid
картографічне креслення	drawing, cartographic(al) drawing
картографічний банк даних, КБД, КБнД	cartographic data bank, cartographic databank, CDB
картографічний дизайн	cartographic design
картографічний метод дослідження	cartographic method of research
картографічний образ	cartographic pattern, cartographic image
картографічний проектор	map projector
картографічний фонд	stock of maps, inventory of maps
картографія	cartography, mapping science

картографування	mapping, map (atlas) compilation
картодіаграма	diagram map, diagrammatic map
картометрія	cartometry
картосхема (*син*. карта-схема)	schematic map, sketch map
квантування	quantization, quantisation
класифікація	classification
кластеризація	clustering
комплексне картографування	complex mapping
компоновка карти	map montage, map assembly
конвертування форматів	format conversion
конфігурація	configuration
координати	coordinates
координати (прямокутні в просторі)	rectangular space coordinates, spatial coordinates, 3D coordinates, three dimensional coordinates
координати (прямокутні на площині)	planimetric rectangular coordinates, 2D coordinates, two dimensional coordinates
координати (прямокутні, або Декартові)	grid coordinates, rectangular coordinates, right-angled coordinates, Cartesian coordinates
координати Гаусса-Крюгера	Gauss-Kruger coordinates
координати географічні	geographic(al) coordinates
координати геоцентричні	geocentric coordinates
координати горизонтні	horizontal coordinates
координати екваторіальні	equatorial coordinates
координати еліпсоїдальні	ellipsoidal coordinates
координати квазигеоцентричні	quasi-geocentric coordinates
координати криволінійні	curvilinear coordinates
координати полярні	polar coordinates
координати сферичні	spherical coordinates
координати топоцентричні	topocentric coordinates
координатограф	coordinatograph

координатометр	coordinate-measuring machine
копіювальна рама	back, printing frame, contact screen
коректури карти	chart correction
космічне картографування	space mapping
кривизна	curvature
курвіметр	curvimeter, curvometer
курсор	cursor, puck
кут нахилу (*син*. стрімкість схилу)	slope, gradient, slope gradient, slope angle, angle of inclination
кутова висота	angle of elevation
легенда карти	legend, map legend, sheet memoir
лінія	line, line feature, linear feature
локсодромія	loxodrome, rhumb line
магнітний схил	declination, compass declination
макрос	macro, macro instruction, macrocommand, macrocode
масштаб	scale, horizontal scale
масштаб видання	reproduction scale
масштаб графічний	graphic scale
масштаб лінійний	linear scale, bar scale, scale bar
масштаб числовий	representative fraction, natural scale
математико-картографічне моделювання	mathematical and cartographical modelling
математична картографія	mathematical cartography
математична основа карт	mathematic(al) base
меридіан	meridian
меридіан астрономічний	astronomic(al) meridian
меридіан геодезичний	geodetic meridian
меридіан геоцентричний	geocentric meridian
меридіан осьовий	central meridian, reference meridian
меридіан початковий	prime meridian, principal meridian, zero meridian
метадані	metadata

метод найменших квадратів	least-squares method
мітка	label
множина	set
модель просторових даних	geospatial data model
модем	modem
надійність	reliability
надійність інформаційна	informational reliability
надійність комунікаційна	communicative reliability
надійність організаційна	organizational reliability
надійність технічна	technical reliability
надписи на карті	lettering, inscriptions
накидний монтаж	mosaic, photographic strip
нівелір	level
номенклатура карт	sheet numbering system, map numbering
обробка знімків	image processing
оновлення (*син.* актуалізація)	updating, update
оновлення карти	map revision
оновлення періодичне	cyclic revision
операційна система, ос	operating system, OS
опція	option
оригінал географічної основи	topographic base plate
оригінал карти	original map, basic design
оригінал карти (авторський)	compilation manuscript
оригінал карти (видавницький)	fair draught, fair drafting, fair drawing, final compilation
оригінал карти (напівтоновий)	screen plate
оригінал карти (складацький)	original plot, drawing original, compilation map, compilation sheet, base sheet
оригінал карти (штриховий)	detail plate, line original
оригінал надписів	names overlay, names plate
оригінали карти (кольороподілені)	colour plate, color-separated copy,

	map separates, separation plate, individual image
ортодромія	orthodrome, orthodromic line
ортофотоплан	ortophoto(graph), ortophotoplan, ortophotomap
оснащення карти	equipment of map
оформлення карт	map design, overall design of map
пакетна обробка (*син*. пакетний режим)	batch processing
палетка	measuring grid
пантограф	pantographs
паралель	parallel
перекриття	overlap, lap
перекриття повздовжнє	forward lap, end lap
перекриття поперечне	lateral lap, side lap
периферійні пристрої	peripherals, peripheral, peripheral devices, peripheral equipment, peripheral unit
перспектограф	perspective drawing instruments
Піксел	pixel, pel
Піктограма (*син.* значок, "іконка", "ікона", маркер)	icon
планіметр	planimeter, integrating instruments
Планіметр	planimeter
Поверхня	surface, relief
Позиціонування	positioning, *GPS* measurement, *GPS* surveying
Полігон	polygon, area, area feature, region, face
полігони (діаграми) Вороного	Voronoi diagrams
полігони Дірихле	Dirichlet tessellation
полігони Тиссена	Thiessen polygons
Пошук найближчого сусіда	nearest neighbour analysis
приймачі позиціонування	*GPS* receivers, *GLONASS* receivers,

	GPS /*GLONASS* receivers
прилади геодезичні	geodetic instrument
програмне забезпечення (*син.* математичне забезпечення, програмні засоби)	software
проекції азимутальні	azimutal projections, zenithal projections
проекції багатогранні	polyhedral projections
проекції довільні	arbitrary projections, aphylactic projections, compromise map projections
проекції картографічні	map projection, projection
проекції конічні	conic(al) projections
проекції косі	oblique aspect (or case) of a map projection
проекції нормальні	normal projections, normal aspect (or case) of a map projection
проекції поліконічні	polyconic projections
проекції поперечні	transverse projection, transverse aspect (or case) of a map projection
проекції псевдоконічні	pseudo-conical projections
проекції псевдоциліндричні	pseudo-cylindrical projections
проекції рівновеликі	equivalent projections, equal-area projections
проекції рівнокутні	conformal projections, orthomorphic projections
проекції рівнопроміжкові	equidistant projections
проекції умовні	conventional projections
проекції циліндричні	cylindrical projections
просторовий аналіз	spatial analysis
просторовий об’єкт	feature, spatial feature, geographic(al) feature, object
просторові дані (*син.* географічні дані)	spatial data, geographic(al) data, geospatial data, georeferenced data
профіль поперечного перетину	cross-section, profile

процесор	processor
рамка внутрішня	neat line
рамка градусна і мінутна	grade and minute frame
рамка зовнішня	exterior margin, external margin, map edge, sheet margin
рамки карти	framework, map margin, map border, sheet border
растр	raster
растрове представлення (*син.* растрова модель даних)	raster data structure, tessellation data structure, grid data structure, raster data model
растрово-векторное перетворення (*син.* векторизація)	vectorization, raster to vector conversion
ребро	edge
регулярна сітка	grid, regular grid, tessellation
редагування карти (атласу)	map editing, editing of atlas
рельєфні карти	plastic relief map
розграфлення карти	sheet line system
розпізнавання образів	pattern recognition, icon identification
румб	cardinal point, cardinal direction, rhumb
сегмент	line segment, segment, chord
синтезоване зображення	image composition
синтетичне картографування	synthetic mapping
системне картографування	system mapping
сітка (на карті)	grid, map grid
сітка географічна	geographical grid, graticule
сітка картографічна	graticule, cartographic(al) grid
сітка кілометрова	square grid, standard grid
сітка прямокутна	grid
сканування	scanning
спеціальна карта	special-purpose map
старіння карти	map aging

стереомодель	stereo model
стрілка-вказівник "північ-південь"	north arrow
сумісність геозображень	compatibility of geoimages
сфероїд	spheroid
схема зближення меридіанів	declination diagram
схема магнітного схилення	magnetic declination diagram
схеми розташування суміжних листів карти	index adjoining sheets
сцена	scene
тахеометр	tacheometer
тегування	tagging
текстове супроводження	lettering
тематична карта (*син.* галузева карта)	thematic map
теодоліт	theodolite
термінал	terminal
топографічна карта	topographic map
топографія	topography
топологізація	topologization
точка огляду	vista point, viewpoint, point of view
точність вимірювань за картою	map measuring accuracy
трансформація проекцій	projection change, projection transformation, projection conversion
трансформування координат	transformation coordinates
тріангуляція	triangulation network
умовні позначки	conventional sign, (cartographic) symbols, map symbols
умовні позначки (лінійні)	line symbols
умовні позначки (площинні)	area pattern, area symbols
умовні позначки (позамасштабні)	point symbols
Фотограмметрія	photogrammetry
Фотокарта	photomap, photographic map
фотоплан	aerial photoplan

