**МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ**
**МИКОЛАЇВСЬКИЙ НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ**
**ІМЕНІ В.О. СУХОМЛИНСЬКОГО**
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# МЕТОДИЧНІ РЕКОМЕНДАЦІЇ ДЛЯ САМОСТІЙНОЇ РОБОТИ З ДИСЦИПЛІНИ "НАУКОВО-ТЕХНІЧНИЙ ПЕРЕКЛАД" ДЛЯ СТУДЕНТІВ МЕХАНІКО-МАТЕМАТИЧНОГО ФАКУЛЬТЕТУ

**МИКОЛАЇВ – 2018**

Методичні рекомендації для самостійної роботи з дисципліни “Науково-технічний переклад” для студентів механіко-математичного факультету. – Миколаїв, МНУ ім. В.О. Сухомлинського, 2018. – 170 с.

Рекомендовано навчально-методичною радою Миколаївського національного університету імені В.О. Сухомлинського як методичні рекомендації для самостійної роботи з дисципліни “Науково-технічний переклад” для студентів механіко-математичного факультету (Протокол №8 засідання навчально-методичної ради Миколаївського національного університету імені В.О. Сухомлинського від 29.05.2018 р.)

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Методичні рекомендації призначені для використання під час самостійної роботи студентами механіко-математичного факультету, які вивчають курс науково-технічного перекладу в рамках підготовки до майбутньої професійної діяльності.

Навчальний матеріал посібника ґрунтується на англомовних аутентичних ресурсах, що відображають сучасний розвиток науки і техніки в галузі інформатики та інформаційних технологій. Тексти розділів дібрані з урахуванням змісту спеціальних дисциплін, які вивчаються студентами.

Методичні рекомендації складаються з п'яти частин: введення, основного курсу самостійної роботи, комплексу вправ для систематизації граматичних навичок, граматичного довідника та термінологічного словника.

**ЗМІСТ**

# INTRODUCTION

## ACADEMIC READING STRATEGIES

Translation of academic texts is thought to be one of the skills that university students must learn. However, to become a good academic translator, it is foundational and significant to read academically. Reading academically allows you to learn new words, master new phrases, and comprehend new ideas critically.

To be a good academic reader, there are three skills that one needs to improve:

- **The ability to read actively:** to understand, learn and retain what you read.
- **The ability to read critically:** to evaluate and interpret what you read.
- **The ability to read fluently:** to get used to most of the words in your readings and learn the definitions of words that you do not know.

## THE ABILITY TO READ ACTIVELY

There are some strategies to read actively that we can provide you with this journey.

### Pre-reading

Writing freely on a topic that you read enables you to know what you already know and how you think about it. Pre-reading is an important step to first come up with some of your own ideas.

### Annotating

When you annotate a text, you underline, highlight and make notes as you read. Annotating is a summary per page. You annotate so that you do not need to read the text all over again later. To annotate, you do not have to be very specific, but you should jot down some key points that the authors talk about. Annotating is good for reviewing and recalling what you have read and useful when you write essays and exams.

### Note-taking

When you note-take, you keep records or memos from what you read in order to have a better understanding. Note-taking can be a study guide in your writing, particularly when you do research. We recommended you take notes on key points from your articles, the writer's name, and the publication information in a journal. The notes that you take are useful when you try to understand the main points of the reading and the articles you read.

**Identifying important information**

***Thesis***

A thesis is the main argument or the point that the author tells the readers. A thesis is usually a clear and specific statement. This is the most significant part of all. It is not just a random statement, but is an insightful argument which leads the whole article.

**Significant claims**

Significant claims are as important as the thesis, which is usually stated in topic sentences. Annotating or underlining these arguments in the notes as you read helps you understand why the author makes the points.

**Important words and unfamiliar words**

It is usually important when the author uses important and unfamiliar words. Making marks on these words helps you to follow the main arguments of the article. You may need to look up the unfamiliar words to understand the article better and avoid confusion.

**Important ideas**

Marking important ideas within a text helps you solve and comprehend its meaning. Paraphrasing the important ideas are also helpful in order to organize the main ideas in your own words and recall them.

**Memorable passages or images**

Passages or images in an article are sometimes vital to understand the context. Try to think that why the author puts photos or passages allows you to have a broader understanding.

**Questions and comments**

Jotting down your questions and comments is essential when you think and read critically. As you finish reading, you should start to think whether you can answer these questions based on the materials you acquired previously. The answers can be a great start to form your own topics.

## READ CRITICALLY TO TRANSLATE SKILLFULLY

### *Becoming a good critical reader*

#### Read thoroughly

It is good to spend time on reading thoroughly and with focus. Reading too quickly may be a reason to miss some key information. It is important that you understand what the writer talks about before you start writing your words. This helps you to defend your points with connected information.

#### Dig deeper

If the topic of your reading interests you, keep reading articles about relevant themes. Sometimes this can help you to think of some other possibilities that are creative and meaningful.

#### Question what you read

Having questions is always crucial when it comes to academic writing or reading. If you feel uncertain about some points in your reading, do some research on it. This can help you to think from different perspectives and to develop some new questions.

#### Keep following the writer's arguments

Take your time and pay attention to figure out what the author tries to tell readers. You probably should reread and evaluate what the writer tells readers so that you can make sure that nothing is neglected.

#### Develop new questions

Developing questions that you already have is important. List these questions and find the argument in them to help yourself develop some new ideas from them.

#### Keep following what you read

When you have your assignments with you, you do some research on different sources such as journals, peer-reviewed articles, e-books, and newspapers. It is easy for you to get confused with the information you get from all these sources. In order to avoid the situation, you can pay attention to the following points.

**Keep following sources**

Keeping a memo when you read the articles. Also, adding the titles of your reading and the names of the authors to your memos help you write your citations. Moreover, a record of publications dates should be in your memos too.

**Keeping notes**

It is not so difficult to keep your notes. You need to make sure your notes are organized whether by the date you write them, the contents, the category of the source, the information you look for, or by the author's name.

**Make a use of bookmarks**

If you use the Internet to find sources, bookmarking is a great tool for you. You can save the website you find. You may want to create folders to organize your sources.

## THE ABILITY TO READ FLUENTLY = EXPANDING YOUR ACADEMIC VOCABULARY

Building up your vocabulary is the key to success in improving your reading speed. Knowing more words allows you to have a better understanding of the articles you read.

**Read widely**

Reading is an effective way to build your vocabulary. Reading also allows you to become familiar with synonyms and antonyms of the new terms. Reading constantly helps: you can read websites, books, newspapers that are of your interest. You can read books by your favorite authors. You also need to spend some time on the kinds of articles you are not very fond of. This can also help you with your vocabulary. The more you read, the larger your range of vocabulary will be.

**Look for context clues**

When you see words that are unfamiliar to you, it is better to try to guess what it means before you look them up in dictionaries. In order to take a guess, you can read the sentences before and after the unfamiliar words. Sometimes the author gives you the definitions of them indirectly.

**Learn the roots of words**

To learn the roots of words is helpful in any language. English words are from Latin And Greek roots. One way to know the roots is to look up the roots of the words you want to know in the dictionaries.

**Use a dictionary / dictionaries**

Use a dictionary if you want to know what the words mean quickly and specifically. Looking up in a dictionary is the best way to know the meanings.

**Strengthen your understanding**

To strengthen your understanding, making a list of new terms helps you to remember the meanings. In particular, students who learn English as an additional language may need to keep a list on your new terms. In your list, you can include the original sentences, the definitions from a dictionary and the synonyms and antonyms.

*Written by: Madona Nakajo*

*Edited by: Yang Yang*

*https://onlineacademiccommunity.uvic.ca/arwmethodology/2017/11/16/academic-reading-strategies/*

## READING STRATEGIES

Strategies differ from reader to reader. The same reader may use different strategies for different contexts because their purpose for reading changes. Ask yourself “why am I reading?” and “what am I reading?” when deciding which strategies to try.

**Before reading**

- Establish your purpose for reading

- Speculate about the author's purpose for writing
- Review what you already know and want to learn about the topic
- Preview the text to get an overview of its structure, looking at headings, figures, tables, glossary, etc.
- Predict the contents of the text and pose questions about it. Note any discussion questions.

**During reading**

- Annotate and mark sections of the text to easily recall important or interesting ideas
- Check your predictions and find answers to questions
- Use headings and transition words to identify relationships in the text
- Create a vocabulary list of other unfamiliar words to define later
- Try to infer unfamiliar words' meanings by identifying their relationship to the main idea
- Connect the text to what you already know about the topic
- Take breaks (split the text into segments if necessary)

**After reading**

- Summarize the text in your own words (note what you learned, impressions, and reactions) in an outline, concept map, or matrix (for several texts)
- Talk to someone about the author's ideas to check your comprehension
- Identify and reread difficult parts of the text
- Define words on your vocabulary list and practice using them

Works consulted: Grabe, W., & Stoller, F. L. (2002). Harlow: Longman.

*The University of North Carolina,*

*https://writingcenter.unc.edu/esl/resources/academic-reading-strategies/*

**READING AND TRANSLATING PRACTICE**

**Practice the activities, included in every Unit.**

**1. Learn the active vocabulary to the text.**

**1. read (v.)**

• to look at words or symbols and understand what they mean

**2. academic (adj.)**

• cf. academically (adv.)

• relating to schools, colleges, and universities, or connected with studying and thinking, not with practical skills

**3. once (adv.)**

• one single time

**4. re (prep.)**

• (especially in business letters) about; on the subject of

**5. reading (n.)**

• the skill or activity of getting information from books

**6. read (n.)**

• the act of reading something

**7. module (n.)**

• cf. modular (adj.)

• one of a set of separate parts that, when combined, form a complete whole

**8. hour (n.)**

• a period of 60 minutes

**9. session (n.)**

• a formal meeting or series of meetings of an organization such as a legislature or a law court

**10. phrase (n.)**

• cf. phrasal (adj.)

• a group of words that is part of, rather than the whole of, a sentence

**11. glossary (n.)**

• an alphabetical list, with meanings, of the words or phrases in a text that are difficult to understand

**12. everyday (adj.)**

• ordinary, typical, or usual

**13. worth (n.)**

• the amount of money that something

**14. effectively (adv.)**

• in a way that is successful and achieves what you want

**15. tutorial (n.)**

• a period of study with a tutor involving one student or a small group

https://dictionary.cambridge.org

**2. Read the text applying before reading, during reading and after reading strategies described in the introduction.**

**ACADEMIC READING PROCESS**

*Written by: Madona Nakajo*

*Edited by: Yang Yang*

Understanding difficult texts

Reading academic texts can be much less straightforward than reading a daily newspaper or a novel. There are a lot of ideas and information packed onto a page and you will usually have to read it more than once to understand it. Here are some ideas you can try to help you understand what you're reading:

- Often the first sentence will tell you what the paragraph is about. If you want to know how the author has developed this idea, read the concluding sentence of the paragraph too.
- If you don't understand something just take it slowly. Start by re-reading the paragraphs before and after the problematical passage and then re-read the part you had difficulty with.
- Try talking to friends on your module about what you're reading.

- Your tutors are there to help you, so ask them to explain material you do not understand (you may need to see them in their office hours or arrange a time outside of your teaching sessions).
- Try reading about the material in a different book, or going back to an account of it in a textbook if you are having problems.
- If a phrase keeps appearing make sure you understand what it means in the context in which it is being used. If a book has a glossary, look in this before you consult a dictionary. Some words have technical meanings, which are different to their everyday usage.
- Make sure you look at tables, diagrams and graphs in texts.
- If you are having real difficulty with a text, it may be worth having a break and coming back to it later.
- Identify the reading strategies that work for you. Observe when you read most effectively, and plan your reading so that it fits in with how you work best!

*University of Sussex* *http://www.sussex.ac.uk/skillshub/?id=335*

**3. Vocabulary Quiz**

1) **Write the most appropriate word for each of the provided definitions.**

1. a period of study with a tutor involving one student or a small group

**Answer: tu**

2. (especially in business letters) about; on the subject of

**Answer: _____**

3. a group of words that is part of, rather than the whole of, a sentence

**Answer: _____**

4. to look at words or symbols and understand what they mean

**Answer: _____**

5. a period of 60 minutes

**Answer: _____**

2) **Find the most appropriate single word / expression for the paired blanks below and fill them in with appropriate forms.**

6. the act of _____something

It’s not brilliant but it’s worth a _____.

3) **Find the most appropriate word / expression for each of the definitions and fill in the blank in an appropriate form.**

7. an alphabetical list, with meanings, of the words or phrases in a text that are difficult to understand

a _____of technical terms

8. one of a set of separate parts that, when combined, form a complete whole

The emergency building is transported in individual _____, such as bedrooms and a kitchen, which are put together on site.

9. the amount of money that something can be sold for; value

The estimated _____of the plastics and petrochemical industry is about $640 billion.

10. a formal meeting or series of meetings of an organization such as a legislature or a law court

The parliamentary _____is due to end on May 27.

11. ordinary, typical, or usual the _____lives of ordinary citizens

12. in a way that is successful and achieves what you want

The pills work more _____if you take a hot drink after them.

13. the skill or activity of getting information from books

_____ and tennis are my favorite pastimes.

14. one single time

I went sailing_____, but I didn’t like it.

4) **Choose the most appropriate definition for each of the provided words.**

15. **academic =**

① strong and well

② relating to schools, colleges, and universities, or connected with studying and thinking, not with practical skills

③ joined together as a group

④ expressing “no”

⑤ the following day, morning, etc. is the next one.

*https://www.word-booster.com*

**4. Translate the text into Ukrainian.**

# КРЕДИТ 1

# UNIT 1

## What Is Artificial Intelligence?

**1. Learn the active vocabulary to the text.**

**1) artificial (adj.)**

• cf. artificiality (n.)

• cf. artificially (adv.)

• made or produced by human beings rather than occurring naturally, especially as a copy of something natural

**2) synthesis (n.)**

• the combination of components or elements to form a connected whole

**3) computational (adj.)**

• using or relating to computers

**4) act (v.)**

• take action; do something

**5) thermostat (n.)**

• a device that automatically regulates temperature, or that activates a device when the temperature reaches a certain point.

**6) airplane (n.)**

• an aeroplane.

**7) out (n.)**

• a way of escaping from a problem or dilemma

**8) arguably (adv.)**

• it may be argued (used to qualify the statement of an opinion or belief)

**9) erode (v.)**

• (of wind, water, or other natural agents) gradually wear away (soil, rock, or land)

**10) omnipotent (adj.)**

• cf. omnipotence (n.)

• (of a deity) having unlimited power

**11) specialized (adj.)**

• requiring or involving detailed and specific knowledge or training

**12) constrain (v.)**

• compel or force (someone) to follow a particular course of action

**13) finite (adj.)**

• limited in size or extent

**14) researcher (n.)**

• a person who carries out academic or scientific research

**15) empirical (adj.)**

• cf. empirically (adv.)

• based on, concerned with, or verifiable by observation or experience rather than theory or pure logic

https://dictionary.cambridge.org

**2. Read the text applying before reading, during reading and after reading strategies described in the introduction.**

**What Is Artificial Intelligence?**

**Artificial intelligence**, or **AI**, is the field that studies *the synthesis and analysis of computational agents that act intelligently*. Let us examine each part of this definition.

An **agent** is something that acts in an environment - it does something. Agents include worms, dogs, thermostats, airplanes, robots, humans, companies, and countries.

We are interested in what an agent does; that is, how it **acts**. We judge an agent by its actions.

An agent acts **intelligently** when

- what it does is appropriate for its circumstances and its goals,
- it is flexible to changing environments and changing goals,
- it learns from experience, and

- it makes appropriate choices given its perceptual and computational limitations. An agent typically cannot observe the state of the world directly; it has only a finite memory and it does not have unlimited time to act.

A **computational** agent is an agent whose decisions about its actions can be explained in terms of computation. That is, the decision can be broken down into primitive operation that can be implemented in a physical device. This computation can take many forms. In humans this computation is carried out in "wetware"; in computers it is carried out in "hardware." Although there are some agents that are arguably not computational, such as the wind and rain eroding a landscape, it is an open question whether all intelligent agents are computational.

The central **scientific goal** of AI is to understand the principles that make intelligent behavior possible in natural or artificial systems. This is done by

- the **analysis** of natural and artificial agents;
- formulating and testing hypotheses about what it takes to construct intelligent agents; and
- designing, building, and experimenting with computational systems that perform tasks commonly viewed as requiring intelligence.

As part of science, researchers build empirical systems to test hypotheses or to explore the space of possibilities. These are quite distinct from applications that are built to be useful for an application domain.

Note that the definition is not for intelligent *thought*. We are only interested in **thinking** intelligently insofar as it leads to better performance. The role of thought is to affect action.

The central **engineering goal** of AI is the **design** and **synthesis** of useful, intelligent artifacts. We actually want to build agents that act intelligently. Such agents are useful in many applications.

(David L. Poole, Alan K. Mackworth. *Artificial Intelligence: foundations of computational agents* (2nd edition), Cambridge University Press, 2017. – Available at http://assets.cambridge.org/97805215/19007/frontmatter/9780521519007_ frontmat ter.pdf.)

**3. Vocabulary Quiz**

1) **Write the most appropriate word for each of the provided definitions.**

1. using or relating to computers

**Answer: _____**

2. made or produced by human beings rather than occurring naturally, especially as a copy of something natural

**Answer: _____**

2) **Find the most appropriate word / expression for each of the definitions and fill in the blank in an appropriate form.**

3. limited in size or extent

Every computer has a_____ amount of memory.

4. the combination of components or elements to form a connected whole

The_____ of intellect and emotion in his work.

5. compel or force (someone) to follow a particular course of action

Children are _____ to work in the way the book dictates.

6. (of wind, water, or other natural agents) gradually wear away (soil, rock, or land)

The cliffs on this coast have been _____ by the sea.

7. requiring or involving detailed and specific knowledge or training

Employees with _____skills.

8. based on, concerned with, or verifiable by observation or experience rather than theory or pure logic

They provided considerable _____evidence to support their argument.

9. it may be argued (used to qualify the statement of an opinion or belief)

She is _____the greatest woman tennis player of all time.

10. a person who carries out academic or scientific research

A medical _____who pioneered the development of antibiotics.

11. take _____ion; do something

Governments must _____to reduce pollution.

12. a way of escaping from a problem or dilemma

He was desperately looking for an _____.

3) **Choose the most appropriate definition for each of the provided words.**

13. **thermostat =**

① a woman who has sexual relationships with a lot of men without any emotional involvement

② a way of talking or behaving that is too proud

③ a tube-shaped musical instrument that is played by blowing through a single reed

④ a person who supports new ideas and social change, especially one who belongs to a political party

⑤ a device that automatically regulates temperature, or that activates a device when the temperature reaches a certain point.