Фотоплівка	photographic film
фоторельєф	photographic hill shading
фоторепродукційна камера	photocopier
Фотосхема	photomontage
фрагментування	tiling
центроїд	centroid, seed
циркуль-вимірювач	divider
цифрова карта	digital map
цифрова картографія	digital cartography
цифрова модель рельєфу, ЦМР	digital terrain model, *DTM*; digital elevation model, *DEM*; Digital Terrain Elevation Data, *DTED*
цифрування	digitizing, digitising, digitalization
шар	layer, theme, coverage, overlay
широта	latitude
шкала закладень	slope diagram
шкали (на картах)	scale, graduation
штучний інтелект	artifical intelligence, AI

АНГЛО-УКРАЇНСЬКИЙ ГЛОСАРІЙ ОСНОВНИХ ТЕРМІНІВ ГЕОІНФОРМАЦІЙНИХ СИСТЕМ І ТЕХНОЛОГІЙ

absolute height, altitude absolute, height, elevation, altitude	висота (*син.* абсолютна висота, (висотна) відмітка)
aerial photograph, aerial photo, aero photo, print	аерофотознімок
aerial photoplan	фотоплан
algorithm	алгоритм
algorithmic generalization	генералізація алгоритмічна
anaglyphic(al) map, anaglyph	анагліфічна карта, анагліф
analytical map	аналітична карта
analytical shading, digital shading	відмивка автоматична
angle of elevation	кутова висота
annotation	анотація
applied geodesy, engineering geodesy	геодезія прикладна, або інженерна
approximation	апроксимація (апроксимування)
arbitrary projections, aphylactic projections, compromise map projections	проекції довільні
arc, string, chain, line, edge	дуга
archiving	архівування (архівація)
arc-node model	векторно-топологічне представлення (*син*. лінійно-вузлове представлення)
area pattern, area symbols	умовні позначки (площинні)
artifical intelligence, AI	штучний інтелект
aspect, compass aspect, exposure, direction of steepest slope	експозиція (схилу)
astronomic(al) azimuth, astronomic(al) bearing	азимут (астрономічний)
astronomic(al) longitude	довгота астрономічна
astronomic(al) meridian	меридіан астрономічний
astronomic(al) zenith distance	астрономічна зенітна відстань
atlas for education	атлас учбовий
atlas, geographical atlas	атлас (географічний атлас)
attribute	атрибут

attribute data	атрибутивні дані
attribute tagging, attribute matching	атрибутування
automated cartography, computer aided mapping, CAM	автоматизована картографія
automated generalization	генералізація автоматична
automatic(al) mapping system, computer-aided mapping system	автоматична картографічна система, АКС
azimutal projections, zenithal projections	проекції азимутальні
azimuth, bearing	азимут
back azimuth, reverse azimuth	азимут (обернений)
back, printing frame, contact screen	копіювальна рама
basic geodetic survey	геодезичні роботи (основні)
batch processing	пакетна обробка (*син*. пакетний режим)
bearing, direction angle, grid azimuth, grid bearing, Y- azimuth	дирекційний кут
benchmark	геодезичний пункт - репер
bit	біт
black-and-white aerial photograph	аерофотознімок чорно-білий
block-diagram	блок-діаграма
border, boundary, edge	границя
buffer zone, buffer, corridor	буферна зона
byte	байт
cardinal point, cardinal direction, rhumb	румб
cartogram choropleth map	картограма
cartographic communication, communication in cartography	картографічна комунікація
cartographic data bank, cartographic databank, CDB	картографічний банк даних, КБД, КБнД
cartographic data base, cartographic database, CDB	картографічна база даних
cartographic design	картографічний дизайн

cartographic generalization	генералізація картографічна
cartographic information	картографічна інформація
cartographic method of research	картографічний метод дослідження
cartographic pattern, cartographic image	картографічний образ
cartography, mapping science	картографія
cartometry	картометрія
celestial geodesy, satellite geodesy, space geodesy	геодезія космічна, або супутникова
celestial globe	глобус небесний
central meridian, reference meridian	меридіан осьовий
centroid, seed	центроїд
classification	класифікація
clustering	кластеризація
colour aerial photograph	аерофотознімок кольоровий
colour plate, color-separated copy, map separates, separation plate, individual image	оригінали карти (кольороподілені)
combined shading	відмивка при комбінованому освітленні
communicative reliability	надійність комунікаційна
compass azimuth, compass bearing, compass direction, magnetic azimuth	азимут (магнітний)
compatibility of geoimages	сумісність геозображень
compilation manuscript	оригінал карти (авторський)
complex mapping	комплексне картографування
component elements of map, map features	елементи карти
computer aided mapping, CAM	автоматизоване картографування
computer atlas	атлас комп’ютерний
configuration	конфігурація
conformal projections, orthomorphic projections	проекції рівнокутні
conic(al) projections	проекції конічні

contact print	аерофотознімок контактний
control extension	геодезичні мережі згущення
control net, geodetic control, geodetic net, network, frame, framework	геодезична мережа
control, geodetic control	геодезична основа карти
conventional projections	проекції умовні
conventional sign, (cartographic) symbols, map symbols	умовні позначки
convergence of meridians, convergent angle, grid declination, declination of grid north, theta angle	зближення меридіанів
coordinate-measuring machine	координатометр
coordinates	координати
coordinatograph	координатограф
country atlas, home region atlas	атлас краєзнавчий
cross-section block-diagram	блок-діаграма (профільна)
cross-section, profile	профіль поперечного перетину
cursor, puck	курсор
curvature	кривизна
curvilinear coordinates	координати криволінійні
curvimeter, curvometer	курвіметр
cyclic revision	оновлення періодичне
cylindrical projections	проекції циліндричні
data base, database, DB	база даних, (БД)
data calibration	калібровка даних
databank, data bank	банк даних
datum, *pl.* data	дані
declination diagram	схема зближення меридіанів
declination, compass declination	магнітний схил
detail plate, line original	оригінал карти (штриховий)
diagram map, diagrammatic map	картодіаграма
digital cartography	цифрова картографія
digital map	цифрова карта

digital terrain model, *DTM*; digital elevation model, *DEM*; Digital Terrain Elevation Data, *DTED*	цифрова модель рельєфу, ЦМР
digitizer, digitiser, tablet, table digitizer, digitizer tablet, digital tablet, graphic tablet	дигитайзер
digitizing, digitising, digitalization	цифрування
direct signs	дешифрувальні ознаки (прямі)
Dirichlet tessellation	полігони Дірихле
dispatching	диспетчеризація
display, display device	дисплей
distance meter	дальномір
distributed database	бази даних (розподілені)
divider	циркуль-вимірювач
drawing, cartographic(al) drawing	картографічне креслення
driver, device driver	драйвер
dynamic generalization	генералізація динамічна
Earth ellipsoid	еліпсоїд земний
Earth-centered Greenwich cartesian coordinate system	геоцентрична грінвичська прямокутна система координат
economics of cartographic production	економіка картографічного виробництва
edge	ребро
ellipse of distortion, Tissot's indicatrix	еліпс спотворень (*син.* індикатриса Тіссо)
ellipsoid	еліпсоїд
ellipsoidal coordinates	координати еліпсоїдальні
enlargement print	аерофотознімок збільшений
equator	екватор
equatorial coordinates	координати екваторіальні
equidistant projections	проекції рівнопроміжкові
equivalent projections, equal-area projections	проекції рівновеликі
expert system	експертна система, ес