14. **omnipotent =**

① with the hair removed

② If computer files are searchable, it is possible to search for words, numbers, and other information in those files

③ If an unpleasant action or remark is unprovoked, it has not been caused by anything and is therefore unfair

④ (of a deity) having unlimited power

https://www.word-booster.com

**4. Translate the text into Ukrainian.**

# UNIT 2

## Artificial and Natural Intelligence

**1. Learn the active vocabulary to the text.**

**1) established (adj.)**

• having existed or done something for a long time and therefore recognized and generally accepted

**2) tsunami (n.)**

• a long, high sea wave caused by an earthquake or other disturbance

**3) landslide (n.)**

• a collapse of a mass of earth or rock from a mountain or cliff

**4) mirage (n.)**

• an optical illusion caused by atmospheric conditions, especially the appearance of a sheet of water in a desert or on a hot road caused by the refraction of light from the sky by heated air

**5) artificially (adv.)**

• by means of human intervention rather than naturally

**6) interrogator (n.)**

• a person who questions someone closely, aggressively, or formally

**7) interface (n.)**

• a point where two systems, subjects, organizations, etc. meet and interact

**8) sonnet (n.)**

• a poem of fourteen lines using any of a number of formal rhyme schemes, in English typically having ten syllables per line.

**9) schema (n.)**

• a representation of a plan or theory in the form of an outline or model

**10) trickery (n.)**

• the practice of deception

**11) currently (adv.)**

• at the present time

**12) councilman (n.)**

• a member of a council, especially a municipal one

**13) reliably (adv.)**

• in a consistently good or accurate way

**14) colony (n.)**

• a country or area under the full or partial political control of another country and occupied by settlers from that country

**15) master (v.)**

• acquire complete knowledge or skill in (a subject, technique, or art)

**16) instructive (adj.)**

• cf. instructively (adv.)

• useful and informative

**17) tool (n.)**

• a device or implement, especially one held in the hand, used to carry out a particular function

**18) program (v.)**

• restore to a normal or upright position

**19) slate (n.)**

• a fine-grained grey, green, or bluish-purple metamorphic rock easily split into smooth, flat plates

https://dictionary.cambridge.org

**2. Read the text applying before reading, during reading and after reading strategies described in the introduction.**

**Artificial and Natural Intelligence**

Artificial intelligence (AI) is the established name for the field, but the term "artificial intelligence" is a source of much confusion because artificial intelligence may be interpreted as the opposite of real intelligence.

For any phenomenon, you can distinguish real versus fake, where the fake is non-real. You can also distinguish natural versus artificial. Natural means occurring in nature and artificial means made by people.

**Example 1.1:** A tsunami is a large wave in an ocean caused by an earthquake or a landslide. Natural tsunamis occur from time to time. You could imagine an artificial tsunami that was made by people, for example, by exploding a bomb in the ocean, yet which is still a real tsunami. One could also imagine fake tsunamis: either artificial, using computer graphics, or natural, for example, a mirage that looks like a tsunami but is not one.

It is arguable that intelligence is different: you cannot have *fake* intelligence. If an agent behaves intelligently, it is intelligent. It is only the external behavior that defines intelligence; acting intelligently is being intelligent. Thus, artificial intelligence, if and when it is achieved, will be real intelligence created artificially.

This idea of intelligence being defined by external behavior was the motivation for a test for intelligence designed by Turing (Turing, A. (1950). Computing machinery and intelligence. *Mind*, 59: 433-460.), which has become known as the **Turing test**. The Turing test consists of an imitation game where an interrogator can ask a witness, via a text interface, any question. If the interrogator cannot distinguish the witness from a human, the witness must be intelligent. *Figure 1* shows a possible dialog that Turing suggested. An agent that is not really intelligent could not fake intelligence for arbitrary topics.

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Interrogator:

In the first line of your sonnet which reads "Shall I compare thee to a summer's day," would not "a spring day" do as well or better?

Witness:

It wouldn't scan.

Interrogator:

How about "a winter's day," That would scan all right.

Witness:

Yes, but nobody wants to be compared to a winter's day.

Interrogator:

Would you say Mr. Pickwick reminded you of Christmas?

Witness:

In a way.

Interrogator:

Yet Christmas is a winter's day, and I do not think Mr. Pickwick would mind the comparison.

Witness:

I don't think you're serious. By a winter's day one means a typical winter's day, rather than a special one like Christmas.

*Figure 1: A possible dialog for the Turing test (from Turing (1950))*

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There has been much debate about the Turing test. Unfortunately, although it may provide a test for how to recognize intelligence, it does not provide a way to get there; trying each year to fake it does not seem like a useful avenue of research.

The obvious naturally intelligent agent is the human being. Some people might say that worms, insects, or bacteria are intelligent, but more people would say that dogs, whales, or monkeys are intelligent (see Exercise 1.1). One class of intelligent agents that may be more intelligent than humans is the class of *organizations*. Ant colonies are a prototypical example of organizations. Each individual ant may not be very intelligent, but an ant colony can act more intelligently than any individual ant. The colony can discover food and exploit it very effectively as well as adapt to changing circumstances. Similarly, companies can develop, manufacture, and distribute products where the sum of the skills required is much more than any individual could master. Modern computers, from low-level hardware to high-level software, are more complicated than any human can understand, yet they are manufactured daily by organizations of humans. Human *society* viewed as an agent is arguably the most intelligent agent known.

It is instructive to consider where human intelligence comes from. There are three main sources:

**biology**:

Humans have evolved into adaptable animals that can survive in various habitats.

**culture**:

Culture provides not only language, but also useful tools, useful concepts, and the wisdom that is passed from parents and teachers to children.

**life-long learning**:

Humans learn throughout their life and accumulate knowledge and skills.

These sources interact in complex ways. Biological evolution has provided stages of growth that allow for different learning at different stages of life. We humans and our culture have evolved together so that humans are helpless at birth, presumably because of our culture of looking after infants. Culture interacts strongly with learning. A major part of lifelong learning is what people are taught by parents and teachers. Language, which is part of culture, provides distinctions in the world that should be noticed for learning.

Exercise 1.1:

For each of the following, give five reasons why:

a. A dog is more intelligent than a worm.

b. A human is more intelligent than a dog.

c. An organization is more intelligent than an individual human.

Based on these, give a definition of what "more intelligent" may mean.

(David L. Poole, Alan K. Mackworth. *Artificial Intelligence: foundations of computational agents* (2nd edition), Cambridge University Press, 2017. – Available at http://assets.cambridge.org/97805215/19007/frontmatter/9780521519007_ frontmat ter.pdf.)

**3. Vocabulary Quiz**

1) **Write the most appropriate word for each of the provided definitions.**

1. a person who questions someone closely, aggressively, or formally

**Answer: _____**

2. a poem of fourteen lines using any of a number of formal rhyme schemes, in English typically having ten syllables per line.

**Answer:** _____

3. a fine-grained grey, green, or bluish-purple metamorphic rock easily split into smooth, flat plates

**Answer:** _____

4. a point where two systems, subjects, organizations, etc. meet and interact

**Answer:** _____

5. having existed or done something for a long time and therefore recognized and generally accepted

**Answer:** _____

6. restore to a normal or upright position

**Answer:** _____

7. at the present time

**Answer:** _____

2) **Find the most appropriate word / expression for each of the definitions and fill in the blank in an appropriate form.**

8. the practice of deception

The dealer resorted to _____.

9. a member of a council, especially a municipal one

_____ Gerry Richardson.

10. an optical illusion caused by atmospheric conditions, especially the appearance of a sheet of water in a desert or on a hot road caused by the refraction of light from the sky by heated air

The surface of the road ahead rippled in the heat _____.

11. a representation of a plan or theory in the form of an outline or model

A _____ of scientific reasoning.

12. useful and informative

It is _____ to compare the two projects.

13. a collapse of a mass of earth or rock from a mountain or cliff

Businessmen have been buried under a _____ of paperwork.

14. a long, high sea wave caused by an earthquake or other disturbance

The loss of human lives from this latest_____ is staggering.

15. by means of human intervention rather than naturally

She never wanted to be kept _____ alive with life support.

16. a country or area under the full or partial political control of another country and occupied by settlers from that country

Japanese forces overran the French _____ of Indo-China.

17. in a consistently good or accurate way

Few of these paintings can be _____dated.

18. a device or implement, especially one held in the hand, used to carry out a particular function

Gardening _____.

3) **Choose the most appropriate definition for each of the provided words.**

19. **master =**

① to shake slightly, usually because you are cold, frightened, or very emotional

② to make someone upset or angry

③ to make someone angry

④ acquire complete knowledge or skill in (a subject, technique, or art)

⑤ If you choke, or if something chokes you, you stop breathing because something is blocking your throat

https://www.word-booster.com

**4. Translate the text into Ukrainian.**

# UNIT 3

## A Brief History of AI

**1. Learn the active vocabulary to the text.**

**1) model (v.)**

• to wear fashionable clothes, jewelry, etc. in order to advertise them

**2) hydraulics (n.)**

• a system of using water to produce power

**3) hologram (n.)**

• a special type of photograph or image made with a laser in which the objects shown look solid, as if they are real, rather than flat

**4) analog (n.)**

• something that is similar to or can be used instead of something else

**5) modeling (n.)**

• the job of wearing clothes, jewelry, etc. in order to advertise them

**6) espouse (v.)**

• cf. espousal (n.)

• to become involved with or support an activity or opinion

**7) thinking (n.)**

• the activity of using your mind to consider something

**8) tape (n.)**

• thin plastic in a long, narrow strip with a magnetic covering that allows sounds or sounds and pictures to be recorded and played again, especially one on which sound is recorded

**9) lambda (n.)**

• the 11th letter of the Greek alphabet

**10) calculus (n.)**

• an area of advanced mathematics in which continuously changing values are studied

**11) computational (adj.)**

• involving the calculation of answers, amounts, results, etc.

**12) compute (v.)**

• cf. computation (n.)

• to calculate an answer or amount by using a machine

**13) champion (v.)**

• to support, defend, or fight for a person, belief, right, or principle enthusiastically

**14) theorem (n.)**

• (especially in mathematics) a formal statement that can be shown to be true by logic

**15) neuron (n.)**

• a nerve cell that carries information between the brain and other parts of the body

**16) neural (adj.)**

• involving a nerve or the system of nerves that includes the brain

**17) algebra (n.)**

• cf. algebraic (adj.)

• cf. algebraically (adv.)

• a part of mathematics in which signs and letters represent numbers

**18) interestingly (adv.)**

• used to introduce a piece of information that the speaker thinks is strange or interesting

**19) compound (n.)**

• a chemical that combines two or more elements

https://dictionary.cambridge.org

**2. Read the text applying before reading, during reading and after reading strategies described in the introduction.**

**A Brief History of AI**

Throughout human history, people have used technology to model themselves. There is evidence of this from ancient China, Egypt, and Greece that bears witness to the universality of this activity. Each new technology has, in its turn, been exploited

to build intelligent agents or models of mind. Clockwork, hydraulics, telephone switching systems, holograms, analog computers, and digital computers have all been proposed both as technological metaphors for intelligence and as mechanisms for modeling mind.

About 400 years ago people started to write about the nature of thought and reason. Hobbes (1588-1679), who has been described by Haugeland (Haugeland, J. (1985). *Artificial Intelligence: The Very Idea*. MIT Press, Cambridge, MA.), p. 85 as the "Grandfather of AI," espoused the position that thinking was symbolic reasoning like talking out loud or working out an answer with pen and paper. The idea of symbolic reasoning was further developed by Descartes (1596-1650), Pascal (1623-1662), Spinoza (1632-1677), Leibniz (1646-1716), and others who were pioneers in the philosophy of mind.

The idea of symbolic operations became more concrete with the development of computers. The first general-purpose computer designed (but not built until 1991, at the Science Museum of London) was the **Analytical Engine** by Babbage (1792-1871). In the early part of the 20th century, there was much work done on understanding computation. Several models of computation were proposed, including the Turing machine by Alan Turing (1912-1954), a theoretical machine that writes symbols on an infinitely long tape, and the lambda calculus of Church (1903-1995), which is a mathematical formalism for rewriting formulas. It can be shown that these very different formalisms are equivalent in that any function computable by one is computable by the others. This leads to the **Church-Turing thesis**:

Any effectively computable function can be carried out on a Turing machine (and so also in the lambda calculus or any of the other equivalent formalisms).

Here **effectively computable** means following well-defined operations; "computers" in Turing's day were people who followed well-defined steps and computers as we know them today did not exist. This thesis says that all computation can be carried out on a Turing machine or one of the other equivalent computational machines. The Church-Turing thesis cannot be proved but it is a hypothesis that has stood the test of time. No one has built a machine that has carried out computation

that cannot be computed by a Turing machine. There is no evidence that people can compute functions that are not Turing computable. An agent's actions are a function of its abilities, its history, and its goals or preferences. This provides an argument that computation is more than just a metaphor for intelligence; reasoning *is* computation and computation can be carried out by a computer.

Once real computers were built, some of the first applications of computers were AI programs. For example, Samuel (Samuel, A.L. (1959). Some studies in machine learning using the game of checkers. *IBM Journal on Research and Development*, 3(3): 210-229.) built a checkers program in 1952 and implemented a program that learns to play checkers in the late 1950s. Newell and Simon (Newell, A. and Simon, H.A. (1956). The logic theory machine: A complex information processing system. Technical Report P-868, The Rand Corporation.) built a program, Logic Theorist, that discovers proofs in propositional logic. In addition to that for high-level symbolic reasoning, there was also much work on low-level learning inspired by how neurons work. McCulloch and Pitts (McCulloch, W. and Pitts, W. (1943). A logical calculus of ideas immanent in nervous activity. *Bulletin of Mathematical Biophysics*, 5: 115-133.) showed how a simple thresholding "formal neuron" could be the basis for a Turing-complete machine. The first learning for these neural networks was described by Minsky (Minsky, M. (1961). Steps towards artificial intelligence. *Proceedings of the IEEE*, 49: 8-30.). One of the early significant works was the Perceptron of Rosenblatt (Rosenblatt, F. (1958). The perceptron: A probabilistic model for information storage and organization in the brain. *Psychological Review*, 65(6): 386-408.). The work on neural networks went into decline for a number of years after the 1968 book by Minsky and Papert (Minsky, M. and Papert, S. (1988). *Perceptrons: An Introduction to Computational Geometry*. MIT Press, Cambridge, MA, expanded edition.), which argued that the representations learned were inadequate for intelligent action.

These early programs concentrated on learning and search as the foundations of the field. It became apparent early that one of the main problems was how to represent the knowledge needed to solve a problem. Before learning, an agent must

have an appropriate target language for the learned knowledge. There have been many proposals for representations from simple feature-based representations to complex logical representations of [McCarthy, J. and Hayes, P.J. (1969). Some philosophical problems from the standpoint of artificial intelligence. In M. Meltzer and D. Michie (Eds.), *Machine Intelligence 4*, pp. 463-502. Edinburgh University Press.] and many in between such as the frames of Minsky (Minsky, M.L. (1975). A framework for representing knowledge. In P. Winston (Ed.), *The Psychology of Computer Vision*, pp. 211-277. McGraw-Hill, New York.).

During the 1960s and 1970s, success was had in building natural language understanding systems in limited domains. For example, the STUDENT program of Daniel Bobrow (Bobrow, D.G. (1967). Natural language input for a computer problem solving system. In M. Minsky (Ed.), *Semantic Information Processing*, pp. 133-215. MIT Press, Cambridge MA.) could solve high school algebra problems expressed in natural language. [Winograd, T. (1990). Thinking machines: Can there be? Are we? In D. Partridge and Y. Wilks (Eds.), *The Foundations of Artificial Intelligence: A Sourcebook*, pp. 167-189. Cambridge University Press, Cambridge, England.]'s SHRDLU system could, using restricted natural language, discuss and carry out tasks in a simulated blocks world. CHAT-80 [Warren, D.H.D. and Pereira, F.C.N. (1982). An efficient easily adaptable system for interpreting natural language queries. *Computational Linguistics*, 8(3-4): 110 - 122.] could answer geographical questions placed to it in natural language. *Figure 2* shows some questions that CHAT-80 answered based on a database of facts about countries, rivers, and so on. All of these systems could only reason in very limited domains using restricted vocabulary and sentence structure.

---

- Does Afghanistan border China?
- What is the capital of Upper Volta?
- Which country's capital is London?
- Which is the largest African country?
- How large is the smallest American country?

- What is the ocean that borders African countries and that borders Asian countries?
- What are the capitals of the countries bordering the Baltic?
- How many countries does the Danube flow through?
- What is the total area of countries south of the Equator and not in Australasia?
- What is the average area of the countries in each continent?
- Is there more than one country in each continent?
- What are the countries from which a river flows into the Black Sea?
- What are the continents no country in which contains more than two cities whose population exceeds 1 million?
- Which country bordering the Mediterranean borders a country that is bordered by a country whose population exceeds the population of India?
- Which countries with a population exceeding 10 million border the Atlantic?

*Figure 2: Some questions CHAT-80 could answer*

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During the 1970s and 1980s, there was a large body of work on **expert systems**, where the aim was to capture the knowledge of an expert in some domain so that a computer could carry out expert tasks. For example, **DENDRAL** [Buchanan, B.G. and Feigenbaum, E.A. (1978). Dendral and meta-dendral: Their applications dimension. *Artificial Intelligence*, 11: 5-24.], developed from 1965 to 1983 in the field of organic chemistry, proposed plausible structures for new organic compounds. **MYCIN** [Buchanan, B. and Shortliffe, E. (Eds.) (1984). *Rule-Based Expert Systems: The MYCIN Experiments of the Stanford Heuristic Programming Project*. Addison-Wesley, Reading, MA.], developed from 1972 to 1980, diagnosed infectious diseases of the blood, prescribed antimicrobial therapy, and explained its reasoning. The 1970s and 1980s were also a period when AI reasoning became widespread in languages such as **Prolog** [Colmerauer, A. and Roussel, P. (1996). The birth of

Prolog. In T.J. Bergin and R.G. Gibson (Eds.), *History of Programming Languages*. ACM Press/Addison-Wesley.].

During the 1990s and the 2000s there was great growth in the subdisciplines of AI such as perception, probabilistic and decision-theoretic reasoning, planning, embodied systems, machine learning, and many other fields. There has also been much progress on the foundations of the field; these form the foundations of this book.

(David L. Poole, Alan K. Mackworth. *Artificial Intelligence: foundations of computational agents* (2nd edition), Cambridge University Press, 2017. – Available at http://assets.cambridge.org/97805215/19007/frontmatter/9780521519007_ frontmat ter.pdf.)

**3. Vocabulary Quiz**

**1) Write the most appropriate word for each of the provided definitions.**

1. a system of using water to produce power

**Answer:** _____

2. the 11th letter of the Greek alphabet

**Answer:** _____

3. a special type of photograph or image made with a laser in which the objects shown look solid, as if they are real, rather than flat

**Answer:** _____

4. involving the calculation of answers, amounts, results, etc.