exterior margin, external margin, map edge, sheet margin	рамка зовнішня
fair draught, fair drafting, fair drawing, final compilation	оригінал карти (видавницький)
false colour composite	аерофотознімок спектрозональний
feature, spatial feature, geographic(al) feature, object	просторовий об’єкт
format conversion	конвертування форматів
forward azimuth	азимут (прямий)
forward lap, end lap	перекриття повздовжнє
framework, map margin, map border, sheet border	рамки карти
Gauss-Kruger coordinates	координати Гаусса-Крюгера
general atlas	атлас загальногеографічний
general automatic mapping system	автоматична картографічна система (загальнокартографічна)
general maps	карти загальногеографічні
generalization	генералізація
generalization operators	генералізаційні оператори
geocentric coordinates	координати геоцентричні
geocentric longitude	довгота геоцентрична
geocentric meridian	меридіан геоцентричний
geocoding	геокодування
geodesic zenith distance	геодезична зенітна відстань
geodesic, geodetic length, geodetic line	геодезична лінія
geodesy	геодезія
geodetic azimuth, surveying azimuth	азимут (геодезичний)
geodetic height, ellipsoid height	висота геодезична
geodetic instrument	прилади геодезичні
geodetic longitude	довгота геодезична
geodetic meridian	меридіан геодезичний
geodetic points	геодезичний пункт

geodetic reference system	геодезичні референційні системи
geodetic survey(ing), higher geodesy, higher survey(ing)	геодезія вища
geographic(al) coordinates	координати географічні
geographic(al) information system, GIS, spatial information system	географічна інформаційна система (геоінформаційна система, гіс)
geographical grid, graticule	сітка географічна
geoiconics	геоіконіка
geoid	геоїд
geoidal height, orthometric height	висота ортометрична
geoimage, georepresentation	геозображення
geoinformational mapping, geoinformatic mapping	геоінформаційне картографування
geomatics	геоматика
geospatial data model	модель просторових даних
GIS	геоінформаційні технології (*син*. гіс-технології)
GIS technology, geo-informatics	геоінформатика
GIS-based analysis	геоінформаційний аналіз
globe	глобус
GPS receivers, *GLONASS* receivers, *GPS* /*GLONASS* receivers	приймачі позиціонування
grade and minute frame	рамка градусна і мінутна
graph, linear complex, complex	граф
graphic scale	масштаб графічний
graphical user interface, GUI	графічний інтерфейс користувача
graticule, cartographic(al) grid	сітка картографічна
graticule, map graticule, cartographical grid	картографічна сітка
grid	сітка прямокутна
grid coordinates, rectangular coordinates, right-angled coordinates, Cartesian coordinates	координати (прямокутні, або Декартові)
grid, map grid	сітка (на карті)

grid, regular grid, tessellation	регулярна сітка
hardware	апаратне забезпечення (апаратні засоби, апаратура, технічні засоби)
horizontal angle	горизонтальний кут
horizontal coordinates	координати горизонтні
icon	Піктограма (*син.* значок, "іконка", "ікона", маркер)
identifier	ідентифікатор
image analysis**,** image processing, computer interpretation, automated interpretation	автоматизоване дешифрування (автоматичне дешифрування)
image composition	синтезоване зображення
image processing	обробка знімків
index adjoining sheets	схеми розташування суміжних листів карти
indication	дешифрувальні ознаки
indirect signs, indicators	дешифрувальні ознаки (непрямі або індикаційні)
informatics, computer science	інформатика
information	інформація
information support	інформаційне забезпечення
informational reliability	надійність інформаційна
inset map	врізка (*син.* карта-врізка)
interactive mode, interactive processing, conversational mode	інтерактивна обробка
interface	інтерфейс
Internet	інтернет
interpolation	інтерполяція
interpretation, photo interpretation, decoding	дешифрування
intersection	засічка
isoline block-diagram, isogram block-diagram	блок-діаграма (ізолінійна)
key map, index sheet	збірний лист

label	мітка
land information system	земельна інформаційна система, зіс
large scale maps	карти крупномасштабні
lateral lap, side lap	перекриття поперечне
latitude	широта
layer, theme, coverage, overlay	шар
least-squares method	метод найменших квадратів
legend, map legend, sheet memoir	легенда карти
lettering	текстове супроводження
lettering, inscriptions	надписи на карті
level	нівелір
level control, levelling network, elevation control, vertical control, vertical net	геодезичні мережі (нівелірні, або висотні)
level ellipsoid	еліпсоїд рівневий
line segment, segment, chord	сегмент
line symbols	умовні позначки (лінійні)
line, line feature, linear feature	лінія
linear scale, bar scale, scale bar	масштаб лінійний
longitude	довгота
loxodrome, rhumb line	локсодромія
macro, macro instruction, macrocommand, macrocode	макрос
magnetic declination diagram	схема магнітного схилення
map aging	старіння карти
map and atlases analysis	аналіз і оцінка карт і атласів
map bibliography	картографічна бібліографія
map database	бази даних (картографічні)
map design, overall design of map	оформлення карт
map editing, editing of atlas	редагування карти (атласу)
map informativity, map capacity	інформативність карти
map measuring accuracy	точність вимірювань за картою
map montage, map assembly	компоновка карти

map projection, projection	проекції картографічні
map projector	картографічний проектор
map publication, map edition	видання карт
map revision	оновлення карти
map, chart	карта
mapjoin, mosaicking	зшивка
mapping, map (atlas) compilation	картографування
marginal information, marginal representation	зарамкове оформлення карти
marine geodesy	геодезія морська
mathematic(al) base	математична основа карт
mathematical and cartographical modelling	математико-картографічне моделювання
mathematical cartography	математична картографія
measuring grid	палетка
medium scale maps	карти середньомасштабні
meridian	меридіан
metadata	метадані
military atlas	атлас військовий
modem	модем
monochrome aerial photograph	аерофотознімок монохромний
mosaic, photographic strip	накидний монтаж
mutual azimuths	азимути (взаємні)
names overlay, names plate	оригінал надписів
national atlas	атлас національний
nearest neighbour analysis	Пошук найближчого сусіда
neat line	рамка внутрішня
neighbourhood analysis, proximity analysis	аналіз близькості
network analysis	аналіз мереж
normal height	висота нормальна
normal projections, normal aspect (or case) of a map projection	проекції нормальні

north arrow	стрілка-вказівник "північ-південь"
object oriented automatic mapping system	автоматична картографічна система (спеціалізована)
oblique aspect (or case) of a map projection	проекції косі
oblique shading	відмивка при боковому освітленні
oblique, aerial photograph, perspective aerial photograph	аерофотознімок перспективний
operating system, OS	операційна система, ос
option	опція
organizational reliability	надійність організаційна
original map, basic design	оригінал карти
original plot, drawing original, compilation map, compilation sheet, base sheet	оригінал карти (складацький)
orthodrome, orthodromic line	ортодромія
ortophoto(graph), ortophotoplan, ortophotomap	ортофотоплан
overlap, lap	перекриття
pantographs	пантограф
parallel	паралель
pattern recognition, icon identification	розпізнавання образів
pattern, graphic image	графічний образ
peripherals, peripheral, peripheral devices, peripheral equipment, peripheral unit	периферійні пристрої
perspective drawing instruments	перспектограф
photocopier	фоторепродукційна камера
photogrammetry	Фотограмметрія
photographic film	Фотоплівка
photographic hill shading	фоторельєф
photomap, photographic map	Фотокарта
photomontage	Фотосхема

pixel, pel	Піксел
plane control, horizontal control, horizontal net	геодезичні мережі (планові, або опорні)
planetary globe	глобус планетний
planimeter	Планіметр
planimeter, integrating instruments	планіметр
planimetric rectangular coordinates, 2D coordinates, two dimensional coordinates	координати (прямокутні на площині)
plastic relief map	рельєфні карти
point symbols	умовні позначки (позамасштабні)
poin-to-point visibility, intervisibility	взаємна видимість двох точок
polar coordinates	координати полярні
polyconic projections	проекції поліконічні
polygon, area, area feature, region, face	Полігон
polyhedral projections	проекції багатогранні
positioning, *GPS* measurement*, GPS* surveying	Позиціонування
prime meridian, principal meridian, zero meridian	меридіан початковий
processor	процесор
projection change, projection transformation, projection conversion	трансформація проекцій
pseudo-conical projections	проекції псевдоконічні
pseudo-cylindrical projections	проекції псевдоциліндричні
quantization, quantisation	квантування
quasi-geocentric coordinates	координати квазигеоцентричні
query, request	запит
raster	растр
raster data structure, tessellation data structure, grid data structure, raster data model	растрове представлення (*син.* растрова модель даних)
rasterization, rasterisation, gridding, vector to raster conversion	векторно-растрове перетворення (*син.* растеризація)

rectangular space coordinates, spatial coordinates, 3D coordinates, three dimensional coordinates	координати (прямокутні в просторі)
regional atlas	атлас регіональний
relative height	висота відносна
reliability	надійність
remote sensing data, remotely sensed data, remote surveying data, aerospace data	дані дистанційного зондування, (ДДЗ)
remote sensing generalization, optical generalization	генералізація дистанційна
remote sensing methods, distant methods	дистанційні методи
remote sensing, remote surveying, *RS*	дистанційне зондування, дз
representative fraction, natural scale	масштаб числовий
reproduction scale	масштаб видання
revolution Earth ellipsoid ellipsoid	еліпсоїд обертання
road atlas	атлас дорожній
scale, graduation	шкали (на картах)
scale, horizontal scale	масштаб
scanning	сканування
scene	сцена
schematic map, sketch map	картосхема (*син*. карта-схема)
school atlas	атлас шкільний
scientific-reference atlas	атлас науково-довідниковий
screen plate	оригінал карти (напівтоновий)
scribing instruments, scribers, scribing cutters	гравіювальні інструменти
set	множина
shading, hill shading	відмивка
sheet line system	розграфлення карти
sheet numbering system, map numbering	номенклатура карт
single photographs, single-lens	аерофотознімок одиночний

photograph	
slope diagram	шкала закладень
slope, gradient, slope gradient, slope angle, angle of inclination	кут нахилу (*син*. стрімкість схилу)
small scale maps	карти дрібномасштабні
software	програмне забезпечення (*син*. математичне забезпечення, програмні засоби)
space mapping	космічне картографування
spatial analysis	просторовий аналіз
spatial data generalization, spatial data generalisation	генералізація просторових даних
spatial data, geographic(al) data, geospatial data, georeferenced data	просторові дані (*син.* географічні дані)
spatial database	бази даних (просторові)
special-purpose map	спеціальна карта
spherical coordinates	координати сферичні
spheroid	сфероїд
spheroid(al) geodesy, geodesy on the ellipsoid	геодезія сфероїдична
square grid, standard grid	сітка кілометрова
stereo model	стереомодель
stereoscopic photograph, stereo pair	аерофотознімок стереоскопічний
stock of maps, inventory of maps	картографічний фонд
surface, relief	Поверхня
survey control	геодезичні мережі (знімальні)
synthetic mapping	синтетичне картографування
system mapping	системне картографування
tacheometer	тахеометр
tagging	тегування
technical reliability	надійність технічна
terminal	термінал
terrestrial globe	глобус земний

thematic atlas	атлас тематичний
thematic map	тематична карта (*син.* галузева карта)
thematic maps	карти тематичні
theodolite	теодоліт
theoretical geodesy, physical geodesy	геодезія теоретична
Thiessen polygons	полігони Тиссена
tiling	фрагментування
time-section block-diagram	блок-діаграма (метахронна)
topocentric coordinates	координати топоцентричні
topographic base plate	оригінал географічної основи
topographic base, topographical basis, base map	географічна основа карти (*син.* топографічна основа карти, *жарг.* топооснова)
topographic map	топографічна карта
topography	топографія
topologization	топологізація
tourist's atlas	атлас туристичний
transformation coordinates	трансформування координат
transverse projection, transverse aspect (or case) of a map projection	проекції поперечні
travelling salesman problem	задача комівояжера
triangulation network	тріангуляція
triaxial ellipsoid	еліпсоїд тривісний
updating, update	оновлення (*син.* актуалізація)
vector	вектор
vector data model	векторна модель даних
vector data structure, vector data model	векторне представлення
vectorization	векторизація
vectorization, raster to vector conversion	растрово-векторное перетворення (*син.* векторизація)
vectorizer	векторизатор

vertex	вершина
vertical aerial photograph	аерофотознімок плановий
vertical angle	вертикальний кут
vertical shading	відмивка при відвісному освітленні
viewshed analysis, visibility/invisibility analysis	аналіз видимості/невидимості
virtual reality, VR	віртуальна реальність
vista point, viewpoint, point of view	точка огляду
visualization, visualisation, viewing, display, displaying	візуалізація (*син.* графічне відтворення, відображення)
visualizer, viewer	візуалізатор (*син.* вьювер, *жарг.* вьюер)
Voronoi diagrams	полігони (діаграми) Вороного
work station, workstation	автоматизоване робоче місце (АРМ), робоча станція
World ellipsoid	еліпсоїд загальноземний
zenith angle, zenith distance	зенітна відстань
equipment of map	оснащення карти
chart correction	коректури карти

Tactical Signs (Symbols)


A unit


Headquarters


An observation post


Squad


Section or unit larger than squad but smaller than a platoon


Platoon or Detachment

Company, Battery, or Troop


Battalion or Squadron


Group or Regiment


Brigade or Equivalent Command


Division


Armor


Artillery


Chemical


Cavalry
(Reconnaissance)


Engineer


Infantry


Medical

Military Police


Ordnance

Signal

Transportation

Airborne

Army Aviation

Medium mortar

Light antitank rocket launcher

Medium gun or gun/howitzer

Heavy rocket launcher (artillery)

Medium missile or rocket

105-mm howitzer

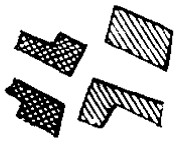
Light tank

Medium tank

Heavy tank

Personnel vehicles

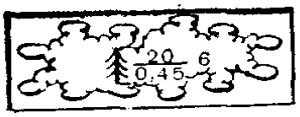
Conventional Signs (Symbols)



Inhabited point

Isolated living house

A foliage forest

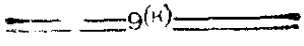


A fir wood

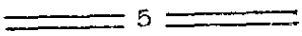
Mixed wood

Streams, rivers

Railroad

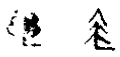


Highway

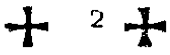


Dirt roads

Roads, trails



Trees



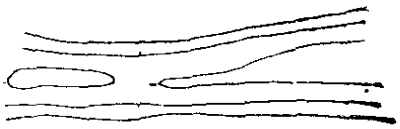
Church

Cemetery —

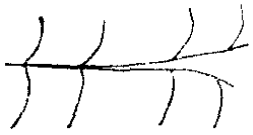
Hill, mountain

Hollow

Delt



Saddle

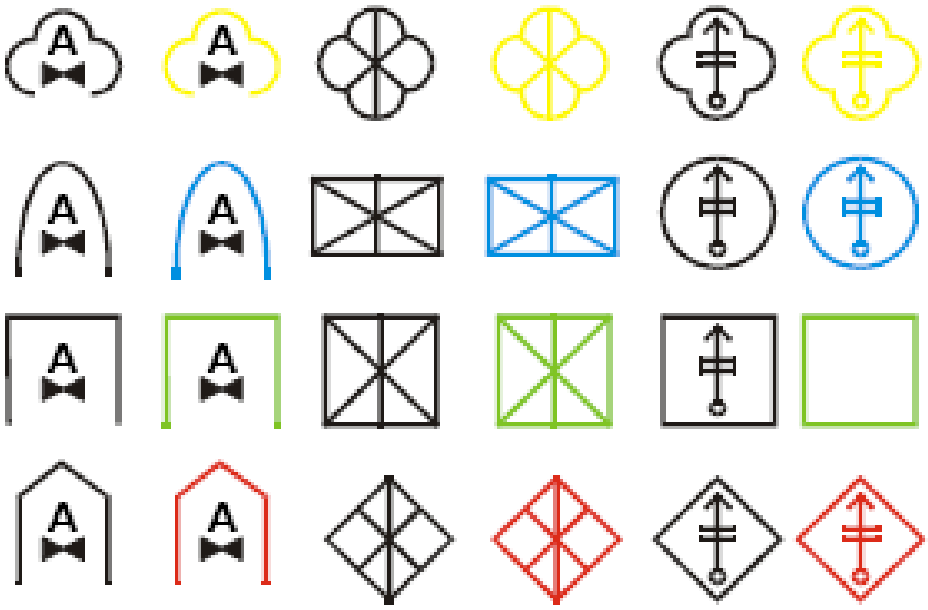


Narrow ravine

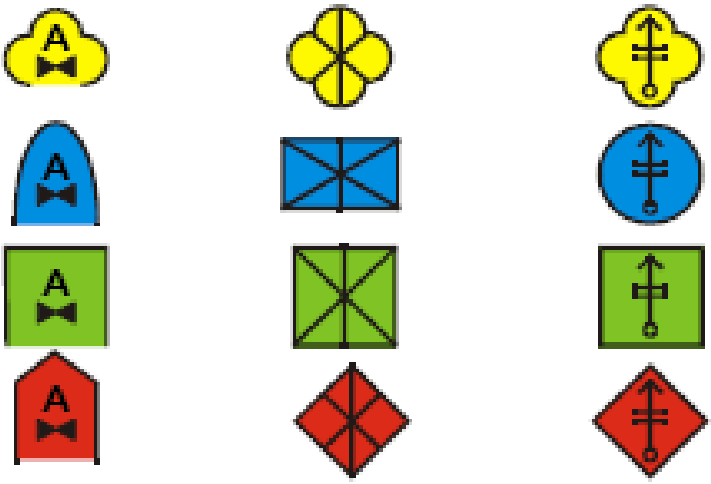
EXAMPLES OF HAND-DRAWN AND COMPUTER-GENERATED SYMBOLS

AVIATION		UNITS		EQUIPMENT	
ROTARY WING AIRCRAFT		INFANTRY MOTORIZED		MORTAR MEDIUM	
Black	Colour	Black	Colour	Black	Colour