**Answer:** _____

5. a part of mathematics in which signs and letters represent numbers

**Answer:** _____

6. an area of advanced mathematics in which continuously changing values are studied

**Answer:** _____

7. a nerve cell that carries information between the brain and other parts of the body

**Answer:** _____

8. the activity of using your mind to consider something

**Answer: _____**

2) **Find the most appropriate word / expression for each of the definitions and fill in the blank in an appropriate form.**

9. (especially in mathematics) a formal statement that can be shown to be true by logic

a mathematical _____

10. involving a nerve or the system of nerves that includes the brain

Some people suffered severe _____damage as a result of the disease.

11. something that is similar to or can be used instead of something else

He has been studying the European_____of the British Parliament.

12. to become involved with or support an activity or opinion

Vegetarianism is one cause she does not_____.

13. to support, defend, or fight for a person, belief, right, or principle enthusiastically

He has _____constitutional reform for many years.

14. to calculate an answer or amount by using a machine

_____the ratio of the object's height to its weight.

15. the job of wearing clothes, jewelry, etc. in order to advertise them

Ashley's always wanted to go into _____.

16. to wear fashionable clothes, jewelry, etc. in order to advertise them

Tatjana is _____ing a Versace design.

17. a chemical that combines two or more elements

Salt is a _____of sodium and chlorine.

18. thin plastic in a long, narrow strip with a magnetic covering that allows sounds or sounds and pictures to be recorded and played again, especially one on which sound is recorded

magnetic _____

19. used to introduce a piece of information that the speaker thinks is strange or interesting

_____ (enough), he never actually said that he was innocent.

https://www.word-booster.com

**4. Translate the text into Ukrainian.**

## КРЕДИТ 2

## UNIT 4

## Relationship to Other Disciplines

**1. Learn the active vocabulary to the text.**

**1) sociology (n.)**

• the study of the relationships between people living in groups, especially in industrial societies

**2) computational (adj.)**

• involving the calculation of answers, amounts, results, etc.

**3) epistemology (n.)**

• cf. epistemological (adj.)

• the part of philosophy that is about the study of how we know things

**4) executable (adj.)**

• An executable file or program can be understood by the operating system of a computer and makes the computer perform a particular task.

**5) redesign (n.)**

• a change in the design of something

**6) instructive (adj.)**

• cf. instructively (adv.)

• giving useful or interesting information

**7) dissect (v.)**

• to cut open something, especially a dead body or a plant, and study its structure

**8) hypothesize (v.)**

• to give a possible but not yet proved explanation for something

**9) flap (v.)**

• to wave something, especially wings when or as if flying

**10) membrane (n.)**

• a thin piece of skin that covers or connects parts of a person’s or animal’s body

**11) strap (v.)**

• to fasten something in position by fastening a narrow piece of leather or other strong material around it

**12) underlie (v.)**

• to be a hidden cause of or strong influence on something

**13) aerodynamics (n.)**

• the science that studies the movement of gases and the way solid bodies, such as aircraft, move through them

**14) analogous (adj.)**

• a comparison between things that have similar features, often used to help explain a principle or idea

**15) mimic (v.)**

• to copy the way in which a particular person usually speaks and moves, usually in order to make people laugh

**16) algorithm (n.)**

• cf. algorithmic (adj.)

• a set of mathematical instructions or rules that, especially if given to a computer, will help to calculate an answer to a problem

**17) timeshare (n.)**

• a vacation house or apartment that is owned by several different people who each use it for a particular period of the year

**18) algebra (n.)**

• cf. algebraic (adj.)

• cf. algebraically (adv.)

• a part of mathematics in which signs and letters represent numbers

**19) cognition (n.)**

• the use of conscious mental processes

**20) neuroscience (n.)**

• the scientific study of the nervous system and the Brain

https://dictionary.cambridge.org

**2. Read the text applying before reading, during reading and after reading strategies described in the introduction.**

**Relationship to Other Disciplines**

AI is a very young discipline. Other disciplines as diverse as philosophy, neurobiology, evolutionary biology, psychology, economics, political science, sociology, anthropology, control engineering, statistics, and many more have been studying aspects of intelligence much longer.

The science of AI could be described as "synthetic psychology," "experimental philosophy," or "computational epistemology"– epistemology is the study of knowledge. AI can be seen as a way to study the nature of knowledge and intelligence, but with a more powerful experimental tool than was previously available. Instead of being able to observe only the external behavior of intelligent systems, as philosophy, psychology, economics, and sociology have traditionally been able to do, AI researchers experiment with executable models of intelligent behavior. Most important, such models are open to inspection, redesign, and experiment in a complete and rigorous way. Modern computers provide a way to construct the models about which philosophers have only been able to theorize. AI researchers can experiment with these models as opposed to just discussing their abstract properties. AI theories can be empirically grounded in implementations. Moreover, we are often surprised when simple agents exhibit complex behavior. We would not have known this without implementing the agents.

It is instructive to consider an analogy between the development of flying machines over the past few centuries and the development of thinking machines over the past few decades. There are several ways to understand flying. One is to dissect known flying animals and hypothesize their common structural features as necessary fundamental characteristics of any flying agent. With this method, an examination of

birds, bats, and insects would suggest that flying involves the flapping of wings made of some structure covered with feathers or a membrane. Furthermore, the hypothesis could be tested by strapping feathers to one's arms, flapping, and jumping into the air, as Icarus did. An alternative methodology is to try to understand the principles of flying without restricting oneself to the natural occurrences of flying. This typically involves the construction of artifacts that embody the hypothesized principles, even if they do not behave like flying animals in any way except flying. This second method has provided both useful tools – airplanes – and a better understanding of the principles underlying flying, namely aerodynamics.

AI takes an approach analogous to that of aerodynamics. AI researchers are interested in testing general hypotheses about the nature of intelligence by building machines that are intelligent and that do not necessarily mimic humans or organizations. This also offers an approach to the question, "Can computers really think?" by considering the analogous question, "Can airplanes really fly?"

AI is intimately linked with the discipline of computer science because the study of computation is central to AI. It is essential to understand algorithms, data structures, and combinatorial complexity to build intelligent machines. It is also surprising how much of computer science started as a spinoff from AI, from timesharing to computer algebra systems.

Finally, AI can be seen as coming under the umbrella of cognitive science. Cognitive science links various disciplines that study cognition and reasoning, from psychology to linguistics to anthropology to neuroscience. AI distinguishes itself within cognitive science by providing tools to build intelligence rather than just studying the external behavior of intelligent agents or dissecting the inner workings of intelligent systems.

(David L. Poole, Alan K. Mackworth. *Artificial Intelligence: foundations of computational agents* (2nd edition), Cambridge University Press, 2017. – Available at http://assets.cambridge.org/97805215/19007/frontmatter/9780521519007_ frontmat ter.pdf.)

**3. Vocabulary Quiz**

1) **Write the most appropriate word for each of the provided definitions.**

1. the science that studies the movement of gases and the way solid bodies, such as aircraft, move

through them

**Answer:** _____

2. a change in the design of something

**Answer:** _____

3. to cut open something, especially a dead body or a plant, and study its structure

**Answer:** _____

4. giving useful or interesting information

**Answer:** _____

5. to wave something, especially wings when or as if flying

**Answer:** _____

6. a thin piece of skin that covers or connects parts of a person's or animal's body

**Answer:** _____

7. to copy the way in which a particular person usually speaks and moves, usually in order to make people laugh

**Answer:** _____

2) **Find the most appropriate word / expression for each of the definitions and fill in the blank in an appropriate form.**

8. a vacation house or apartment that is owned by several different people who each use it for a particular period of the year

We bought a _____in Florida.

9. the scientific study of the nervous system and the brain

Thanks to advances in _____, we now know that adult brains can grow and change.

10. involving the calculation of answers, amounts, results, etc.

The children had limited linguistic and_____skills.

11. a comparison between things that have similar features, often used to help explain a principle or idea

The experience of mystic trance is in a sense_____ to sleep or drunkenness.

12. to give a possible but not yet proved explanation for something

There's no point _____about how the accident happened, since we'll never really know.

13. a set of mathematical instructions or rules that, especially if given to a computer, will help to calculate an answer to a problem

Music apps use _____to predict the probability that fans of one particular band will like another.

14. the study of the relationships between people living in groups, especially in industrial societies

She has a degree in _____and politics.

3) **Choose the most appropriate definition for each of the provided words.**

15. **epistemology** =

① the part of philosophy that is about the study of how we know things

② the back end of an animal

③ a sea fish with a strong taste, often used as food

④ a movement away from a place

⑤ a loud sound made by forcing air through the nose

16. **algebra** =

① the state of being unable to stop thinking about something or someone, or an unnaturally strong interest in something or someone

② the belief that having money and possessions is the most important thing in life

③ the advantage of a situation

④ a part of mathematics in which signs and letters represent numbers

⑤ a long period of time, especially one in which there are new developments and great change

17. **cognition =**

① the use of conscious mental processes

② a sloping position or a move in a particular direction, especially up or down

③ a serious disease in which the body produces too many white blood cells

④ a piece of informal clothing with long sleeves, usually made of thick cotton, worn on the upper part of the body

⑤ a person who operates a camera when movies or television programs are being made

18. **underlie =**

① to wear or be decorated with something

② to walk through water or other liquid with some effort, because it is deep enough to come quite high up your legs, or thick

③ to use a cloth to remove dust from the surface of something

④ to know about something before it happens

⑤ to be a hidden cause of or strong influence on something

19. **strap =**

① to turn and direct an object

② to fasten something in position by fastening a narrow piece of leather or other strong material around it

③ to come close together in a group, or to hold your arms and legs close to your body, especially because of cold or fear

④ to arrange things or people so that there is some distance or time between them

⑤ If an area is populated by people or animals, they live in that area

https://www.word-booster.com

**4. Translate the text into Ukrainian.**

# UNIT 5

## Agents Situated in Environments

**1. Learn the active vocabulary to the text.**

**1) coupling (n.)**

• a device that joins two things together

**2) computational (adj.)**

• involving the calculation of answers, amounts, results, etc.

**3) sensor (n.)**

• a device that is used to record that something is present or that there are changes in something

**4) perceptual (adj.)**

• relating to the ability to notice something or come to an opinion about something using your senses

**5) deterministic (adj.)**

• believing that everything that happens must happen as it does and could not have happened any other way, or relating to this belief

**6) encode (v.)**

• to change something into a system for sending messages secretly, or to represent complicated

information in a simple or short way

**7) thermostat (n.)**

• a device that keeps a building, engine, etc. within a limited temperature range by automatically

switching the supply of heat on and off

**8) mobile (adj.)**

• moving or walking around freely

**9) diagnostic (adj.)**

• identifying a particular illness using a combination of signs and symptoms

**10) mediate (v.)**

• cf. mediation (n.)

• cf. mediator (n.)

• to talk to two separate people or groups involved in a disagreement to try to help them to agree or find a solution to their problems

https://dictionary.cambridge.org

**2. Read the text applying before reading, during reading and after reading strategies described in the introduction.**

**Agents Situated in Environments**

AI is about practical reasoning: reasoning in order to do something. A coupling of perception, reasoning, and acting comprises an **agent**. An agent acts in an **environment**. An agent's environment may well include other agents. An agent together with its environment is called a **world**.

An agent could be, for example, a coupling of a computational engine with physical sensors and actuators, called a **robot**, where the environment is a physical setting. It could be the coupling of an advice-giving computer--an **expert system**--with a human who provides perceptual information and carries out the task. An agent could be a program that acts in a purely computational environment--a **software agent**.

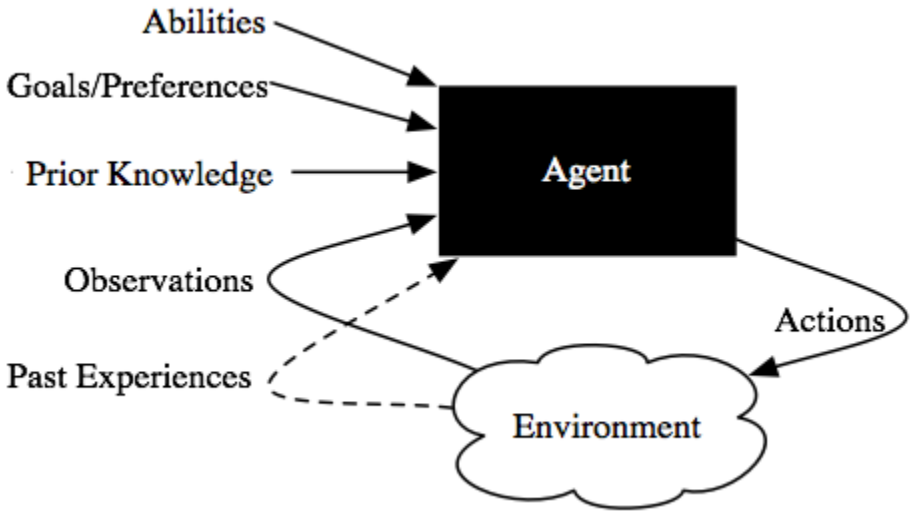


*Figure 3: An agent interacting with an environment*

*Figure 3* shows the inputs and outputs of an agent. At any time, what an agent does depends on its

- **prior knowledge** about the agent and the environment;
- **history** of interaction with the environment, which is composed of
  - **observations** of the current environment and
  - **past experiences** of previous actions and observations, or other data, from which it can learn;
- **goals** that it must try to achieve or preferences over states of the world; and
- **abilities**, which are the primitive actions it is capable of carrying out.

Two deterministic agents with the same prior knowledge, history, abilities, and goals should do the same thing. Changing any one of these can result in different actions.

Each agent has some internal state that can encode beliefs about its environment and itself. It may have goals to achieve, ways to act in the environment to achieve those goals, and various means to modify its beliefs by reasoning, perception, and learning. This is an all-encompassing view of intelligent agents varying in complexity from a simple thermostat, to a team of mobile robots, to a diagnostic advising system whose perceptions and actions are mediated by human beings, to society itself.

(David L. Poole, Alan K. Mackworth. *Artificial Intelligence: foundations of computational agents* (2nd edition), Cambridge University Press, 2017. – Available at http://assets.cambridge.org/97805215/19007/frontmatter/9780521519007_ frontmat ter.pdf.)

**3. Vocabulary Quiz**

1) **Write the most appropriate word for each of the provided definitions.**

1. the science that studies the movement of gases and the way solid bodies, such as aircraft, move

through them

**Answer:** _____

2. a change in the design of something

**Answer:** _____

3. to cut open something, especially a dead body or a plant, and study its structure

**Answer: _____**

4. giving useful or interesting information

**Answer: _____**

5. to wave something, especially wings when or as if flying

**Answer: _____**

6. a thin piece of skin that covers or connects parts of a person's or animal's body

**Answer: _____**

7. to copy the way in which a particular person usually speaks and moves, usually in order to make people laugh

**Answer: _____**

2) **Find the most appropriate word / expression for each of the definitions and fill in the blank in an appropriate form.**

8. a vacation house or apartment that is owned by several different people who each use it for a particular period of the year

We bought a _____in Florida.

9. the scientific study of the nervous system and the brain

Thanks to advances in _____, we now know that adult brains can grow and change.

10. involving the calculation of answers, amounts, results, etc.

The children had limited linguistic and_____skills.

11. a comparison between things that have similar features, often used to help explain a principle or idea

The experience of mystic trance is in a sense _____to sleep or drunkenness.

12. to give a possible but not yet proved explanation for something

There's no point _____about how the accident happened, since we'll never really know.

13. a set of mathematical instructions or rules that, especially if given to a computer, will help to calculate an answer to a problem

Music apps use _____to predict the probability that fans of one particular band will like another.

14. the study of the relationships between people living in groups, especially in industrial societies

She has a degree in _____and politics.

3) **Choose the most appropriate definition for each of the provided words.**

15. **epistemology =**

① the part of philosophy that is about the study of how we know things

② the back end of an animal

③ a sea fish with a strong taste, often used as food

④ a movement away from a place

⑤ a loud sound made by forcing air through the nose

16. **algebra =**

① the state of being unable to stop thinking about something or someone, or an unnaturally strong interest in something or someone

② the belief that having money and possessions is the most important thing in life

③ the advantage of a situation

④ a part of mathematics in which signs and letters represent numbers

⑤ a long period of time, especially one in which there are new developments and great change

17. **cognition =**

① the use of conscious mental processes

② a sloping position or a move in a particular direction, especially up or down

③ a serious disease in which the body produces too many white blood cells

④ a piece of informal clothing with long sleeves, usually made of thick cotton, worn on the upper part of the body

⑤ a person who operates a camera when movies or television programs are being made

18. **underlie =**

① to wear or be decorated with something

② to walk through water or other liquid with some effort, because it is deep enough to come quite high up your legs, or thick

③ to use a cloth to remove dust from the surface of something

④ to know about something before it happens

⑤ to be a hidden cause of or strong influence on something

19. **strap =**

① to turn and direct an object

② to fasten something in position by fastening a narrow piece of leather or other strong material around it

③ to come close together in a group, or to hold your arms and legs close to your body, especially because of cold or fear

④ to arrange things or people so that there is some distance or time between them

⑤ If an area is populated by people or animals, they live in that area

https://www.word-booster.com

**4. Translate the text into Ukrainian.**

# UNIT 6

## Knowledge Representation

**1. Learn the active vocabulary to the text.**

**1) representation (n.)**

• a person or organization that speaks, acts, or is present officially for someone else

**2) out (n.)**

• an excuse or reason for avoiding an unpleasant situation

**3) informally (adv.)**

• (of situations) not formal or official, or (of clothing, behavior, speech) suitable when you are with friends and family but not for official occasions

**4) framework (n.)**

• a supporting structure around which something can be built

**5) flesh (n.)**

• the soft part of the body of a person or animal that is between the skin and the bones, or the soft inside part of a fruit or vegetable

**6) compute (v.)**

• cf. computation (n.)

• to calculate an answer or amount by using a machine

**7) output (n.)**

• an amount of something produced by a person, machine, factory, country, etc.

**8) sequence (n.)**

• a series of related things or events, or the order in which they follow each other

**9) compact (adj.)**

• cf. compactly (adv.)

• cf. compactness (n.)

• consisting of parts that are positioned together closely or in a tidy way, using very little space

**10) result (v.)**

• to happen or exist because something else has happened

**11) amenable (adj.)**

• willing to accept or be influenced by a suggestion

**12) computational (adj.)**

• involving the calculation of answers, amounts, results, etc.

**13) inference (n.)**

• a guess that you make or an opinion that you form based on the information that you have

**14) tractable (adj.)**

• cf. tractability (n.)