Hand-drawn Symbols

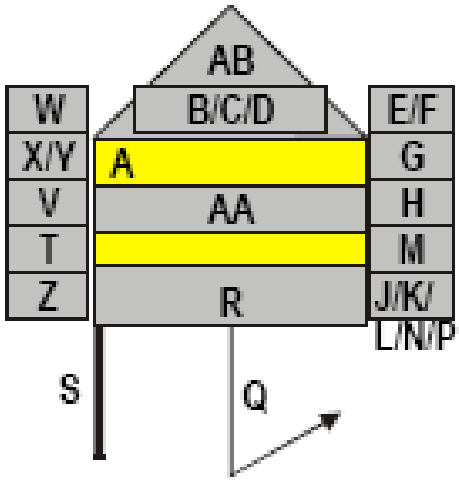


Computer-generated Colour-filled Symbols



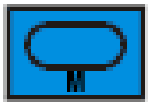
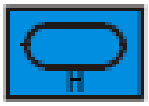
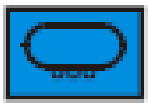
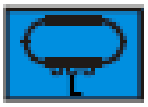
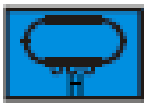
FIELD POSITIONS FOR UNITS, INSTALLATIONS AND EQUIPMENT

A : Symbol Indicator
B : Size Indicator
C : Quantity of Equipment
D : Battle Group Indicator
E : Suspect, Assumed Friend, Faker, Joker
F : Reinforced or Detached
G : Staff Comments
H : Additional Information
J : Evaluation Rating
K : Combat Effectiveness
L : Signature Equipment
M : Higher Formation
N : Hostile (Enemy)
P : Identification Modes and Codes
Q : Direction of Movement Indicator
R : Mobility Indicator
S : Headquarters Staff Indicator
T : Unique Designation
V : Type of Equipment
W : Date-Time-Group (DTG)
X : Altitude/Depth
Y : Location
Z : Speed
AA : Special C^2 Headquarters
AB : Feint/Dummy Indicator



3

Military Symbols for Land Operations

OPERATIONAL ICONS—COMBAT ARMS				
DESCRIPTION	UNKNOWN	FRIEND	NEUTRAL	HOSTILE
ARMOUR TRACK MEDIUM				
ARMOUR TRACK HEAVY				
ARMOUR TRACK RECOVERY				
ARMOUR WHEELED				
ARMOUR WHEELED LIGHT				
ARMOUR WHEELED MEDIUM				
ARMOUR WHEELED HEAVY				

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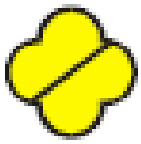
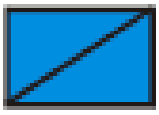
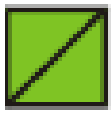
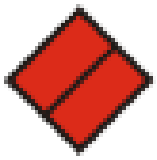
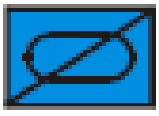
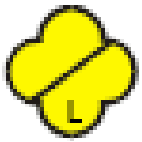
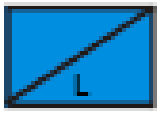
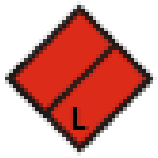
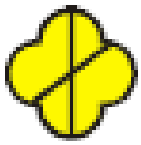
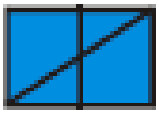
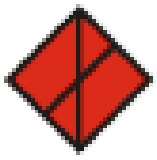
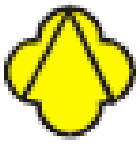
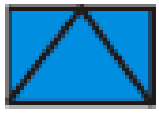
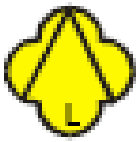
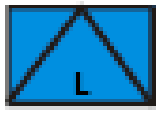
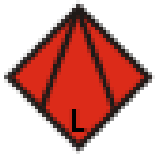
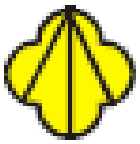
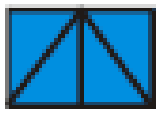
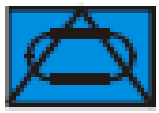
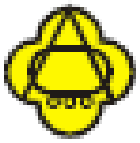
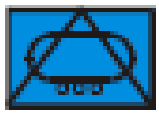
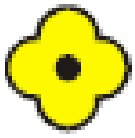
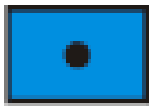
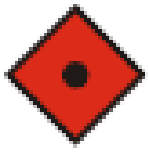
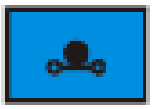
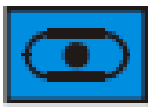
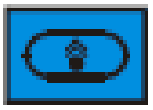
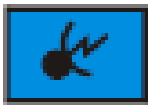
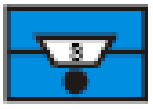
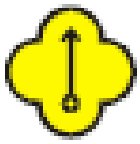
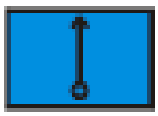
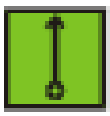
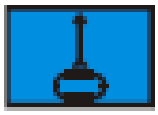
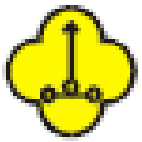
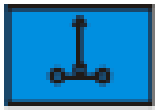
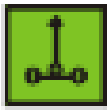
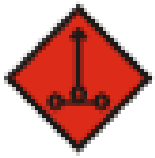
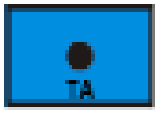
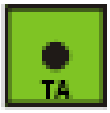
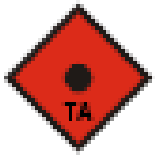
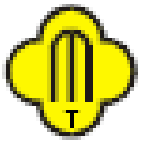
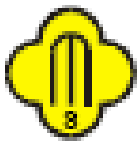
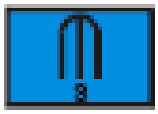
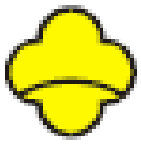
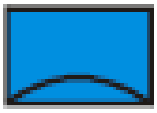
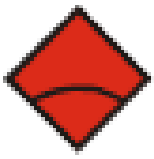
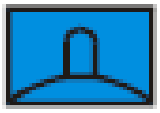
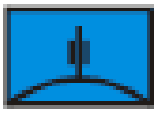
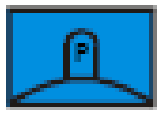
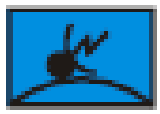
OPERATIONAL ICONS—COMBAT ARMS				
DESCRIPTION	UNKNOWN	FRIEND	NEUTRAL	HOSTILE
RECCE				
RECCE ARMOUR				
RECCE LIGHT				
RECCE MOTORIZED				
RECCE ARMOUR WHEELED				

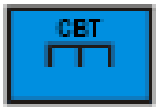
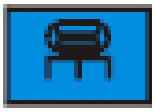
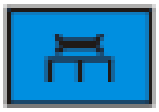
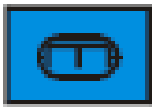
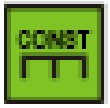
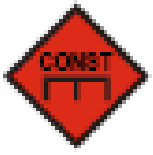
Military Symbols for Land Operations

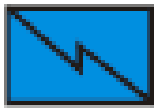
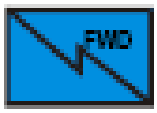
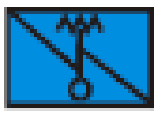
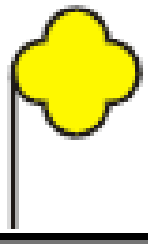
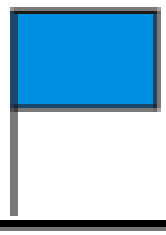
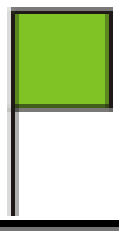
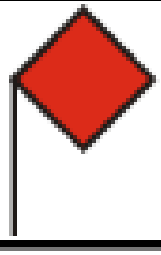
OPERATIONAL ICONS—COMBAT ARMS				
DESCRIPTION	UNKNOWN	FRIEND	NEUTRAL	HOSTILE
ANTI ARMOUR				
ANTI ARMOUR LIGHT				
ANTI ARMOUR MOTORIZED				
ANTI ARMOUR TRACK				
ANTI ARMOUR ARMOURED MOTORIZED				
ANTI ARMOUR WHEELED				

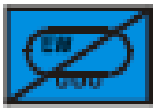
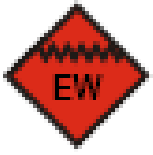
OPERATIONAL ICONS—COMBAT ARMS				
DESCRIPTION	UNKNOWN	FRIEND	NEUTRAL	HOSTILE
FIELD ARTILLERY				
FIELD ARTILLERY HOWITZER/GUN TOWED				
FIELD ARTILLERY HOWITZER/GUN SELF-PROPELLED				
FIELD ARTILLERY ROCKET MULTI ROCKET LAUNCHER SELF-PROPELLED				
FIELD ARTILLERY TARGET ACQUISITION RADAR				
FIELD ARTILLERY TARGET ACQUISITION SOUND				

OPERATIONAL ICONS—COMBAT SUPPORT ARMS				
DESCRIPTION	UNKNOWN	FRIEND	NEUTRAL	HOSTILE
MORTAR				
FIELD ARTILLERY MORTAR SP TRACKED				
FIELD ARTILLERY MORTAR TOWED				
FIELD ARTILLERY TARGET ACQUISITION				
MISSILE				
MISSILE SURFACE TO SURFACE (SS) TACTICAL				
MISSILE (SS) STRATEGIC				

OPERATIONAL ICONS—COMBAT SUPPORT ARMS				
DESCRIPTION	UNKNOWN	FRIEND	NEUTRAL	HOSTILE
AIR DEFENCE				
AIR DEFENCE MISSILE				
AIR DEFENCE MISSILE SELF-PROPELLED				
AIR DEFENCE SHORT RANGE (e.g. JAVELIN)				
AIR DEFENCE GUN UNIT 35mm/ SKYGUARD				
AIR DEFENCE/ PATRIOT				
AIR DEFENCE TARGET ACQUISITION				

OPERATIONAL ICONS—COMBAT SUPPORT ARMS				
DESCRIPTION	UNKNOWN	FRIEND	NEUTRAL	HOSTILE
ENGINEER				
COMBAT ENGINEER RECCE				
COMBAT ENGINEER ARMOURED VEHICLE LAUNCHED BRIDGE (AVLB)				
ENGINEER BRIDGE				
COMBAT ENGINEER MOTORIZED				
COMBAT ENGINEER ARMOURED TRACKED				
COMBAT ENGINEER CONSTRUCTION				

OPERATIONAL ICONS—COMBAT SUPPORT ARMS				
DESCRIPTION	UNKNOWN	FRIEND	NEUTRAL	HOSTILE
SIGNAL UNIT				
SIGNAL UNIT AREA				
SIGNAL UNIT OPERATIONS				
SIGNAL UNIT FORWARD				
SIGNAL UNIT RADIO UNIT				
HEADQUARTERS (Staff indicating location)				

OPERATIONAL ICONS—COMBAT SUPPORT ARMS				
DESCRIPTION	UNKNOWN	FRIEND	NEUTRAL	HOSTILE
ELECTRONIC WARFARE				
ELECTRONIC WARFARE ARMOUR WHEEELED				
ELECTRONIC WARFARE DIRECTION FINDING				
ELECTRONIC WARFARE INTERCEPT				
ELECTRONIC WARFARE JAMMING				
ELECTRONIC WARFARE THEATRE				

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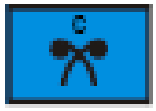
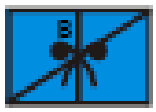
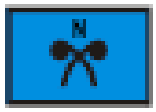
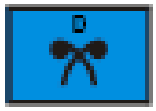
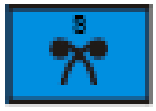
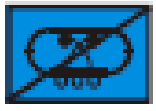
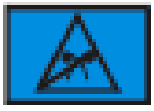
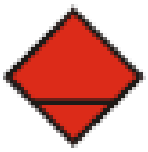
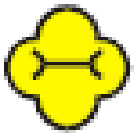
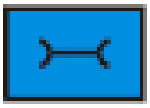
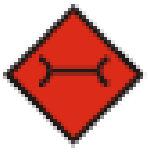
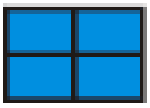
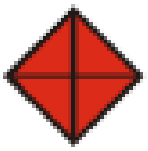
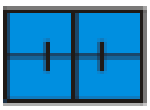
OPERATIONAL ICONS—COMBAT SUPPORT ARMS				
DESCRIPTION	UNKNOWN	FRIEND	NEUTRAL	HOSTILE
NBC				
NBC CHEMICAL				
NBC BIOLOGICAL RECCE EQUIPPED MOTORIZED				
NBC NUCLEAR				
NBC DECONTAMINATION				
NBC CHEMICAL SMOKE				
NBC WHEELED ARMOUR VEHICLE RECCE				
NBC OBSERVATION POST				

Military Symbols for Land Operations

OPERATIONAL ICONS—COMBAT SERVICE SUPPORT				
DESCRIPTION	UNKNOWN	FRIEND	NEUTRAL	HOSTILE
COMBAT SERVICE SUPPORT (CSS)				
SUPPLY				
MAINTENANCE				
MEDICAL				
MEDICAL TREATMENT FACILITY				
TRANSPORTATION				

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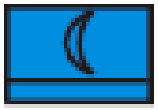
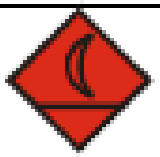
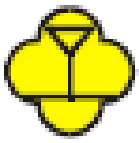
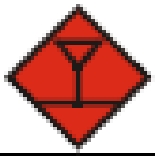
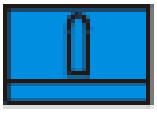
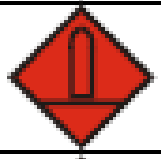
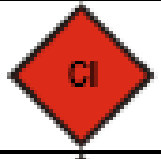
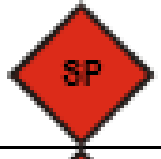
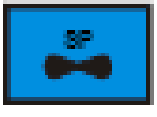
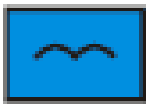
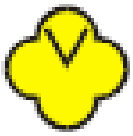
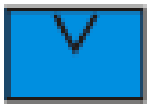
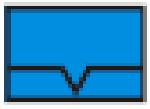
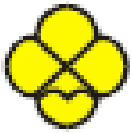
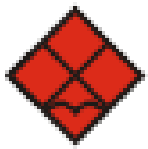
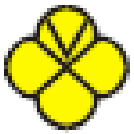
OPERATIONAL ICONS—COMBAT SERVICE SUPPORT				
DESCRIPTION	UNKNOWN	FRIEND	NEUTRAL	HOSTILE
REPLACEMENT HOLDING UNIT				
MILITARY POLICE				
MILITARY INTELLIGENCE INTERROGATION				
CSS SUPPLY CLASS I				
CSS SUPPLY CLASS III				
CSS SUPPLY CLASS V				
COUNTER INTELLIGENCE				
COUNTER INTELLIGENCE DIVISION (CID)				
SHORE PATROL				
SECURITY POLICE (AIR)				

OPERATIONAL ICONS—AIRBORNE/AIR-ASSAULT				
DESCRIPTION	UNKNOWN	FRIEND	NEUTRAL	HOSTILE
AIRBORNE				
COMBAT AIR ASSAULT				
COMBAT AIR ASSAULT LIFT				
COMBAT INFANTRY AIRBORNE				
INFANTRY AIR ASSAULT				