• easily dealt with, controlled, or persuaded

**15) debug (v.)**

• to remove bugs (= mistakes) from a computer program

https://dictionary.cambridge.org

**2. Read the text applying before reading, during reading and after reading strategies described in the introduction.**

**Knowledge Representation**

Typically, a problem to solve or a task to carry out, as well as what constitutes a solution, is only given informally, such as "deliver parcels promptly when they arrive" or "fix whatever is wrong with the electrical system of the house."

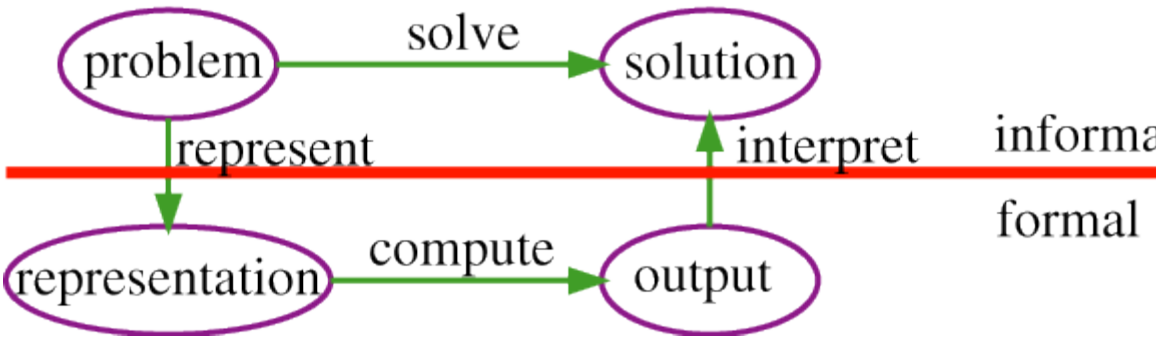


*Figure 4: The role of representations in solving problems*

The general framework for solving problems by computer is given in *Figure 4*. To solve a problem, the designer of a system must

- flesh out the task and determine what constitutes a solution;
- represent the problem in a language with which a computer can reason;
- use the computer to compute an output, which is an answer presented to a user or a sequence of actions to be carried out in the environment; and
- interpret the output as a solution to the problem.

**Knowledge** is the information about a domain that can be used to solve problems in that domain. To solve many problems requires much knowledge, and this knowledge must be represented in the computer. As part of designing a program to solve problems, we must define how the knowledge will be represented. A **representation scheme** is the form of the knowledge that is used in an agent. A **representation** of some piece of knowledge is the internal representation of the knowledge. A representation scheme specifies the form of the knowledge. A **knowledge base** is the representation of all of the knowledge that is stored by an agent.

A good representation scheme is a compromise among many competing objectives. A representation should be

- rich enough to express the knowledge needed to solve the problem.
- as close to the problem as possible; it should be compact, natural, and maintainable. It should be easy to see the relationship between the representation and the domain being represented, so that it is easy to determine whether the knowledge represented is correct. A small change in the problem should result in a small change in the representation of the problem.
- amenable to efficient computation, which usually means that it is able to express features of the problem that can be exploited for computational gain and able to trade off accuracy and computation time.
- able to be acquired from people, data and past experiences.

Many different representation schemes have been designed. Many of these start with some of these objectives and are then expanded to include the other objectives.

For example, some are designed for learning and then expanded to allow richer problem solving and inference abilities. Some representation schemes are designed with expressiveness in mind, and then inference and learning are added on. Some schemes start from tractable inference and then are made more natural, and more able to be acquired.

Some of the questions that must be considered when given a problem or a task are the following:

- What is a solution to the problem? How good must a solution be?
- How can the problem be represented? What distinctions in the world are needed to solve the problem? What specific knowledge about the world is required? How can an agent acquire the knowledge from experts or from experience? How can the knowledge be debugged, maintained, and improved?
- How can the agent compute an output that can be interpreted as a solution to the problem? Is worst-case performance or average-case performance the critical time to minimize? Is it important for a human to understand how the answer was derived?

These issues are discussed in the next sections and arise in many of the representation schemes presented later in the book.

(David L. Poole, Alan K. Mackworth. *Artificial Intelligence: foundations of computational agents* (2nd edition), Cambridge University Press, 2017. – Available at http://assets.cambridge.org/97805215/19007/frontmatter/9780521519007_ frontmat ter.pdf.)

**3. Vocabulary Quiz**

1) **Write the most appropriate word for each of the provided definitions.**

1. involving the calculation of answers, amounts, results, etc.

**Answer: _____**

2. to calculate an answer or amount by using a machine

**Answer: _____**

3. consisting of parts that are positioned together closely or in a tidy way, using very little space

**Answer: _____**

4. (of situations) not formal or official, or (of clothing, behavior, speech) suitable when you are with friends and family but not for official occasions

**Answer: _____**

5. a person or organization that speaks, acts, or is present officially for someone else

**Answer: _____**

6. to happen or exist because something else has happened

2) **Find the most appropriate word / expression for each of the definitions and fill in the blank in an appropriate form.**

7. to remove bugs (= mistakes) from a computer program

to _____a program

8. easily dealt with, controlled, or persuaded

The problem turned out to be less _____than I had expected.

9. willing to accept or be influenced by a suggestion

She might be more _____to the idea if you explained how much money it would save.

10. a guess that you make or an opinion that you form based on the information that you have

They were warned to expect a heavy air attack and by _____many casualties.

11. an amount of something produced by a person, machine, factory, country, etc.

Last year manufacturing _____fell by 14 percent.

12. the soft part of the body of a person or animal that is between the skin and the bones, or the soft inside part of a fruit or vegetable

The thorn went deep into the _____of my hand.

13. a series of related things or events, or the order in which they follow each other

The first chapter describes the strange _____of events that led to his death.

14. a supporting structure around which something can be built

a legal _____for resolving disputes

15. an excuse or reason for avoiding an unpleasant situation

We must arrange the negotiations so we have an _____if we need it.

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**4. Translate the text into Ukrainian.**

# КРЕДИТ 3

## UNIT 7

## Defining a Solution

**1. Learn the active vocabulary to the text.**

**1) refine (v.)**

• to make something pure or improve something,

especially by removing unwanted material

**2) unspecified (adj.)**

• If something is unspecified, you are not told what it is

**3) arbitrarily (adv.)**

• based on chance rather than being planned or based on reason

**4) trading (n.)**

• the activity of buying and selling goods and/or services

**5) out (n.)**

• an excuse or reason for avoiding an unpleasant situation

**6) reasoning (n.)**

• the process of thinking about something in order to make a decision

**7) incomplete (adj.)**

• cf. incompletely (adv.)

• cf. incompleteness (n.)

• not having some parts, or not finished

**8) optimal (adj.)**

• optimum

**9) cardinal (adj.)**

• of great importance

**10) magnitude (n.)**

• the large size or importance of something

**11) explicitly (adv.)**

• clear and exact

**12) proportion (n.)**

• the number or amount of a group or part of something when compared to the whole

**13) cardinal (n.)**

• a priest of very high rank in the Roman Catholic Church

**14) desirability (n.)**

• the quality of being sexually attractive

**15) utility (n.)**

• a service that is used by the public, such as an electricity or gas supply or a train service

**16) approximation (n.)**

• a guess of a number that is not exact but that is close

**17) theoretically (adv.)**

• in a way that obeys some rules but is not likely

**18) algorithm (n.)**

• cf. algorithmic (adj.)

• a set of mathematical instructions or rules that, especially if given to a computer, will help to calculate an answer to a problem

**19) drop (v.)**

• to fall or to allow something to fall

**20) indeed (adv.)**

• really or certainly, often used to emphasize something

https://dictionary.cambridge.org

**2. Read the text applying before reading, during reading and after reading strategies described in the introduction.**

**Defining a Solution**

Given an informal description of a problem, before even considering a computer, a knowledge base designer should determine what would constitute a solution. This question arises not only in AI but in any software design. Much of **software engineering** involves refining the specification of the problem.

Typically, problems are not well specified. Not only is there usually much left unspecified, but also the unspecified parts cannot be filled in arbitrarily. For example, if you ask a trading agent to find out all the information about resorts that may have health issues, you do not want the agent to return the information about all resorts, even though all of the information you requested is in the result. However, if the trading agent does not have complete knowledge about the resorts, returning all of the information may be the only way for it to guarantee that all of the requested information is there. Similarly, you do not want a delivery robot, when asked to take all of the trash to the garbage can, to take everything to the garbage can, even though this may be the only way to guarantee that all of the trash has been taken. Much work in AI is motivated by **commonsense reasoning**; we want the computer to be able to make commonsense conclusions about the unstated assumptions.

Given a well-defined problem, the next issue is whether it matters if the answer returned is incorrect or incomplete. For example, if the specification asks for all instances, does it matter if some are missing? Does it matter if there are some extra instances? Often a person does not want just any solution but the best solution according to some criteria. There are four common classes of solutions:

Optimal solution

An **optimal solution** to a problem is one that is the best solution according to some measure of solution quality. This measure is typically specified as an **ordinal**, where only the order matters. However, in some situations, such as when combining multiple criteria or when reasoning under uncertainty, you need a **cardinal** measure, where the relative magnitudes also matter. An example of an ordinal measure is for the robot to take out as much trash as possible; the more trash it can take out, the better. As an example of a cardinal measure, you may want the delivery robot to take as much of the trash as possible to the garbage can, minimizing the distance traveled, and explicitly specify a trade-off between the effort required and the proportion of the trash taken out. It may be better to miss some trash than to waste too much time. One general cardinal measure of desirability, known as **utility**, is used in **decision theory.**

Satisficing solution

Often an agent does not need the best solution to a problem but just needs some solution. A **satisficing solution** is one that is good enough according to some description of which solutions are adequate. For example, a person may tell a robot that it must take all of trash out, or tell it to take out three items of trash.

Approximately optimal solution

One of the advantages of a cardinal measure of success is that it allows for approximations. An **approximately optimal solution** is one whose measure of quality is close to the best that could theoretically be obtained. Typically agents do not need optimal solutions to problems; they only must get close enough. For example, the robot may not need to travel the optimal distance to take out the trash but may only need to be within, say, *10%* of the optimal distance.

For some problems, it is much easier computationally to get an approximately optimal solution than to get an optimal solution. However, for other problems, it is (asymptotically) just as difficult to guarantee finding an approximately optimal solution as it is to guarantee finding an optimal solution. Some approximation algorithms guarantee that a solution is within some range of optimal, but for some algorithms no guarantees are available.

Probable solution

A **probable solution** is one that, even though it may not actually be a solution to the problem, is likely to be a solution. This is one way to approximate, in a precise manner, a satisficing solution. For example, in the case where the delivery robot could drop the trash or fail to pick it up when it attempts to, you may need the robot to be 80% sure that it has picked up three items of trash. Often you want to distinguish the **false-positive error** rate (the proportion of the answers given by the computer that are not correct) from the **false-negative error** rate (which is the proportion of those answers not given by the computer that are indeed correct). Some applications are much more tolerant of one of these errors than of the other.

These categories are not exclusive. A form of learning known as **probably approximately correct (PAC) learning** considers probably learning an approximately correct concept.

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**3. Vocabulary Quiz**

1) **Write the most appropriate word for each of the provided definitions.**

1. based on chance rather than being planned or based on reason

**Answer:** _____

2. the quality of being sexually attractive

**Answer:** _____

3. a priest of very high rank in the Roman Catholic Church

**Answer:** _____

4. a set of mathematical instructions or rules that, especially if given to a computer, will help to calculate an answer to a problem

**Answer:** _____

5. to make something pure or improve something, especially by removing unwanted material

**Answer:** _____

6. a guess of a number that is not exact but that is close

**Answer:** _____

**2) Find the most appropriate single word / expression for the paired blanks below and fill them in with appropriate forms.**

7. If something is _____, you are not told what it is

The court awarded her an _____amount of money.

3) **Find the most appropriate word / expression for each of the definitions and fill in the blank in an appropriate form.**

8. of great importance

a _____rule/error/sin

9. the process of thinking about something in order to make a decision

The _____behind her conclusion is impossible to fault.

10. clear and exact

I told you quite _____ (= clearly) to be home by midnight.

11. the large size or importance of something

They don't seem to grasp the _____of the problem.

12. _____in a way that obeys some rules but is not likely

It is _____possible.

13. the activity of buying and selling goods and/or services

She doesn't approve of Sunday _____ (=stores being open on Sunday).

14. the number or amount of a group or part of something when compared to the whole

Children make up a large _____of the world's population.

15. not having some parts, or not finished

The decision was based on _____or inaccurate information.

16. to fall or to allow something to fall

She _____her keys.

17. an excuse or reason for avoiding an unpleasant situation

We must arrange the negotiations so we have an _____if we need it.

4) **Choose the most appropriate definition for each of the provided words.**

18. **optimal** =

① serious and determined, especially too serious and unable to find your own actions funny

② secret, often in a formal, business, or military situation

③ preserved and sold in a metal container

④ optimum

⑤ If an argument, set of ideas, or a plan is coherent, it is clear and carefully considered, and each part of it connects or follows in a natural or reasonable way.

19. **utility** =

① a usual or fixed way of doing things

② a service that is used by the public, such as an electricity or gas supply or a train service

③ a public road, especially an important road that joins cities or towns together

④ a person who trades in something

⑤ a particular amount of money that is paid, usually every week, to an employee, especially one who does work that needs physical skills or strength, rather than a job needing a college education

20. **indeed =**

① very; to a large degree

② really or certainly, often used to emphasize something

③ in a way that is easy to see, hear, read, or understand

④ as much as suggested

⑤ (during) the night of the present day

https://www.word-booster.com

**4. Translate the text into Ukrainian.**

# UNIT 8

## Representations

**1. Learn the active vocabulary to the text.**

**1) physical (n.)**

• an examination of a person's body by a doctor in order to discover if that person is healthy,

sometimes done before a person can be accepted for a particular job

**2) manipulate (v.)**

• to control something or someone to your advantage, often unfairly or dishonestly

**3) quantum (n.)**

• the smallest amount or unit of something, especially energy

**4) model (v.)**

• to wear fashionable clothes, jewelry, etc. in order to advertise them

**5) abstraction (n.)**

• the situation in which a subject is very general and not based on real situations

**6) simplistic (adj.)**

• making something complicated seem simple by ignoring important parts of it

**7) slippage (n.)**

• a reduction in the rate, amount, or standard of something

**8) predictive (adj.)**

• relating to the ability to predict

**9) successively (adv.)**

• happening one after the other without any break

**10) neural (adj.)**

• involving a nerve or the system of nerves that includes the brain

**11) neuron (n.)**

• a nerve cell that carries information between the brain and other parts of the body

**12) neuronal (adj.)**

• relating to a nerve cell or a neuron (= a basic unit of a nerve cell)

**13) hierarchical (adj.)**

• a system in which people or things are arranged according to their importance

**14) physicist (n.)**

• a person who studies physics or whose job is connected with physics

**15) biologist (n.)**

• a scientist who studies biology

**16) anthropologist (n.)**

• someone who scientifically studies humans and their customs, beliefs, and relationships

**17) conjecture (n.)**

• a guess about something based on how it seems and not on proof

**18) emulate (v.)**

• cf. emulation (n.)

• to copy something achieved by someone else and try to do it as well as he or she has

**19) computational (adj.)**

• involving the calculation of answers, amounts, results, etc.

**22) reason (v.)**

• to try to understand and to make judgments based on practical facts

**23) robotic (adj.)**

• relating to or like a robot

**24) compute (v.)**

• cf. computation (n.)

• to calculate an answer or amount by using a machine

**25) manipulation (n.)**

• controlling someone or something to your own advantage, often unfairly or dishonestly

https://dictionary.cambridge.org

**2. Read the text applying before reading, during reading and after reading strategies described in the introduction.**

**Representations**

Once you have some requirements on the nature of a solution, you must represent the problem so a computer can solve it.

Computers and human minds are examples of **physical symbol systems**. A **symbol** is a meaningful pattern that can be manipulated. Examples of symbols are written words, sentences, gestures, marks on paper, or sequences of bits. A **symbol system** creates, copies, modifies, and destroys symbols. Essentially, a symbol is one of the patterns manipulated as a unit by a symbol system. The term physical is used, because symbols in a physical symbol system are physical objects that are part of the real world, even though they may be internal to computers and brains. They may also need to physically affect action or motor control.

Much of AI rests on the **physical symbol system hypothesis** of Newell and Simon (Newell, A. and Simon, H.A. (1976). Computer science as empirical enquiry: Symbols and search. *Communications of the ACM*, 19: 113-126.):

A physical symbol system has the necessary and sufficient means for general intelligent action.

This is a strong hypothesis. It means that any intelligent agent is necessarily a physical symbol system. It also means that a physical symbol system is all that is needed for intelligent action; there is no magic or an as-yet-to-be-discovered quantum phenomenon required. It does not imply that a physical symbol system does not need a body to sense and act in the world. The physical symbol system hypothesis is an empirical hypothesis that, like other scientific hypotheses, is to be judged by how well it fits the evidence, and what alternative hypotheses exist. Indeed, it could be false.

An intelligent agent can be seen as manipulating symbols to produce action. Many of these symbols are used to refer to things in the world. Other symbols may be useful concepts that may or may not have external meaning. Yet other symbols may refer to internal states of the agent.

An agent can use physical symbol systems to model the world. A **model** of a world is a representation of the specifics of what is true in the world or of the dynamic of the world. The world does not have to be modeled at the most detailed level to be useful. All models are **abstractions**; they represent only part of the world and leave out many of the details. An agent can have a very simplistic model of the world, or it can have a very detailed model of the world. The **level of abstraction** provides a partial ordering of abstraction. A lower-level abstraction includes more details than a higher-level abstraction. An agent can have multiple, even contradictory, models of the world. The models are judged not by whether they are correct, but by whether they are useful.

**Example 1.2:** A delivery robot can model the environment at a high level of abstraction in terms of rooms, corridors, doors, and obstacles, ignoring distances, its size, the steering angles needed, the slippage of the wheels, the weight of parcels, the details of obstacles, the political situation in Canada, and virtually everything else. The robot could model the environment at lower levels of abstraction by taking some of these details into account. Some of these details may be irrelevant for the successful implementation of the robot, but some may be crucial for the robot to succeed. For example, in some situations the size of the robot and the steering angles may be crucial for not getting stuck around a particular corner. In other situations, if the robot stays close to the center of the corridor, it may not need to model its width or the steering angles.

Choosing an appropriate level of abstraction is difficult because

- a high-level description is easier for a human to specify and understand.
- a low-level description can be more accurate and more predictive. Often high-level descriptions abstract away details that may be important for actually solving the problem.
- the lower the level, the more difficult it is to reason with. This is because a solution at a lower level of detail involves more steps and many more possible courses of action exist from which to choose.