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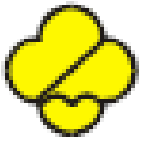
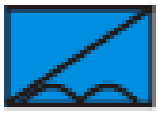
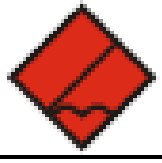
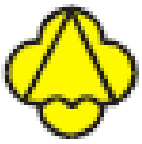
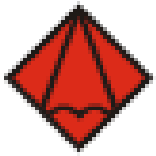
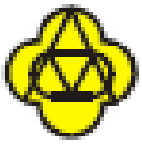
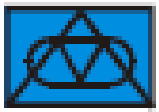
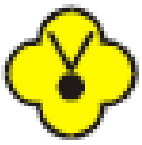
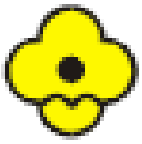
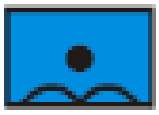
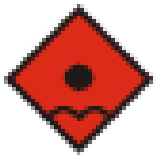
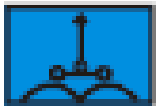
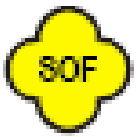
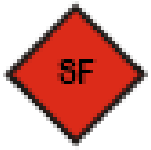
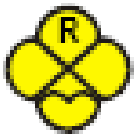
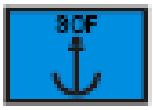
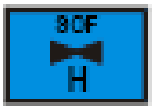
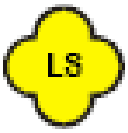
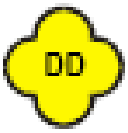
OPERATIONAL ICONS—AIRBORNE/AIR-ASSAULT

DESCRIPTION	UNKNOWN	FRIEND	NEUTRAL	HOSTILE
RECCE AIRBORNE				
ANTI ARMOUR AIRBORNE				
ANTI ARMOUR AIR ASSAULT				
FIELD ARTILLERY HOWITZER/GUN AIR ASSAULT				
FIELD ARTILLERY HOWITZER/GUN AIRBORNE				
FIELD ARTILLERY MORTAR TOWED AIRBORNE				
AIR DEFENCE AIRBORNE				
ENGINEER AIRBORNE				

OPERATIONAL ICONS—SPECIAL OPERATIONS FORCES				
DESCRIPTION	UNKNOWN	FRIEND	NEUTRAL	HOSTILE
SPECIAL OPERATIONS FORCE (SOF) UNIT				
SOF				
SOF SPECIAL FORCES				
SOF INFANTRY RANGER (R)				
SOF UNIT NAVAL				
SOF UNIT NAVAL SEAL				
SOF AVIATION ROTARY WING COMBAT SEARCH & RESCUE				
SOF AVIATION FIXED WING				

Military Symbols for Land Operations

OPERATIONAL ICONS—SEA TRACKS				
DESCRIPTION	UNKNOWN	FRIEND	NEUTRAL	HOSTILE
AMPHIBIOUS WARFARE LANDING SHIP				
AMPHIBIOUS WARFARE LANDING CRAFT				
LINE BATTLESHIP				
MINE WARFARE MINESWEEPER				
LINE DESTROYER				
NON-MILITARY MERCHANT ROLL ON/ ROLL OFF (RO/RO)				
HOVERCRAFT				

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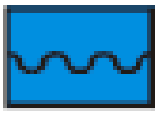
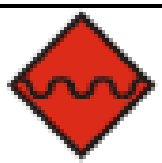
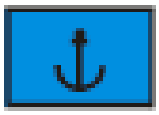
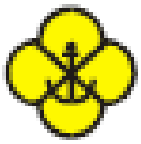
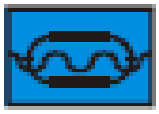
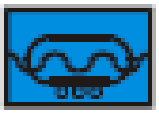
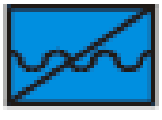
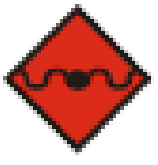
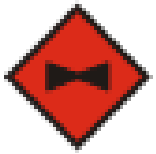
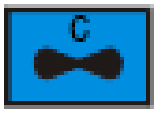
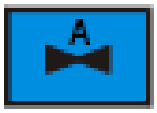
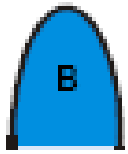
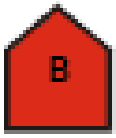
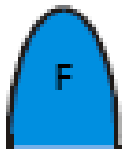
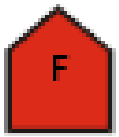
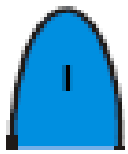
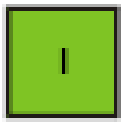
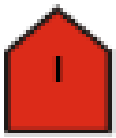
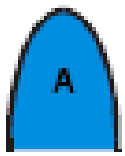
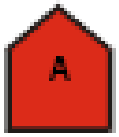
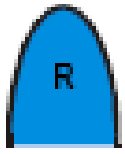
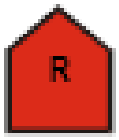
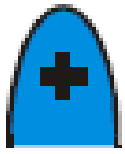
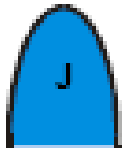
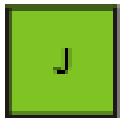
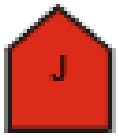
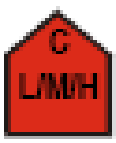
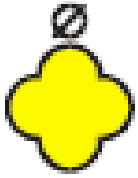
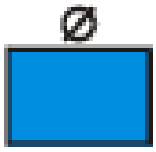
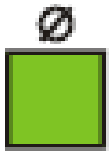
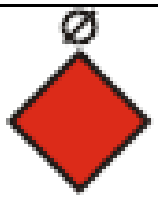
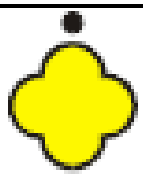
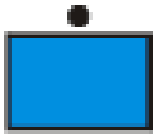
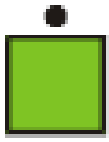
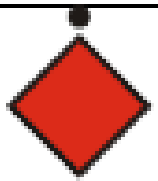
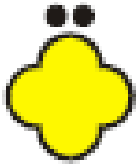
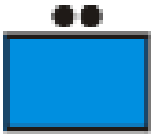
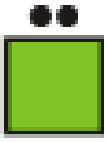
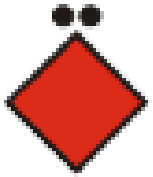
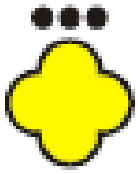
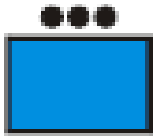
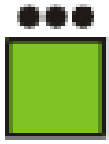
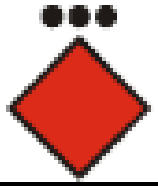
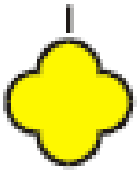
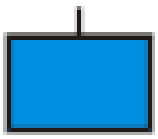
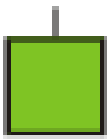
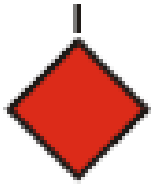
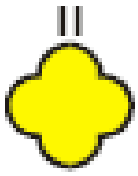
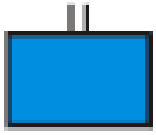
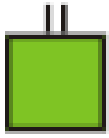
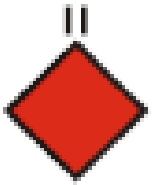
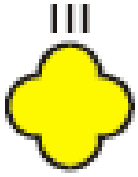
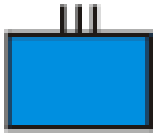
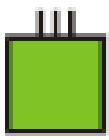
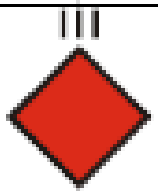
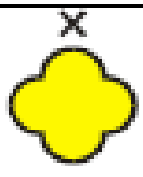
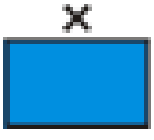
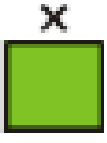
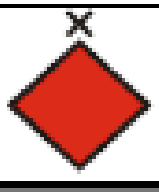
OPERATIONAL ICONS—AMPHIBIOUS

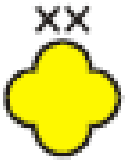
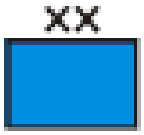
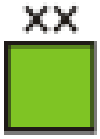
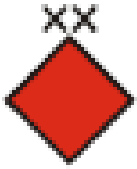
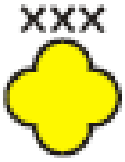
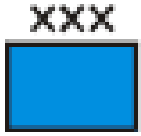
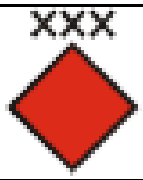
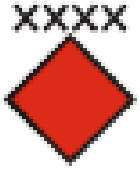
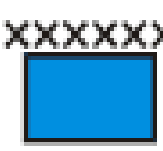
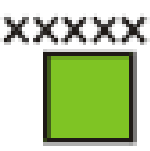
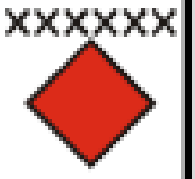
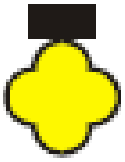
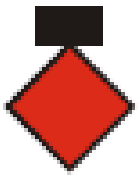
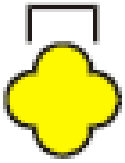
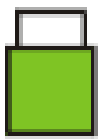
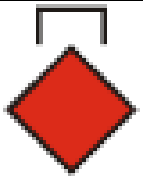
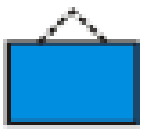
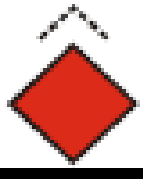
DESCRIPTION	UNKNOWN	FRIEND	NEUTRAL	HOSTILE
UNIT AMPHIBIOUS				
UNIT NAVAL				
AMPHIBIOUS INFANTRY				
COMBAT INFANTRY NAVAL				
COMBAT AMPHIBIOUS ARMOUR TRACK				
AMPHIBIOUS ARMOUR WHEELED				
MARINE RECCE				
AMPHIBIOUS FIELD ARTILLERY HOWITZER/GUN				

OPERATIONAL ICONS—AVIATION				
DESCRIPTION	UNKNOWN	FRIEND	NEUTRAL	HOSTILE
AVIATION ROTARY WING				
AVIATION FIXED WING				
AVIATION FIXED WING UTILITY				
AVIATION ROTARY WING UTILITY				
AVIATION FIXED WING CARGO AIRLIFT				
AVIATION ROTARY WING ATTACK				
AVIATION SEARCH & RESCUE				
AVIATION UNMANNED AERIAL VEHICLE				

OPERATIONAL ICONS—AIR				
DESCRIPTION	UNKNOWN	FRIEND	NEUTRAL	HOSTILE
FIXED WING BOMBER				
FIXED WING FIGHTER				
FIXED WING FIGHTER INTERCEPTOR				
FIXED WING ATTACK/STRIKE				
FIXED WING RECCE				
FIXED WING MEDEVAC				
FIXED WING ELECTRONIC COUNTER-MEASURES (ECM)/JAMMER				
FIXED WING CARGO AIRLIFT LIGHT/MEDIUM/ HEAVY				

OPERATIONAL ICONS—SIZE INDICATOR				
DESCRIPTION	UNKNOWN	FRIEND	NEUTRAL	HOSTILE
TEAM/CREW				
SQUAD				
SECTION				
PLATOON				
COMPANY				
BATTALION				
REGIMENT/ GROUP				
BRIGADE				

Military Symbols for Land Operations

OPERATIONAL ICONS—SIZE INDICATOR				
DESCRIPTION	UNKNOWN	FRIEND	NEUTRAL	HOSTILE
DIVISION				
CORPS				
ARMY				
ARMY GROUP				
REGION				
INSTALLATION				
BATTLE GROUP				
FEINT/DUMMY				

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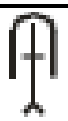
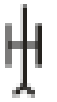
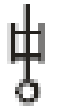
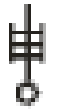
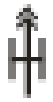
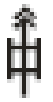
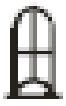
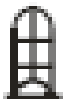
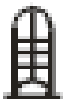
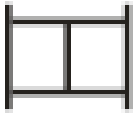
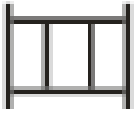
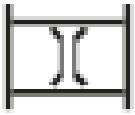
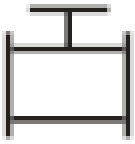
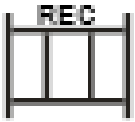
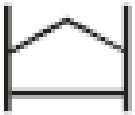
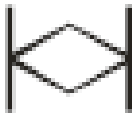
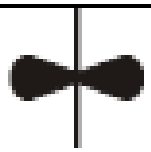
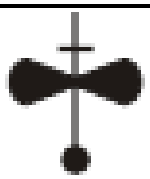
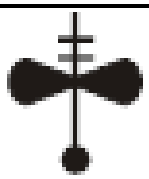
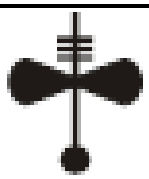
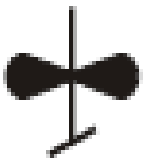
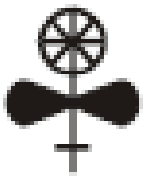
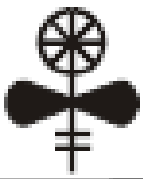
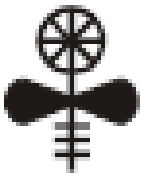
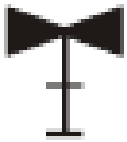
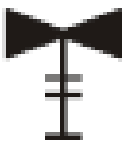
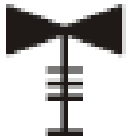
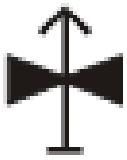
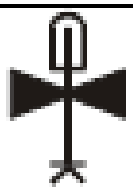
EQUIPMENT—WEAPONS

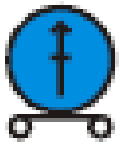
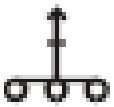
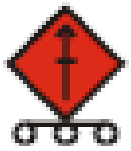
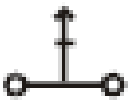
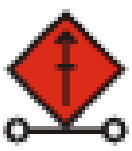
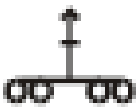
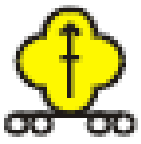
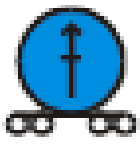
DESCRIPTION	LIGHT	MEDIUM	HEAVY
MACHINE GUN			
MORTAR			
GRENADE LAUNCHER			
ANTI-TANK ROCKET LAUNCHER			
ANTI-TANK MISSILE LAUNCHER			
ANTI-TANK GUN			
FIELD ARTILLERY DIRECT FIRE GUN			
FIELD ARTILLERY HOWITZER			
MULTIPLE ROCKET LAUNCHER			
SURFACE TO SURFACE MISSILE LAUNCHER			
AIR DEFENCE GUN			
SURFACE TO AIR AIR DEFENCE MISSILE LAUNCHER			

Military Symbols for Land Operations

EQUIPMENT—VEHICLES			
DESCRIPTION	LIGHT	MEDIUM	HEAVY
ARMOURED TANK			
ARMOURED VEHICLE LAUNCHED BRIDGE (AVLB)			
ENGINEER VEHICLE DOZER			
ARMOURED TANK RECOVERY			
ARMOURED PERSONNEL CARRIER (APC)			
GROUND VEHICLE ARMOURED			
GROUND UTILITY VEHICLE			

EQUIPMENT—ICON SET/AIR			
DESCRIPTION	LIGHT	MEDIUM	HEAVY
AIR FIXED WING FIGHTER (Size and type unspecified)			
AIR FIXED WING BOMBER			
AIR FIXED WING FIGHTER (Size unspecified)			
AIR FIXED WING RECCE			
AIR FIXED WING TRANSPORT			
ROTARY WING			
ROTARY WING ARMY ATTACK HELICOPTER			
ROTARY WING ARMY ATTACK HELICOPTER			
FIXED WING UNMANNED AERIAL VEHICLE (UAV)			

EQUIPMENT—MOBILITY INDICATORS

MOBILITY SYMBOL	UN-FRAMED	UN-KNOWN	FRIEND	NEUTRAL	HOSTILE
WHEELED (Limited cross-country)					
					
WHEELED (Cross-country)					
					
TRACKED					
					
WHEELED & TRACKED					
					
TOWED					
					
RAILWAY					
					
AMPHIBIOUS					
					

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