- you may not know the information needed for a low-level description. For example, the delivery robot may not know what obstacles it will encounter or how slippery the floor will be at the time that it must decide what to do.

It is often a good idea to model an environment at multiple levels of abstraction.

Biological systems, and computers, can be described at multiple levels of abstraction. At successively lower levels are the neural level, the biochemical level (what chemicals and what electrical potentials are being transmitted), the chemical level (what chemical reactions are being carried out), and the level of physics (in terms of forces on atoms and quantum phenomena). What levels above the neuron level are needed to account for intelligence is still an open question. Note that these levels of description are echoed in the hierarchical structure of science itself, where scientists are divided into physicists, chemists, biologists, psychologists, anthropologists, and so on. Although no level of description is more important than any other, we conjecture that you do not have to emulate every level of a human to build an AI agent but rather you can emulate the higher levels and build them on the foundation of modern computers. This conjecture is part of what AI studies.

The following are two levels that seem to be common to both biological and computational entities:

- The **knowledge level** is a level of abstraction that considers what an agent knows and believes and what its goals are. The knowledge level considers what an agent knows, but not how it reasons. For example, the delivery agent's behavior can be described in terms of whether it knows that a parcel has arrived or not and whether it knows where a particular person is or not. Both human and robotic agents can be described at the knowledge level. At this level, you do not specify how the solution will be computed or even which of the many possible strategies available to the agent will be used.
- The **symbol level** is a level of description of an agent in terms of the reasoning it does. To implement the knowledge level, an agent manipulates symbols to produce answers. Many cognitive science experiments are designed to determine

what symbol manipulation occurs during reasoning. Note that whereas the knowledge level is about what the agent believes about the external world and what its goals are in terms of the outside world, the symbol level is about what goes on inside an agent to reason about the external world.

(David L. Poole, Alan K. Mackworth. *Artificial Intelligence: foundations of computational agents* (2nd edition), Cambridge University Press, 2017. – Available at http://assets.cambridge.org/97805215/19007/frontmatter/9780521519007_ frontmat ter.pdf.)

**3. Vocabulary Quiz**

1) **Write the most appropriate word for each of the provided definitions.**

1. an examination of a person's body by a doctor in order to discover if that person is healthy, sometimes done before a person can be accepted for a particular job

**Answer:** _____

2. a reduction in the rate, amount, or standard of something

**Answer:** _____

3. involving the calculation of answers, amounts, results, etc.

**Answer:** _____

4. making something complicated seem simple by ignoring important parts of it

**Answer:** _____

5. a nerve cell that carries information between the brain and other parts of the body

**Answer:** _____

6. involving a nerve or the system of nerves that includes the brain

**Answer:** _____

7. relating to or like a robot

**Answer:** _____

8. to copy something achieved by someone else and try to do it as well as he or she has

**Answer:** _____

9. happening one after the other without any break

**Answer: _____**

10. someone who scientifically studies humans and their customs, beliefs, and relationships

**Answer: _____**

11. a person who studies physics or whose job is connected with physics

**Answer: _____**

12. a scientist who studies biology

**Answer: _____**

13. controlling someone or something to your own advantage, often unfairly or dishonestly

**Answer: _____**

14. the situation in which a subject is very general and not based on real situations

**Answer: _____**

2) **Find the most appropriate word / expression for each of the definitions and fill in the blank in an appropriate form.**

15. relating to a nerve cell or a neuron (= a basic unit of a nerve cell)

The drugs increase _____ activity as a treatment for Alzheimer's disease.

16. a guess about something based on how it seems and not on proof

There's been a lot of _____ in the media recently about the marriage.

17. to copy something achieved by someone else and try to do it as well as he or she has

They hope to _____ the success of other software companies.

18. involving the calculation of answers, amounts, results, etc.

The children had limited linguistic and_____ skills.

19. happening one after the other without any break

Since the championship began, they have finished _____ ninth, seventh, and fifth.

20. relating to the ability to predict

The _____ value of this new method of analysis has still to be proven.

21. to calculate an answer or amount by using a machine

_____ the ratio of the object's height to its weight.

22. a system in which people or things are arranged according to their importance

It's a very _____ organization in which everyone's status is clearly defined.

23. the smallest amount or unit of something, especially energy

_____ theory

24. to try to understand and to make judgments based on practical facts

[+ (that)] Newton _____ (that) there had to be a force such as gravity

25. a system in which people or things are arranged according to their importance

It's a very _____ organization in which everyone's status is clearly defined.

3) **Choose the most appropriate definition for each of the provided words.**

26. **slippage =**

① the glass used for windows

② someone who writes words for songs, especially pop songs

③ a reduction in the rate, amount, or standard of something

④ a person of low rank and little authority who works for someone more important

27. **manipulation =**

① the act of telling your employer that you are leaving your job

② the ability to use words in a smart and humorous way

③ someone who works in a garden, growing and taking care of plants

④ controlling someone or something to your own advantage, often unfairly or dishonestly

⑤ an occasion when two lines cross, or the place where this happens

28. **robotic =**

① relating to or like a robot

② moving or operating more slowly than usual and with less energy or power

③ involving or expressed in numbers

④ having or producing happy and enjoyable feelings suitable for a festival or other special occasion

⑤ deserving respect because of age, high position, or religious or historical importance

29. **quantum =**

① the smallest amount or unit of something, especially energy

② small, rounded stones, often mixed with sand

③ an occasion when you have an informal meal of sandwiches, etc. outside, or the food itself

④ a trick to get someone's money or make someone do what you want

⑤ a chemical element that is present in teeth, bones, and chalk

https://www.word-booster.com

**4. Translate the text into Ukrainian.**

# UNIT 9

## Reasoning and Acting

**1. Learn the active vocabulary to the text.**

**1) manipulation (n.)**

• controlling someone or something to your own advantage, often unfairly or dishonestly

**2) reasoning (n.)**

• the process of thinking about something in order to make a decision

**3) compute (v.)**

• cf. computation (n.)

• to calculate an answer or amount by using a machine

**4) might (v.)**

• past simple of the verb may, used especially when reporting what someone has said, thought, asked, etc.

**5) act (v.)**

• to behave in the stated way

**6) compilation (n.)**

• the act of compiling something

**7) usable (adj.)**

• that can be used

**8) extreme (n.)**

• the largest possible amount or degree of something

**9) niche (n.)**

• a job or position that is very suitable for someone, especially one that he or she likes

**10) thermostat (n.)**

• a device that keeps a building, engine, etc. within a limited temperature range by automatically switching the supply of heat on and off

**11) automobile (n.)**

• a car

**12) redesign (v.)**

• to change the design of something

**13) sand (v.)**

• to make something smooth by rubbing it with something rough, especially sandpaper (= strong paper with sand attached to it)

**14) arbitrary (adj.)**

• cf. arbitrarily (adv.)

• cf. arbitrariness (n.)

• based on chance rather than being planned or based on reason

**15) extant (adj.)**

• used to refer to something very old that is still existing

**16) researcher (n.)**

• to study a subject in detail, especially in order to discover new information or reach a new understanding

**17) pursue (v.)**

• to follow someone or something, usually to try to catch him, her, or it

**18) engineer (v.)**

• to arrange cleverly and often secretly for something to happen, especially something that is to your advantage

**19) complexity (n.)**

• the state of having many parts and being difficult to understand or find an answer to

**20) optimize (v.)**

• to make something as good as possible

https://dictionary.cambridge.org

**2. Read the text applying before reading, during reading and after reading strategies described in the introduction.**

**Reasoning and Acting**

The manipulation of symbols to produce action is called **reasoning**.

One way that AI representations differ from computer programs in traditional languages is that an AI representation typically specifies **what** needs to be computed, not **how** it is to be computed. We might specify that the agent should find the most likely disease a patient has, or specify that a robot should get coffee, but not give detailed instructions on how to do these things. Much AI reasoning involves searching through the space of possibilities to determine how to complete a task.

In deciding what an agent will do, there are three aspects of computation that must be distinguished: (1) the computation that goes into the design of the agent, (2) the computation that the agent can do before it observes the world and needs to act, and (3) the computation that is done by the agent as it is acting.

- **Design time reasoning** is the reasoning that is carried out to design the agent. It is carried out by the designer of the agent, not the agent itself.
- **Offline computation** is the computation done by the agent before it has to act. It can include compilation and learning. Offline, the agent takes background knowledge and data and compiles them into a usable form called a **knowledge base**. **Background knowledge** can be given either at design time or offline.
- **Online computation** is the computation done by the agent between observing the environment and acting in the environment. A piece of information obtained online is called an **observation**. An agent typically must use both its knowledge base and its observations to determine what to do.

It is important to distinguish between the knowledge in the mind of the designer and the knowledge in the mind of the agent. Consider the extreme cases:

- At one extreme is a highly specialized agent that works well in the environment for which it was designed, but it is helpless outside of this niche. The designer may have done considerable work in building the agent, but the agent may not need to do very much to operate well. An example is a thermostat. It may be difficult to design a thermostat so that it turns on and off at exactly the right temperatures, but the thermostat itself does not have to do much computation. Another example is a painting robot that always paints the same parts in an automobile factory. There may be much design time or offline computation to get it

to work perfectly, but the painting robot can paint parts with little online computation; it senses that there is a part in position, but then it carries out its predefined actions. These very specialized agents do not adapt well to different environments or to changing goals. The painting robot would not notice if a different sort of part were present and, even if it did, it would not know what to do with it. It would have to be redesigned or reprogrammed to paint different parts or to change into a sanding machine or a dog washing machine.

- At the other extreme is a very flexible agent that can survive in arbitrary environments and accept new tasks at run time. Simple biological agents such as insects can adapt to complex changing environments, but they cannot carry out arbitrary tasks. Designing an agent that can adapt to complex environments and changing goals is a major challenge. The agent will know much more about the particulars of a situation than the designer. Even biology has not produced many such agents. Humans may be the only extant example, but even humans need time to adapt to new environments.

Even if the flexible agent is our ultimate dream, researchers have to reach this goal via more mundane goals. Rather than building a universal agent, which can adapt to any environment and solve any task, they have built particular agents for particular environmental niches. The designer can exploit the structure of the particular niche and the agent does not have to reason about other possibilities.

Two broad strategies have been pursued in building agents:

- The first is to simplify environments and build complex reasoning systems for these simple environments. For example, factory robots can do sophisticated tasks in the engineered environment of a factory, but they may be hopeless in a natural environment. Much of the complexity of the problem can be reduced by simplifying the environment. This is also important for building practical systems because many environments can be engineered to make them simpler for agents.

- The second strategy is to build simple agents in natural environments. This is inspired by seeing how **insects** can survive in complex environments even

though they have very limited reasoning abilities. Researchers then make the agents have more reasoning abilities as their tasks become more complicated.

One of the advantages of simplifying environments is that it may enable us to prove properties of agents or to optimize agents for particular situations. Proving properties or optimization typically requires a model of the agent and its environment. The agent may do a little or a lot of reasoning, but an observer or designer of the agent may be able to reason about the agent and the environment. For example, the designer may be able to prove whether the agent can achieve a goal, whether it can avoid getting into situations that may be bad for the agent (**safety goals**), whether it will get stuck somewhere (**liveness**), or whether it will eventually get around to each of the things it should do (**fairness**). Of course, the proof is only as good as the model.

The advantage of building agents for complex environments is that these are the types of environments in which humans live and want our agents to live.

Fortunately, research along both lines is being carried out. In the first case, researchers start with simple environments and make the environments more complex. In the second case, researchers increase the complexity of the behaviors that the agents can carry out.

(David L. Poole, Alan K. Mackworth. *Artificial Intelligence: foundations of computational agents* (2nd edition), Cambridge University Press, 2017. – Available at http://assets.cambridge.org/97805215/19007/frontmatter/9780521519007_ frontmat ter.pdf.)

**3. Vocabulary Quiz**

1) **Write the most appropriate word for each of the provided definitions.**

1. to make something as good as possible

**Answer: _____**

2. that can be used

**Answer: _____**

3. to calculate an answer or amount by using a machine

**Answer: _____**

4. the process of thinking about something in order to make a decision

**Answer: _____**

5. the state of having many parts and being difficult to understand or find an answer to

**Answer: _____**

6. to behave in the stated way

**Answer: _____**

2) **Find the most appropriate single word / expression for the paired blanks below and fill them in with appropriate forms.**

7. to make something smooth by rubbing it with something rough, especially sandpaper (= strong paper with _____attached to it)

_____door (down) thoroughly before starting to paint.

3) **Find the most appropriate word / expression for each of the definitions and fill in the blank in an appropriate form.**

8. used to refer to something very old that is

still existing

We have some _____parish records from the 16th century.

9. the act of compiling something

A team of four was involved in the _____of the book.

10. to change the design of something

In 1993 NASA _____the planned space station.

11. to arrange cleverly and often secretly for something to happen, especially something that is to your advantage

Left-wing groups _____a coup against the military government.

12. based on chance rather than being planned or based on reason

_____decision-making

13. the largest possible amount or degree of something

I've never witnessed such _____of wealth and poverty.

14. controlling someone or something to your own advantage, often unfairly or dishonestly

They have been accused of fraud and stock market _____.

15. a car

the _____ industry

16. to follow someone or something, usually to try to catch him, her, or it

The car was _____by helicopters.

17. to study a subject in detail, especially in order to discover new information or reach a new understanding

a television/political _____

18. past simple of the verb may, used especially when reporting what someone has said, thought, asked, etc.

I brought him some sandwiches because I thought he _____be hungry.

4) **Choose the most appropriate definition for each of the provided words.**

19. **thermostat =**

① a woman who has sexual relationships with a lot of men without any emotional involvement

② a way of talking or behaving that is too proud

③ a tube-shaped musical instrument that is played by blowing through a single reed

④ a person who supports new ideas and social change, especially one who belongs to a political party

⑤ a device that keeps a building, engine, etc. within a limited temperature range by automatically switching the supply of heat on and off

20. **niche =**

① the action of washing something or a part of your body

② the act of doing or saying something again

③ an area of flat ground outside that is partly or completely surrounded by the walls of a building

④ a job or position that is very suitable for someone, especially one that he or she likes

⑤ (a part of) the profit of a company that is paid to the people who own shares in it

https://www.word-booster.com

**4. Translate the text into Ukrainian.**

## ГРАМАТИЧНІ ВПРАВИ

### The simple present tense

*1. Read the following in the third person singular*

1. They wish to speak to you. (He)
2. Buses pass my house every hour.
3. They help their father. (He)
4. We change planes at Heathrow.
5. You watch too much TV. (He)
6. They worry too much. (He)
7. I cash a cheque every month. (He)
8. I always carry an umbrella. (She)
9. They wash the floor every week. (She)
10. His sons go to the local school.
11. These seats cost £10.
12. Elephants never forget.
13. They usually catch the 8.10 bus.
14. They sometimes miss the bus.
15. I mix the ingredients together.
16. The rivers freeze in winter.
17. They fly from London to Edinburgh.
18. The carpets match the curtains.
19. They realize the danger.
20. I use a computer.
21. They do nothing. They lie in bed all day.
22. The boys hurry home after school.
23. They kiss their mother.
24. They dress well.
25. Your children rely on you.
26. You fry everything.
27. The taxes rise every year.

28. They do exercises every morning.
29. Do you like boiled eggs? (He)
30. What do they do on their days off?

*2. Read the following (a) in the negative (b) in the interrogative*

1. You know the answer.
2. He has breakfast at 8.00.
3. He loves her.
4. Some schoolgirls wear uniforms.
5. He trusts you.
6. He tries hard.
7. The park closes at dusk.
8. He misses his mother.
9. The children like sweets.
10. He finishes work at 6.00.
11. He lives beside the sea.
12. He bullies his sisters.
13. This stove heats the water.
14. She has a cooked breakfast.
15. She carries a sleeping bag.
16. He usually believes you.
17. She dances in competitions.
18. You remember the address.
19. She plays chess very well.
20. He worries about her.
21. These thieves work at night.
22. He leaves home at 8.00 every day.
23. Ann arranges everything.
24. She agrees with you.
25. Their dogs bark all night.

26. Their neighbours often complain.
27. Tom enjoys driving at night.
28. He engages new staff every spring.
29. Tom looks very well.
30. They sell fresh grape juice here.
31. She cuts her husband's hair.
32. They pick the apples in October.
33. The last train leaves at midnight.
34. He relaxes at weekends.
35. She refuses to discuss it.

**The simple past tense**

*3. Put the verbs in the following sentences into the simple past tense.*

1. I go to work by bus.
2. I meet her on Tuesdays.
3. He always wears black.
4. I make cakes every week.
5. She gets up at 6.30.
6. He understands me.
7. He shuts the shop at 6.00.
8. She speaks slowly.
9. He leaves the house at 9.00.
10. I read a chapter every night.
11. You eat too much.
12. I see him every day.
13. He cries when he is hurt.
14. Who knows the answer?
15. I think I know it.
16. He takes the dog out twice a day.
17. We buy them here.

18.I dream every night.

19.He often feels ill.

20.I know what he wants.

21.I usually pay him £5.

22.His dog always bites me.

23.It costs 30p.

24.My back hurts.

25.We drink water.

26.His roses grow well.

27.He rides every day.

28.He often falls off.

29.He puts up his prices every year.

30.He sleeps badly.

*4. Put the verbs in the following sentences into (a) the negative (b) the interrogative*.

1. She saw your brother.
2. We heard a terrible noise.
3. He slept till 10.00.
4. He looked at the picture.
5. They drank all the wine.
6. They set out early enough.
7. She thought about it.
8. The police caught the thief.
9. He hid the letter.
10. She found her watch.
11. His nose bled.
12. My mother chose this hotel.
13. She lent you enough money.
14. Keiko taught Japanese.
15. Tom hurt his foot.

16.He broke his arm.

17.His wife came at 8.00.

18.He lost his wallet.

19.His son wrote a novel.

20.They flew to New York.

21.Ann drew you a map.

22.Tom laid the table.

23.Mr Pitt fell downstairs.

24.She lost her way.

25.He forbade her to leave.

26.I sent it to the laundry.

27.Jack kept the money.

28.He rode slowly.

29.They spent it all.

30.She sold the car.

31.Jean rang the bell.

32.The sun rose at 6.00.

33.The boys ran home.

34.He shook the bottle.

35.He forgave her.

*5. Make the sentences (a) negative and (b) interrogative, using* ***do/does/did****.*

1. They have eggs for breakfast.
2. He needs a new coat.
3. He used to sell fruit.
4. They have to work hard.
5. She does the housework.
6. He needs more money.
7. He had a row with his boss.
8. She had a heart attack.

9. Her hair needed cutting.
10. He does his homework after supper.
11. She has a singing lesson every week.
12. He does his best.
13. He has to get up at six every day.
14. The children have dinner at school.
15. She dared him to climb it.
16. You did it on purpose.
17. He dares to say that!
18. They had a good time.
19. The drink did him good.
20. My watch needs cleaning.
21. He had an accident.
22. You had your house painted.
23. She used to make her own clothes.
24. You do the exercises.
25. He had difficulty (in) getting a job.

**The future simple tense**

*6. Put the verbs in brackets into the future simple.*

1. I (know) the result in a week.
2. You (be) in Rome tonight.
3. You (be) able to drive after another five lessons.
4. Do you think that he (recognize) me?
5. Unless he runs he (not catch) the train.
6. He (lend) it to you if you ask him.
7. I hope I (find) it.
8. He (believe) whatever you tell him.
9. I (remember) this day all my life.
10. Perhaps he (arrive) in time for lunch.

11. If he works well I (pay) him £10.
12. I wonder how many of us still (be) here next year.
13. If you think it over you (see) that I am right.
14. If you learn another language you (get) a better job.
15. I am sure that you (like) our new house.
16. Newspaper announcement: The President (drive) along the High Street in an open carriage.
17. You (need) a visa if you are going to Spain.
18. You (feel) better when you've had a meal.
19. She (have) £1000 a year when she is twenty-one.
20. If you put any more polish on that floor someone (slip) on it.
21. I wonder if he (succeed).
22. I hope he (remember) to buy wine.
23. If you leave your roller skates on the path someone (fall) over them.
24. If they fall over them and hurt themselves they (sue) you.
25. If you want twenty cigarettes you (have) to give me more money.
26. Notice: The management (not be) responsible for articles left on the seats.
27. If I drop this it (explode).
28. You (have) time to help me tomorrow?
29. It (matter) if I don't come home till morning?
30. He (mind) if I bring my dog?

**The present continuous tense**

*7. Put the verbs in brackets into the present continuous tense.*

1. She (not work), she (swim) in the river.
2. He (teach) his boy to ride.
3. The airplane (fly) at 2,000 metres.
4. Mrs Jones (sweep) the steps outside her house.
5. It is a lovely day. The sun (shine) and the birds (sing).
6. We (have) breakfast at 8.00 tomorrow as Tom (catch) an early train.

7. She always (ring) up and (ask) questions.
8. Ann usually does the shopping, but I (do) it today as she isn't well.
9. Mother (rest) now. She always rests after lunch.
10. The children are very quiet. Go and see what they (do). - They (cut) up some £5 notes.
11. I can't hear what you (say); the traffic (make) too much noise.
12. She always (lose) her glasses and (ask) me to look for them.
13. Can I borrow your pen or you (use) it at the moment?
14. It (rain)? ~Yes, it (rain) very hard. You can't go out yet.
15. Someone (knock) at the door. Shall I answer it? ~ I (come) in a minute. I just (wash) my hands.
16. You (do) anything this evening? ~ No, I'm not. – Well, I (go) to the cinema. Would you like to come with me?
17. What Tom (do) now? He (clean) his shoes.
18. Why Ann (not wear) her new dress?
19. Why you (mend) that old shirt?
20. You (not tell) the truth. ~ How do you know that I (not tell) the truth?
21. Who (move) the furniture about upstairs? ~ It's Tom. He (paint) the front bedroom.
22. What you (read) now? I (read) *Crime and Punishment.*
23. Why you (make) a cake? Someone (come) to tea?
24. Where is Tom? ~ He (lie) under the car.
25. Why you (type) so fast? You (make) a lot of mistakes.
26. They (dig) an enormous hole just outside my gate. ~ What they (do) that for? ~ I don't know. Perhaps they (look) for oil.
27. What (make) that terrible noise? ~ It's the pneumatic drill. They (repair) the road.
28. What you (wait) for? – I (wait) for my change; the boy just (get) it.
29. Mother: What you (look) at? Something (happen) in the street?
30. Child: Yes. The house opposite is on fire! Come and look.

Mother: I can't. I (bath) the babies. Is the Fire Brigade here?

31. Child: Yes. Fire engines (rush) up and the firemen (jump) out and (unroll) their hoses.
32. Smoke (pour) from the windows! People (stop) to watch.
    A policeman (try) to move them on.
33. An old man (climb) out of a first floor window!
    A fireman (help) him! Two boys (slide) down a rope!
34. A woman (wave) from the attic and a fireman (go) up a ladder to help her!
35. Now he (come) down again! He (carry) a baby! The crowd (cheer)

**The simple present and the present continuous**

*8. Put the verbs in brackets into the simple present or the present continuous tense.*

1. Cuckoos (not build) nests. They (use) the nests of other birds.
2. You can't see Tom now: he (have) a bath.
3. He usually (drink) coffee but today he (drink) tea.
4. What she (do) in the evenings? ~ She usually (play) cards or (watch) TV.
5. I won't go out now as it (rain) and I (not have) an umbrella.
6. The last train (leave) the station at 11.30.
7. He usually (speak) so quickly that I (not understand) him.
8. Ann (make) a dress for herself at the moment. She (make) all her own clothes.
9. Hardly anyone (wear) a hat nowadays.
10. I'm afraid I've broken one of your coffee cups. ~ Don't worry. I (not like) that set anyway.
11. I (wear) my sunglasses today because the sun is very strong.
12. Tom can't have the newspaper now because his aunt (read) it.
13. I'm busy at the moment. I (redecorate) the sitting room.
14. The kettle (boil) now. Shall I make the tea?
15. You (enjoy) yourself or would you like to leave now? - I (enjoy) myself very much. I (want) to stay to the end.
16. How you (get) to work as a rule? ~ I usually (go) by bus but tomorrow I (go) in

Tom's car.

17. Why you (put) on your coat? ~ I (go) for a walk. You (come) with me? - Yes, I'd love to come. You (mind) if I bring my dog?
18. How much you (owe) him? – I (owe) him £5. ~ You (intend) to pay him?
19. Mary usually (learn) languages very quickly but she (not seem) able to learn modern Greek.
20. I always (buy) lottery tickets but I never (win) anything.
21. You (like) this necklace? I (give) it to my daughter for her birthday tomorrow.
22. I won't tell you my secret unless you (promise) not to tell anyone. – I (promise).
23. You always (write) with your left hand?
24. You (love) him? – No, I (like) him very much but I (not love) him.
25. You (dream) at night? – Yes, I always (dream) and if I (eat) too much supper I (have) nightmares.
26. These workmen are never satisfied; they always (complain).
27. We (use) this room today because the window in the other room is broken.
28. This car (make) a very strange noise. You (think) it is all right?- Oh, that noise (not matter). It always (make) a noise like that.
29. What Tom (think) of the Budget? - He (think) it most unfair. ~ I (agree) with him.
30. What this one (cost)? – It (cost) forty pence.
31. You (hear) the wind? It (blow) very strongly tonight.
32. You (see) my car keys anywhere? - No, I (look) for them but I (not see) them.
33. He never (listen) to what you say. He always (think) about something else.
34. You (understand) what the lecturer is saying? ~ No, I (not understand) him at all.
35. What you (have) for breakfast usually? ~ I usually (eat) a carrot and (drink) a glass of cold water.
36. Why you (walk) so fast today? You usually (walk) quite slowly. ~ I (hurry) because I (meet) my mother at 4 o'clock and she (not like) to be kept waiting.

37. You (recognize) that man? ~ I (think) that I have seen him before but I (not remember) his name.
38. Look at that crowd. I (wonder) what they (wait) for.
39. Stop! You (not see) the notice? ~ I (see) it but I can't read it because I (not wear) my glasses.
40. She always (borrow) from me and she never (remember) to pay me back.
41. I (save) up because I (go) abroad in July.
42. I (think) it is a pity you don't take more exercise. You (get) fat.
43. Tom never (do) any work in the garden; he always (work) on his car.
44. That film (come) to the local cinema next week. You (want) to see it?
45. How Peter (get) on at school? ~ Very well. He (seem) to like the life.
46. This story is about a boy who (make) friends with a snake which he (find) in his garden. Then he (go) away but he (not forget) the snake and some years later he (return) and (look) for it. He (find) the snake who (recognize) its old friend and (coil) round him affectionately. But, unfortunately, the snake is by now a full-grown boa-constrictor and its embrace (kill) the poor boy. – The snake (feel) sorry about this? – I (not know). The story (end) there.
47. How you (end) a letter that (begin), 'Dear Sir'? ~ I always (put), 'Yours truly', but Tom (prefer) 'Yours faithfully'.
48. What the word 'catastrophe' (mean)? ~ It (mean) 'disaster'.
49. Who (own) this umbrella? ~ I (not know). Everybody (use) it but nobody (know) who (own) it.
50. You (mind) if I (ask) you a question? ~ That (depend) on the question. ~ It (concern) your brother. ~ I (refuse) to answer any question about my brother.

**The past continuous tense**

*9. Put the verbs in brackets into the past continuous tense.*

1. Detective: I'm afraid I must ask you both what you (do) yesterday at 10.20 p.m. Mr X: I (play) chess with my wife. Mr Y: I (listen) to a play on the radio.
2. The children were frightened because it (get) dark.

3. It was a fine day and the roads were crowded because a lot of people (rush) to the seaside.
4. He usually wears sandals but when I last saw him he (wear) boots.
5. The house was in great disorder because he (redecorate) it.
6. The director didn't allow the actors to travel by air while they (work) on the film.
7. The car had nobody in it but the engine (run).
8. I was alone in the house at that time because Mr Jones (work) in the garage and Mrs Jones (shop).
9. Are you going to Rome? I thought that you (go) to Milan.
10. My wife and I (talk) about you the other day.
11. When I first met him he (study) painting.
12. There was a strong smell and the sound of frying. Obviously Mrs Jones (cook) fish.
13. Tom ate nothing for lunch because he (diet). He said that he (try) to lose 10 kilos.
14. Who you (talk) to on the telephone as I came in? – I (talk) to Mr Pitt.
15. When I first met him he (work) in a restaurant.
16. He watched the children for a moment. Some of them (bathe) in the sea, others (look) for shells, others (play) in the sand.
17. She (stand) at the bus stop. I asked her what bus she (wait) for.
18. From the sounds it was clear that Mary (practise) the piano.
19. Tom (sit) in a corner with a book. I told him that he (read) in very bad light.
20. The traffic (make) so much noise that I couldn't hear what he (say).

**The simple past and the past continuous**

*10. Put the verbs in brackets into the simple past or the past continuous tense.*

1. I lit the fire at 6.00 and it (burn) brightly when Tom came in at 7.00.
2. When I arrived the lecture had already started and the professor (write) on the overhead projector.

3. I (make) a cake when the light went out. I had to finish it in the dark.
4. Unfortunately when I arrived Ann just (leave), so we only had time for a few words.
5. He (watch) TV when the phone rang. Very unwillingly he (turn) down the sound and (go) to answer it.
6. He was very polite. Whenever his wife entered the room he (stand) up.
7. My dog (walk) along quietly when Mr Pitt's Pekinese attacked him.
8. What you (think) of his last book? ~ I (like) it very much.
9. He suddenly (realize) that he (travel) in the wrong direction.
10. He (play) the guitar outside her house when someone opened the window and (throw) out a bucket of water.
11. I just (open) the letter when the wind (blow) it out of my hand.
12. When I (look) for my passport I (find) this old photograph.
13. The boys (play) cards when they (hear) their father's step. They immediately (hide) the cards and (take) out their lesson books.
14. He (clean) his gun when it accidentally (go) off and (kill) him.
15. As I (cross) the road I (step) on a banana skin and (fall) heavily.
16. I still (lie) on the road when I (see) a lorry approaching.
17. Luckily the driver (see) me and (stop) the lorry in time.
18. When I (hear) his knock I (go) to the door and (open) it, but I (not recognize) him at first because I (not wear) my glasses.
19. While the guests (dance) thieves (break) into the house and (steal) a lot of fur coats.
20. The next day, as they (know) that the police (look) for them, they (hide) the coats in a wood and (go) off in different directions.

**The future continuous and the future simple**

*11. Put the verbs in brackets into the future continuous tense.*

1. This time next month I (sit) on a beach.
2. When you arrive I probably (pick) fruit.

3. I'll call for her at eight. - No, don't; she still (have) breakfast then.
4. I (wait) for you when you come out.
5. When you next see me I (wear) my new dress.
6. I'll give Jack your message. I can do it easily because I (see) him tomorrow. We go to work on the same train.
7. You (do) geometry next term.
8. I'll look out for you at the parade. - Do, but I (wear) uniform so you may find it hard to recognize me.
9. We have to do night duty here. I (do) mine next week.
10. In a hundred years' time people (go) to Mars for their holidays.
11. He (use) the car this afternoon.
12. I (see) you again.
13. It's a serious injury but he (walk) again in six weeks.
14. I'll come at three o'clock. - Good, I (expect) you.
15. You'd better go back now; your mother (wonder) where you are.
16. In fifty years" time we (live) entirely on pills.
17. What do you think the children (do) when we get home? - I expect they (have) their supper.
18. The garden (look) its best next month.
19. I've just remembered that I left the bathroom taps on. I expect the water (flow) down the stairs by now.
20. You (need) your camera tomorrow or can I borrow it?
21. We've just got to the top in time. The sun (rise) in a minute.
22. Air hostess: We (take off) in a few minutes. Please fasten your safety belts.
23. We'd better go out tomorrow because Mary (practise) the piano all day.
24. Don't ring her up at 6.00; she (put) the children to bed. Ring later.
25. When I get home my dog (sit) at the door waiting for me.

*12. Put the verbs in brackets into the appropriate future form (continuous or simple)*

1. There is going to be a bus strike. Everyone (walk) to work next week.
2. You've just missed the last train! – Never mind, I (walk).
3. I'll ring you tomorrow at six. – No, don't ring at six; I (bath) the baby then. Ring later.
4. Mother: Your face is dirty. – Child: All right, I (wash) it.
5. Will you have lunch with me on the 24th? – I'd love to, but I'm afraid I (do) my exam then.
6. I (work) for Mr Pitt next week as his own secretary will be away.
7. You (have) something to drink, won't you?
8. Why did you take his razor? He (look) for it everywhere tomorrow.
9. I hope you'll do well in the race tomorrow. I (think) of you.
10. Notice on board ship: In the event of an emergency all passengers (assemble) on the boat deck.
11. I don't feel well enough to go to the station to meet him. ~ I (meet) him for you. But how I (recognize) him? – He's small and fair, and he (wear) a black and white school cap.
12. I (leave) these flowers at the hospital for you. I (go) there anyway to visit my cousin.
13. You ought to try to get a ticket for the Spectators' Gallery next week; they (debate) international fishing rights.
14. You've left the light on. – Oh, so I have. I (go) and turn it off.
15. I've just been appointed assistant at the local library. – Then you (work) under my sister. She is head librarian there.
16. I want to post this letter but I don't want to go out in the rain. - I (post) it for you. I (go) out anyway as I have to take the dog for a walk.
17. The prima ballerina is ill so I expect her understudy (dance) instead.
18. This time next Monday I (sit) in a Paris cafe reading *Le Figaro.* – You (not read). You'll be looking at all the pretty girls.
19. Wages have gone up, so I suppose prices (go up) too.
20. It is nearly autumn; soon the leaves (change) colour.

21. Mother (on phone): My son has just burnt his hand very badly. – Doctor: I (come) at once.
22. Customer in restaurant: Waiter, this plate is dirty. – Waiter: I'm sorry, sir, I (bring) you another.
23. In a few years' time we all (live) in houses heated by solar energy.
24. It's beginning to get dark; the street lights (go on) in a few minutes.
25. We (not play) poker at the party tonight; our hostess doesn't approve of cards.
26. Let's wait here; the swing bridge (open) in a minute to let that ship through.
27. Guest: May I use your phone to ring for a taxi? - Hostess: Oh, there's no need for that; my son (drive) you home.
28. Are you nearly ready? Our guests (arrive) any minute.
29. Now that the parking regulations have become stricter, more people (use) public transport and (leave) their cars at home.
30. I'm afraid I've just broken your goldfish bowl. - Never mind, I (put) the goldfish in the bath.

**The present perfect tense**

*13. Put the verbs in brackets into the present perfect tense, and fill the spaces by repeating the auxiliary.*

1. Where you (be)? ~ I (be) to the dentist.
2. You (have) breakfast? ~ Yes, I …
3. The post (come)? ~ Yes, it …
4. You (see) my watch anywhere? ~ No, I'm afraid I …
5. I (not finish) my letter yet.
6. He just (go) out.
7. Someone (take) my bicycle.
8. The phone (stop) ringing.
9. You (hear) from her lately? - No, I …
10. I just (wash) that floor.

11. The cat (steal) the fish.
12. There aren't any buses because the drivers (go) on strike.
13. Charles (pass) his exam? ~ Yes, he …
14. How many bottles the milkman (leave)? ~ He (leave) six.
15. I (live) here for ten years.
16. How long you (know) Mr Pitt? ~ I (know) him for ten years.
17. Would you like some coffee? I just (make) some.
18. Mary (water) the tomatoes? ~ Yes, I think she …
19. You ever (leave) a restaurant without paying the bill? ~ No, I …
20. I (ask) him to dinner several times.
21. He always (refuse).
22. You ever (ride) a camel?
23. I (buy) a new carpet. Come and look at it.
24. He (post) the letter?
25. I often (see) him but I never (speak) to him.
26. You ever (eat) caviar? ~ No, I …
27. We just (hear) the most extraordinary news.
28. I (not pay) the telephone bill yet.

**The present perfect and the simple past**

*14. Put the verbs in brackets into the present perfect or the simple past tense.*

1. This is my house. ~ How long you (live) here? ~ I (live) here since 1990.
2. He (live) in London for two years and then (go) to Edinburgh.
3. Shakespeare (write) a lot of plays.
4. My brother (write) several plays. He just (finish) his second tragedy.
5. I (fly) over Loch Ness last week. ~ You (see) the Loch Ness monster?
6. I (not see) him for three years. I wonder where he is.
7. He (not smoke) for two weeks. He is trying to give it up.
8. When he (arrive)? ~ He (arrive) at 2.00.
9. I can't go out because I (not finish) my work.

10. I never (drink) whisky. ~ Well, have some now.
11. I (write) the letter but I can't find a stamp.
12. The clock is slow. ~ It isn't slow, it (stop).
13. Here are your shoes; I just (clean) them.
14. I (leave) home at 8.00 and (get) here at twelve.
15. I (do) this sort of work when I (be) an apprentice.
16. He just (go) out.
17. He (go) out ten minutes ago.
18. You (have) breakfast yet? ~ Yes, I (have) it at 8.00.
19. I (meet) him last June.
20. You (see) the moon last night?
21. The play just (begin). You are a little late.
22. The newspaper (come)? ~ Yes, Ann is reading it.
23. We (miss) the bus. Now we'll have to walk.
24. Mr Pound is the bank manager. He (be) here for five years.
25. Mr Count (work) as a cashier for twenty-five years. Then he (retire) and (go) to live in the country.

**The future perfect tense**

*15. Put the verbs in brackets into the future perfect tense.*

1. In a fortnight's time we (take) our exam.
2. I (finish) this book by tomorrow evening.
3. By this time tomorrow we (have) our injections.
4. By the end of next year I (be) here twenty-five years.
5. I'll still be here next summer but Tom (leave).
6. I (finish) this job in twenty minutes.
7. By next winter they (build) four houses in that field.
8. At the rate he is going he (spend) all his money by the time he is twenty-one.
9. By this time next year I (save) £250.
10. By the time we get to the party everything (be) eaten.

11. The train (leave) before we reach the station.
12. If I continue with my diet I (lose) 10 kilos by the end of the month.
13. By the end of my university course I (attend) 1,200 lectures.
14. By the end of this week my illness (cost) me £100.
15. By the time that he leaves school his parents (spend) £25,000 on his education.
16. By the end of the term I (read) all twelve volumes.
17. When you come back I (finish) all the housework.
18. The police (hear) of the theft by this time.
19. We (drink) all that wine by the end of the year.
20. On the fourth of next month he (be) in prison for ten years.
21. At this rate you (break) all the wine glasses by the end of the month.
22. If we don't hurry the sun (rise) before we reach the top.
23. I'm going to Hyde Park to hear the people making speeches. ~ You'll be too late. By the time you get there they (finish) their speeches and everybody (go) home.
24. By midnight he (be) unconscious for forty-eight hours.
25. By the end of the month 5,000 people (see) this exhibition.
26. I suppose that when I come back in ten years' time all these old houses (be) pulled down.
27. On 21 October they (be) married for twenty-five years.
28. After this performance I (see) *Hamlet* twenty-two times.
29. The strike leader said, 'By midnight 500 men (come) out on strike.'
30. At your present rate you (burn) all that coal by the end of the month,
31. The treasurer said, 'By the end of the year all our debts (be paid) off.'
32. Tourist: We've only got five hours in Rome; we are leaving but I'm sure that we (see) everything of importance by then.
33. Householder to Zoo official: One of your elephants is in my garden eating my tomatoes.
34. Zoo official: The elephant keeper will be with you in half an hour.
35. Householder: Your elephant (eat) all my tomatoes by then.

**Future forms**

**The present continuous tense as a future form**

*16. Put the verbs in brackets into the present continuous tense.*

1. They are going to drill for oil here. They (start) on Monday.
2. My uncle (make) a speech on Friday.
3. I (take) my .sister to the ballet tomorrow.
4. She (call) for me at six.
5. He (play) at Wimbledon next summer.
6. I (meet) her at the station at ten.
7. The sales (not start) till Monday.
8. How you (get) to the party tomorrow?-I (go) by car. –Who (drive)?
9. The piano tuner (come) this afternoon.
10. You (give) him anything for his birthday?-Yes, I (give) him a dictionary.
11. The windows (be) cleaned today. Then we'll be able to see out
12. She (come) out of hospital next week.
13. We (have) dinner early tonight as we (go) to the theatre.
14. Where you (go) for your holidays this year? – I (go) to Holland.
15. He (not give) a lecture tonight.
16. I (have) my photograph taken tomorrow.
17. I (buy) her a burglar alarm for a wedding present.
18. The elections (be) held next week.
19. I (have) lunch with my aunt on Thursday.
20. The committee (meet) next Wednesday.
21. My grandparents (celebrate) their golden wedding next week.
22. I (lend) him my cat for his holidays.
23. The strikers (return) to work next week.
24. Smith's (open) a new branch on this street in July.
25. We've bought a new house and (move) in very soon.
26. I (not take) up judo next winter.
27. They (get) married next week.

28. You (do) anything tonight?-Yes, I (go) to my carpentry class.
29. The Prime Minister (fly) to America tomorrow.
30. He (start) a new job on Friday.
31. The Queen (give) a garden party next week. You (go)?
32. I (catch) the 6.30 plane tomorrow. -Where you (leave) your car? – I (not take) the car.
33. Her mother (send) her to France next year.
34. I (go) to the dentist tomorrow. Miss Pitt (take) my class.
35. I (lend) my flat to my American cousins next year.

**The *be going to* form**

*17. Put the verbs in brackets into the **be going** to form.*

1. You (miss) your train.
2. The pressure cooker (explode).
3. When you (pay) the bill?
4. She (dye) the old curtains blue,
5. We (make) this whisky bottle into a lamp.
6. What you (do) with this room? – I (paint) the walls in black and white stripes.
7. The umpire (blow) his whistle.
8. You (eat) all that?
9. That man with the tomato in his hand (throw) it at the speaker.
10. The bull (attack) us.
11. It (rain). Look at those clouds.
12. The cat (have) kittens.
13. The men in the helicopter (try) to rescue the man in the water.
14. That rider (fall) off.
15. These two men (cycle) across Africa.
16. The Lord Mayor is standing up. He (make) a speech.
17. This aeroplane (crash).

18. I (stop) here for a moment to get some petrol.
19. You (ask) him to help you?
20. I've lent you my car once. I (not do) it again.
21. I have seen the play. Now I (read) the book.
22. I (not sleep) in this room. It is haunted.
23. We (buy) a metal detector and look for buried treasure.
24. You (reserve) a seat?
25. I (plant) an oak tree here.
26. The dog (bury) the bone.
27. I (have) a bath.
28. I don't like this macaroni. I (not finish) it.
29. I (not stay) here another minute.
30. We (make) a lot of money out of this.

**The present continuous and the *be going to* form**

*18. Use the present continuous where possible in the following sentences and put the remaining verbs into the **be going to** form.*

1. I (play) bridge tonight with Tom and Ann.
2. He (have) an operation next week.
3. It's very cold. I (light) a fire.
4. We (have) some friends to lunch tomorrow.
5. I've bought a piano; it (be) delivered this afternoon. – Where you (put) it? – I (put) it in the dining room.
6. You (go) to the auction tomorrow? -Yes, I (go) but 1 (not buy) anything.
7. I've reminded you once; I (not do) it again.
8. I (have) my hair cut this afternoon.
9. My nephew (come) to stay with me next weekend. – Where you (put) him? – I (put) him in the room in the tower.
10. Our class (start) German next term.
11. I (spend) a few days in London next week.

12. The Town Council (build) a new school here.
13. What you (tell) the police? – I (tell) them the truth.
14. He (start) tomorrow.
15. The Queen (open) Parliament next month.
16. The Prime Minister (speak) on TV tonight.
17. This shop (close) down next week.
18. When you (have) your next lesson? – I (have) it on Monday.
19. I (collect) my new dress this afternoon.
20. We (take) the children to the seaside this summer.
21. I (give) him a football for his next birthday.
22. She (sing) in her first big concert next month.
23. He (go) to Spain for his holidays. – He (fly)? – No, he (go) by boat.
24. She (see) a specialist next week.
25. He (wash) the car?
26. He (ring) me up tonight.
27. The inspector (ask) you a few questions.
28. Her parents (give) a party for her next month. They (invite) sixty guests.
29. Have you got a ticket for the big match on Saturday? - No, I don't even know who (play). – France (play) England.
30. What you (do) with the money?
31. I (pick) you up at 6.30; don't forget.
32. Where you (go) tonight? – I (go) out with Peter. He (call) for me at eight.
33. I (compete) in the bicycle race tomorrow.
34. Mr. Pitt has just phoned to say that he (not come) back till Wednesday night.
35. I (read) you his answer to my letter of complaint.

**The present continuous and the future simple**

*19. Put the verbs in brackets into the present continuous or the future simple using the present continuous where possible.*

1. I am sure that I (recognize) him.

2. I (see) her tomorrow.
3. He (play) in a tennis match on Friday.
4. She (come) back on Monday.
5. I (go) again next year.
6. We (know) tonight.
7. I (believe) it when I see it.
8. I (have) my car repainted next week.
9. I hope that you (have) a good time tomorrow.
10. Tom (catch) the 7.40 train.
11. Where you (meet) them? – I (meet) them at midnight in the middle of the wood.
12. Look I've broken the teapot. What Mrs. Pitt (say)? – She (not mind); she never liked that one.
13. He (not forget) to come.
14. He (leave) in a few days.
15. I (remember) it.
16. If you drop that bottle it (break).
17. I never (forgive) him.
18. I'm sure that you (like) him.
19. You (see) a signpost at the end of the road,
20. He has cut my hair too short. - Don't worry; it (grow) again very quickly.
21. You (understand) when you are older.
22. The cat (scratch) you if you pull its tail.
23. I (be) back at 8.30.
24. If he doesn't work hard he (not pass) his exam.
25. She (go) on a cruise next summer.
26. I (move) to a new flat next week.
27. I am sorry that the child saw the accident. - I don't think it matters. He soon (forget) all about it.
28. I (wait) here till he comes back.

29. He (not write) to you unless you write to him.
30. There (be) a big meeting here tomorrow.

**Passive Voice**

*20. Active to passive. Put the following into the passive voice.*

1. You should open the wine about three hours before you use it.
2. Previous climbers had cut steps in the ice.
3. Somebody had cleaned my shoes and brushed my suit.
4. We use this room only on special occasions.
5. You must not hammer nails into the walls without permission.
6. Someone switched on a light and opened the door.
7. Somebody had slashed the picture with a knife.
8. They are pulling down the old theatre.
9. Why didn't they mend the roof before it fell in?
10. The police asked each of us about his movements on the night of the crime.
11. Someone will serve refreshments.
12. People must not leave bicycles in the hall.
13. Members may keep books for three weeks. After that they must return them.
14. The burglars had cut an enormous hole in the steel door.
15. I've bought a harp. They are delivering it this afternoon. *(Do not change the first sentence.)*
16. Someone has already told him to report for duty at six.
17. They rang the church bells as a flood warning.
18. No one can do anything unless someone gives us more information.
19. People are spending far more money on food now than they spent ten years ago.
20. The organizers will exhibit the paintings till the end of the month.
21. They will say nothing more about the matter if someone returns the stolen gun.
22. It is high time someone told him to stop behaving like a child.
23. A thief stole my dog and brought him back only when I offered £20 reward for him.

24. The judge gave him two weeks in which to pay the fine.
25. They make these artificial flowers of silk.

**Indirect speech**

**Indirect speech: statements**

*21. Put the following into indirect speech.*

1. ‘I have something to show you,' I said to her.
2. 'Nothing grows in my garden. It never gets any sun,' she said.
3. ‘I'm going away tomorrow, mother,' he said.
4. ‘I've been in London for a month but so far I haven't had time to visit the Tower,' said Rupert.
5. ‘It isn't so foggy today as it was yesterday,' I remarked.
6. ‘'The new underpass is being officially opened the day after tomorrow, 'said the BBC announcer.
7. 'We have moved into our new flat. We don't like it nearly so much as our last one,' said my aunt.
8. 'We have a lift but very often it doesn't work,' they said.
9. 'From one of the windows of my flat I can see the Eiffel Tower,' he said.
10. ‘I've no idea what the time is but I'll dial 8081 and find out,' said his daughter.
11. He said, 'My wife has just been made a judge.'
12. ‘I'll come with you as soon as I am ready,' she replied.
13. ‘I have a German lesson this afternoon and I haven't done my homework yet,' said the small boy.
14. ‘If you let the iron get too hot you will scorch your clothes,' I warned her.
15. ‘'You haven't given me quite enough. The bill is for £14 and you've paid me only £13,' he pointed out.
16. Ann said, 'Englishmen make good husbands because they are nearly always willing to help in the house.'
17. Mary answered, ‘I like men to be useful but I don't like them to be too domesticated. I‘d prefer them to keep out of the kitchen altogether. Men look

silly in aprons anyway.'

18. Motoring report: The new Rolls Royce runs so quietly that all you can hear is the ticking of the clock.
19. Managing director of the Rolls Royce company: In that case we'll have to do
20. something about the clock.
21. ‘I don't know what to do with all my plums. I suppose I'll have to make jam. The trouble is that none of us eats jam,' she said.
22. 'We like working on Sundays because we get double pay,' explained the builders.
23. He said, ‘I am quite a good cook and I do all my own washing and mending too.'
24. 'You can keep that one if you like, Joan,' he said. I've got plenty of others.'
25. ‘I'm going fishing with mother this afternoon,' said the small boy, 'and we are going into the garden now to dig for worms.' (*Omit* now).
26. 'You've got my umbrella,' I said crossly. 'Yours is in your bedroom.'
27. I know exactly what they said,' the private detective explained to his client, 'because I bugged their phone.'
28. ‘I'll sit up till she comes in, but I hope she won't be late,' he said.
29. ‘If you give me some wire, I'll hang that picture for you,' said my cousin.
30. ‘I have a Turkish bath occasionally, but it doesn't seem to make any difference to my weight,' she said.
31. ‘This is quite a good model, madam. I use one of these myself,' said the salesman.
32. 'My new house is supposed to be haunted, but so far I haven't seen any ghosts,' she said.
33. The advertisement said, If you answer the questions correctly you may win £100.'
34. ‘If I press my ear against the wall, I can hear what the people in the next flat are saying,' he said.
35. 'The mirror is there so that you can see yourself when you are dancing,' the instructress told him.

**Indirect speech: questions**

*22. Put the following into indirect speech.*

*The first ten questions require no change of order:*

He said, 'What is happening? – He asked what was happening.

*You can read the last twenty questions, using one of the following prefaces:*

***I wonder/I'd like to know/Do you know?/Have you any idea?/Can you tell me?***

He asked, ‘Where is the nearest bus stop?’ - 'Do you know where the nearest bus stop is?'

1. 'What happened to Mr Budd?' said one of the men.
2. 'Which of his sons inherited his estate?' asked another.
3. 'Who is going to live in the big house?' enquired a third.
4. 'What will happen to his racehorses?' asked someone else.
5. 'Which team has won?' asked Ann.
6. 'Which team won the previous match?' said Bill.
7. 'Who is playing next week?' he asked.
8. 'Who will be umpiring that match?' asked Tom.
9. 'Who wants a lift home?' said Ann.
10. 'Who has just dropped a £10 note?' I asked.
11. 'Where is the ticket office?' asked Mrs Jones.
12. 'What shall I do with my heavy luggage?' she said.
13. 'What platform does the train leave from?' asked Bill.
14. 'When does it arrive in York?' he asked.
15. 'When was the timetable changed?' I asked.
16. 'Why has the 2.30 train been cancelled?' said Ann.
17. 'How much does a day return to Bath cost?' Mrs Jones asked.
18. 'Why does the price go up so often?' she wondered.
19. 'How can I get from the station to the airport?' said Bill.
20. 'When are you coming back?' I asked them.
21. Is a return ticket cheaper than two singles?' said my aunt.
22. 'Do puppies travel free?' asked a dog owner.

23.'Can I bring my dog into the compartment with me?' she asked.

24.'Does this train stop at York?' asked Bill.

25.'Can you telephone from inter-city trains?' said the businessman.

26.'Does the 2.40 have a restaurant car?' he enquired.

27.'Can you get coffee on the train?' asked my aunt.

28.'Do they bring it round on a trolley?' she said.

29.'Are there smoking compartments?' said the man with the pipe.

30.'Have you reserved a seat?' I asked him.

**Indirect speech: commands, requests, advice**

*23. Put the following into indirect speech. In most cases the person addressed must be supplied.*

1. He said, 'Get out of my way.'
2. 'Climb in through the window,' he ordered.
3. 'Please pay at the desk,' said the assistant.
4. 'Open your bag, please,' said the store detective.
5. 'Don't worry about anything, Mrs Pitt,' said her lawyer. 'Leave it all to me.'
6. 'Don't use bent coins in a slot machine,' I warned him.
7. 'Follow that car,' the detective said to the taxi-driver.
8. 'Wash it in lukewarm water,' recommended the assistant.
9. 'Have confidence in me,' urged the doctor.
10. 'Take me up to the 33rd floor,' he said to the liftman.
11. 'Read the notice about life-saving equipment,' advised the air-hostess.
12. 'Always cook with butter,' said her mother, 'never use margarine.'
13. 'Don't argue with your father,' I said.
14. 'Wait for me at the bridge,' said the young man.
15. 'Don't eat too much starch,' I advised her, 'and avoid fried food.'
16. 'Don't say anything to make her angry,' said my father.
17. Notice: Please do not ask at the desk for change for telephone calls.
18. 'Don't forget to feed the goldfish,' Mary said to her brother.

19.'Cross the line by the footbridge,' said the porter.

20.'Write to me as often as you can,' said his wife.

21.'Please book me a seat in a non-smoker,' said the traveller.

22.'Don't forget your sandwiches,' said his mother.

23.'Don't go near the water, children,' she said.

24.'Search the house,' said the police sergeant.

25.'Put down that gun. It's loaded,' she warned.

# ГРАМАТИЧНИЙ ДОВІДНИК

## ТЕПЕРІШНІЙ ПРОСТИЙ ЧАС

## THE PRESENT SIMPLE TENSE

### УТВОРЕННЯ

*Стверджувальна форма* дієслова в ***Present Simple*** в усіх особах однини і множини, крім третьої особи однини, збігається з інфінітивом (неозначеною формою дієслова) без частки **to**:

| | |
|---|---|
| *I study* | я навчаюся |
| *we study* | ми навчаємося |
| *you study* | ви навчаєтеся |
| *they study* | вони навчаються |

У третій особі однини до інфінітива без частки to додається закінчення **-s** або **-es**:

*to invite – he invit**es**, to teach – she teach**es***

Більшість дієслів у третій особі однини мають закінчення **-s**. Закінчення **-es** додається в таких випадках:

а) якщо дієслово закінчується на **s, ss, ch, tch, x**:

*to kiss – kiss**es**, to flash – flash**es***

б) якщо дієслово закінчується на у з попередньою приголосною (буква **y** змінюється перед **-es** на **i**):

*to multiply – multipl**ies**, to dry – dr**ies***

*Але:* якщо перед у стоїть голосна, то додається лише закінчення **-s**:

*to say – say**s**, to obey – obey**s***

в) якщо дієслово закінчується на **o**:

*to go – go**es**, to do – do**es***

*Питальна форма* ***Present Simple*** утворюється за допомогою допоміжного дієслова **do** або **does**, яке ставиться перед підметом:

| | |
|---|---|
| ***Do** I study?* | ***Does** he read?* |
| ***Do** we study?* | ***Does** she write?* |

**Примітка**. Якщо питальне слово виконує роль підмета або означення до підмета, допоміжне дієслово **do** або **does** у цьому випадку не вживається:

*Who lives there?* *Whose father lives there?*

*Заперечна форма* ***Present Simple*** утворюється за допомогою допоміжного дієслова **do** або **does**, заперечної частки **not** та інфінітива основного дієслова без частки **to**:

*I **do not** study. He **does not** study.*

У розмовній мові замість **do not** і **does not** вживаються скорочені форми **don't** і **doesn't**:

*I **don't** see you. He **doesn't** see me.*

Дієслово **to be** в ***Present Simple*** має форми:

| | |
|---|---|
| *I **am*** | *we **are*** |
| *he **is*** | *you **are*** |
| *she **is*** | *they **are*** |
| *it **is*** | |

Питальна та заперечна форми дієслова **to be** утворюються без допоміжного дієслова **to do**:

*Are you an engineer? I am not an engineer.*

**ВЖИВАННЯ**

***Present Simple*** вживається для вираження:

1) звичайної, повторюваної дії в теперішньому часі:

*He goes to see her every day.*

2) дії, яка характеризує підмет постійно:

*He speaks both French and English.*

3) загальновідомих істин:

*Water is a liquid.*

4) запланованої майбутньої дії в підрядних часу, причини та умови:

*I shall be there till he comes.*

5) запланованої майбутньої дії з дієсловами, що означають рух:

*His train arrives tomorrow morning.*

**ПАСИВНИЙ СТАН**

Пасивний стан ***Present Simple*** утворюється за допомогою дієслова **to be** та дієприкметника минулого часу *(Past Participle)* основного дієслова:

*He **is** interrogat**ed**. I **am** ask**ed** about it.*

**МИНУЛИЙ ПРОСТИЙ ЧАС**

**THE PAST SIMPLE TENSE**

**УТВОРЕННЯ**

*Стверджувальна форма* дієслова в ***Past Simple*** в усіх особах однини та множини збігається з другою формою дієслова:

| | |
|---|---|
| *I worked* | я працював |
| *we worked* | ми працювали |
| *you worked* | ви працювали |

В англійській мові дієслова поділяються на правильні та неправильні. ***Past Simple*** правильних дієслів утворюється додаванням до інфінітива без частки to закінчення **-ed**, яке вимовляється як:

**[t] – після глухих приголосних, крім t:**

*to ask – asked to, like – liked*

**[d] – після дзвінких приголосних, крім d, та після голосних:**

*to clean – cleaned, to live – lived, to answer – answered*

**[id] – після t, d, te, de:**

*to want – wanted, to defend – defended, to hate – hated, to decide – decided*

**Правопис правильних дієслів у *Past Simple*:**

а) якщо інфінітив закінчується на голосну **e**, то в ***Past Simple*** перед закінченням **-ed** вона не пишеться:

*to love — lov**ed***

б) якщо інфінітив закінчується на голосну **y**, перед якою стоїть приголосна, то перед закінченням **-ed** буква **y** змінюється на **i**:

*to study — stud**ied**, to cry — cr**ied***

в) якщо інфінітив закінчується на одну приголосну, якій передує короткий наголошений голосний звук, то кінцева приголосна подвоюється:

*to stop — sto**pp**ed to permit — permi**tt**ed*

г) кінцева буква **r** подвоюється, якщо останній склад наголошений і не має дифтонга (подвійного голосного звука):

*to prefer — prefe**rr**ed, to occur — occu**rr**ed*

д) кінцева буква **1** подвоюється, якщо їй передує короткий голосний звук (наголошений чи ненаголошений):

*to travel — trave**ll**ed, to fulfil - fulfi**ll**ed*

**Форма *Past Simple* неправильних дієслів утворюється по-різному.**

*Питальна форма* ***Past Simple*** правильних і неправильних дієслів утворюється за допомогою допоміжного дієслова **did** та інфінітива основного дієслова без частки **to.** Допоміжне дієслово ставиться перед підметом:

***Did** you go to the Institute yesterday?* *What **did** he say?*

*Заперечна форма* ***Past Simple*** утворюється за допомогою допоміжного дієслова **did,** заперечної частки **not** та інфінітива основного дієслова без частки **to.** Допоміжне дієслово ставиться між підметом і присудком:

*I **did not** know this.* *They **did not** work.*

У розмовній мові замість **did not** вживається скорочена форма **didn't:**

*I **didn't** understand you.*

Дієслово **to be** в ***Past Simple*** має форми **was** і **were:**

| | |
|---|---|
| *I **was*** | *we **were*** |
| *you **were*** | *you **were*** |
| *he **was*** | *they **were*** |
| *she **was*** | |
| *it **was*** | |

Питальна та заперечна форми дієслова **to be** утворюються без допоміжного дієслова **did:**

***Were** you at home yesterday? I **was not** at home*

У розмовній мові замість **was not, were not** вживаються форми **wasn't, weren't:**

*They **weren't** afraid of him.*

**ВЖИВАННЯ**

***Past Simple*** вживається для вираження:

1) одноразової або повторюваної дії в минулому. Час минулої дії часто уточнюється обставинами **yesterday, last week, the other day, ago** тощо:

*I saw you in the street yesterday. They lived in London before the war.*

2) ряду послідовних дій у минулому:

*I dressed, went downstairs, had some coffee in the kitchen and went out to the garage.*

3) повторюваної дії у минулому:

*I saw her every day.*

**ПАСИВНИЙ СТАН**

Пасивний стан ***Past Simple*** утворюється за допомогою допоміжного дієслова **to be** в ***Past Simple*** і ***Past Participle*** основного дієслова:

| | |
|---|---|
| *I **was** examin**ed*** | *we were examin**ed*** |
| *you **were** examin**ed*** | *you were examin**ed*** |
| *he **was** examin**ed*** | *they were examin**ed*** |
| *she **was** examin**ed*** | |
| *it **was** examin**ed*** | |

**МАЙБУТНІЙ ПРОСТИЙ ЧАС**

**THE FUTURE SIMPLE TENSE**

**УТВОРЕННЯ**

***Future Simple*** утворюється за допомогою допоміжних дієслів **shall** і **will** та інфінітива основного дієслова без частки **to.** Допоміжне дієслово **shall** вживається в першій особі однини і множини, **will** – у другій і третій особах:

| | |
|---|---|
| *I **shall/will** stand* | *we **shall/will** stand* |

*you **will** stand* *you **will** stand*

*he **will** stand* *they **will** stand*

*she **will** stand*

*it **will** stand*

**Примітка**. У сучасній англійській мові допоміжне дієслово **will** вживається для утворення ***Future Simple*** в усіх особах.

У розмовній мові замість **shall** і **will** звичайно вживається скорочена форма **'ll**, яка на письмі приєднується до підмета:

*I**'ll** tell it to you after dinner.Я розкажу Вам про це після обіду.*

*He**'ll** be back in an hour. Він повернеться за годину.*

У *питальній формі* допоміжне дієслово ставиться перед підметом:

***Shall** we come back here?* Ми повернемося сюди?

*When **will** he be at home?* Коли він буде вдома?

У *заперечній формі* після допоміжного дієслова вживається заперечна частка **not:**

*We **shall not** go there.* Ми не підемо туди.

*He **will not** stay here.* Він не залишиться тут.

У розмовній мові замість **shall not** і **will not** вживаються скорочені форми **shan't** і **won't:**

*I **shan't** go there.* Я не піду туди.

*She **won't** go to the theatre.* Вона не піде до театру.

**ВЖИВАННЯ**

***Future Simple*** вживається для вираження одноразової, постійної або повторюваної дії в майбутньому:

*I'll go there with you.* Я поїду туди з тобою.

*I'll always come back.* Я завжди повертатимусь.

*He'll work at the factory next year.* Наступного року він працюватиме на фабриці.

В англійській мові ***Future Simple*** не вживається в підрядних часу та умови. Для вираження майбутньої дії в таких реченнях вживається ***Present Simple***:

*I'll be here till you **come**. Я буду тут, доки ти прийдеш.*

*I'll give it to him when he **comes** back. Я дам це йому, коли він повернеться.*

**ПАСИВНИЙ СТАН**

Пасивний стан утворюється за допомогою допоміжного дієслова **to be** у ***Future Simple*** і ***Past Participle*** основного дієслова:

*I (we) **shall be** examin**ed**.*

*He (she, it, you, they) **will be** examin**ed**.*

**ТЕПЕРІШНІЙ ТРИВАЛИЙ ЧАС**

**THE PRESENT CONTINUOUS TENSE**

**ДІЄПРИКМЕТНИК ТЕПЕРІШНЬОГО ЧАСУ**

**THE PRESENT PARTICIPLE**

**УТВОРЕННЯ**

1. ***Present Participle*** утворюється за допомогою закінчення **-ing**, яке додається до інфінітива дієслова без частки **to**:

*to read — read**ing***

2. Якщо інфінітив закінчується на німе **e**, то перед закінченням **-ing** воно опускається:

*to writ**e** — writ**ing***

3. Якщо інфінітив закінчується однією приголосною буквою, якій передує короткий наголошений голосний звук, то перед закінченням кінцева приголосна подвоюється:

*to sit — si**tt**ing, to begin — begi**nn**ing*

**Примітка.** Кінцева буква **k** після **oo** не подвоюється: *look — looking*

4. Кінцева буква **r** подвоюється, якщо останній склад наголошений і не містить дифтонга:

*to prefer — prefe**rr**ing*

5. Кінцева буква **1** подвоюється, якщо їй передує короткий голосний звук (наголошений чи ненаголошений):

*to compel – compe**ll**ing to travel – trave**ll**ing*

6. У дієсловах *to lie, to tie, to die* буквосполучення **ie** перед закінченням **-ing** змінюється на **y**:

*to l**ie** — l**y**ing to t**ie** — t**y**ing to d**ie** — d**y**ing*

**Примітка**.Кінцева буква у перед закінченням **-ing** не змінюється:

*to tr**y**- tr**y**ing*

## ТЕПЕРІШНІЙ ТРИВАЛИЙ ЧАС
## THE PRESENT CONTINUOUS TENSE
### УТВОРЕННЯ

***Present Continuous*** утворюється за допомогою допоміжного дієслова **to be** в ***Present Indefinite*** і дієприкметника теперішнього часу ***(Present Participle)*** основного дієслова.

*Стверджувальна форма **Present Continuous**:*

*I **am** speak**ing** (I'm speaking)* *we **are** speak**ing** (we're speaking)*

*he **is** speak**ing** (he's speaking)* *you **are** speak**ing** (you're you speaking)*

*she **is** speak**ing** (she's speaking)* *they **are** speak**ing** (they're speaking)*

*it **is** speak**ing** (it's speaking)*

У дужках подано скорочені форми, що вживаються в розмовній мові.

У *питальній формі* допоміжне дієслово ставиться перед підметом:

***Are** the boys playing chess?*

***Is** she working in the garden?*

*What **are** you doing?*

У *заперечній формі* після допоміжного дієслова вживається заперечна частка not:

*The girls **are not** singing.*

У розмовній мові замість **is not** і **are not** вживаються скорочені форми **isn't** і **aren't**:

*She **isn't** listening in. Why **aren't** you working?*

**ВЖИВАННЯ**

***Present Continuous*** вживається для вираження:

1) дії, що відбувається в момент мовлення:

*You are not listening to me.*

2) тривалої дії, що відбувається в певний період теперішнього часу, хоч і не обов'язково в момент мовлення:

*What are you doing here in London? I'm studying at the University.*

3) тривалої дії, що відбувається одночасно з іншою дією, яка належить до теперішнього часу:

*I am only happy when I am working.*

4) запланованої майбутньої дії, особливо з дієсловами, що означають рух:

*We are flying to Paris in the morning.*

*When are you coming back?*

*Is he coming tonight?*

5) роздратування мовця щодо дії, яка відбувається постійно (зазвичай із словами *always, constantly, continually)*

*He is always loosing things.*

Дієслово **to go** у ***Present Continuous*** з інфінітивом іншого дієслова означає намір виконати дію в найближчому майбутньому або надає відтінку обов'язковості, неминучості виконання дії, позначеної інфінітивом:

*I am **going to speak**.*

*It's **going to rain.***

*He is **going to be** an engineer.*

**Verbs not normally used in the Continuous Tenses**

**Stative verbs** refer to ‘states’. A state has no beginning and no end. We don’t ‘control’ it

**There are 3 cases of verbs:**

- Dynamic verbs which have simple and continuous forms

*I often **listen** to music.*

*I'**m listening** to music now.*

- Verbs which are always stative

*She **loves** her baby.*

- Verbs that have stative and dynamic uses

*I'**m weighting** myself*

*I **weight** 80 kilos.*

1. Verbs of senses

*hear, see, smell, feel, notice, taste*

2. Verbs of feelings and emotions

*hate, like, dislike, love, need, prefer, want, wish, hope*

3. Verbs of mental activity

*believe, imagine, know, mean, realize, recognize, remember, suppose, understand, seem, expect, agree, doubt, forget, prefer*

4. Verbs of possession and being

*have, be, belong, concern, consist, contain, depend, involve, matter, need, owe, own, possess, cost, weight, come from*

**ПАСИВНИЙ СТАН**

Пасивний стан ***Present Continuous*** утворюється за допомогою допоміжного дієслова **to be** в ***Present Continuous*** і ***Past Participle*** основного дієслова:

| | |
|---|---|
| *I am being examined.* | *Am I being examined?* |
| *He (she, it) is being examined.* | *Is he (she, it) being examined?* |
| *We (you, they) are being examined.* | *Are we (you, they) being examined?* |

## МИНУЛИЙ ТРИВАЛИЙ ЧАС

## THE PAST CONTINUOUS TENSE

### УТВОРЕННЯ

*Стверджувальна форма* дієслова в ***Past Continuous*** утворюється за допомогою допоміжного дієслова **to be** в ***Past Simple*** і дієприкметника теперішнього часу ***(Present Participle)*** основного дієслова:

*I **was** mak**ing***
*you **were** mak**ing***
*he **was** mak**ing***
*she **was** mak**ing***
*it **was** mak**ing***
*we **were** mak**ing***
*you **were** mak**ing***
*they **were** mak**ing***

У *питальній формі* допоміжне дієслово ставиться перед підметом:

*What **were** you telling him?*

У *заперечній формі* після допоміжного дієслова вживається заперечна частка **not:**

*I w**as not** watching TV in the evening.*

У розмовній мові в заперечній і питально-заперечній формах замість **was not** і **were not** вживаються переважно скорочені форми **wasn't** і **weren't:**

*He **wasn't** coming. **Wasn't** he coming?*

*They **weren't** coming. **Weren't** they coming?*

### ВЖИВАННЯ

***Past Continuous*** вживається для вираження:

1) дії, що відбувалася, тривала в певний момент у минулому. На час дії звичайно вказують обставинні слова типу **at two o'clock, at midnight, at that moment** або підрядні з дієсловом присудком у ***Past Simple***:

*He was working at his English **at that time**. She was sitting by the window **when he came in.***

2) дії, що тривала протягом якогось часу в минулому:

*In spring he was visiting his old school-fellow.*

### ПАСИВНИЙ СТАН

Пасивний стан ***Past Continuous*** утворюється за допомогою допоміжного дієслова **to be** в ***Past Continuous*** і ***Past Participle*** основного дієслова:

*I (he, she, it) was being examined. We (you, they) were being examined.*

*Питальна і заперечна форми* утворюються таким чином:

***Was** he being taught? He **was not** being taught.*

***Were** they being taught? They **were not** being taught.*

**МАЙБУТНІЙ ТРИВАЛИЙ ЧАС**

**THE FUTURE CONTINUOUS TENSE**

**УТВОРЕННЯ**

*Стверджувальна форма* ***Future Continuous*** утворюється за допомогою допоміжного дієслова **to be** у ***Future Simple*** та дієприкметника теперішнього часу ***(Present Participle)*** основного дієслова:

*I **shall be** translat**ing***
*you **will be** translat**ing***
*he **will be** translat**ing***
*she **will be** translat**ing***
*we **shall be** translat**ing***
*you **will be** translat**ing***
*they **will be** translat**ing***

У *питальній формі* допоміжне дієслово **shall** або **will** ставиться перед підметом:

***Will** they be studying? **Shall** we be training?*

У *заперечній формі* після допоміжного дієслова **shall** або **will** вживається заперечна частка **not:**

*They **will not** be leaving for Kyiv. I **shall not** be painting.*

У розмовній мові замість **shall** і **will** вживається скорочення **'ll**, а замість **shall not** і **will not — shan't** і **won't.**

**ВЖИВАННЯ**

***Future Continuous*** вживається для вираження тривалої дії, що відбуватиметься в якийсь момент або період часу в майбутньому:

**I'll be looking out for you at two o'clock. We'll be playing all morning.**

## ТЕПЕРІШНІЙ ЗАВЕРШЕНИЙ ЧАС

## THE PRESENT PERFECT TENSE

### УТВОРЕННЯ

**Present Perfect** утворюється за допомогою допоміжного дієслова **to have** у ***Present Simple*** і дієприкметника минулого часу ***(Past Participle)*** основного дієслова.

***Past Participle*** правильних дієслів утворюється додаванням до інфінітива закінчення **-ed**, тобто за формою **Past Participle** правильних дієслів не відрізняється від ***Past Simple***:

*I/we/you/they have discuss**ed***

*He/she has discuss**ed***

У розмовній мові вживаються переважно скорочені форми:

***I've** worked. **He's** worked. **We've** worked.*

У *питальній формі* допоміжне дієслово ставиться перед підметом:

***Have** you ever lived in a village? **Has** she congratulated him?*

У *заперечній формі* після допоміжного дієслова вживається заперечна частка **not:**

*My friend **has not** come yet. We **have not** discussed it.*

У розмовній мові замість **have not** і **has not** вживаються скорочені форми **haven't, hasn't** або **'ve not, 's not:**

*I**'ve not** done anything. You **haven't** changed much. He**'s not** come yet.*

У питально-заперечних реченнях вживаються скорочені форми **haven't** і **hasn't,** які ставляться перед підметом:

***Hasn't** he been to Paris? Why **haven't** you put on your coat?*

### ВЖИВАННЯ

**Present Perfect** вживається для вираження дії, яка відбулася до моменту мовлення, і результат цієї минулої дії пов'язаний з цим моментом:

*I have locked the door. Have you turned off the gas?*

Час дії, вираженої дієсловом у **Present Perfect**, здебільшого не зазначається, тому що в центрі уваги результат дії, а не час її перебігу:

*What have they done? You have read more than me.*

**Present Perfect** вживається також у реченнях з такими обставинами часу:

а) що означають період часу, який почався в минулому і тривав до моменту мовлення: **up to now, up to the present** – до цього часу; **lately** – нещодавно, останнім часом; **recently** – останнім часом; **so far** – до цього часу; **since** – відтоді; **not yet** – ще не:

*Up to now we have done three exercises.*

*Have you seen them recently?*

*Have you heard from your sister lately?*

б) що означають період часу, який ще не закінчився: **today** – сьогодні; **this week** – цього тижня; **this month** – цього місяця; **this year** – цього року; **this morning** – сьогодні вранці:

*Have you seen her today? Has he visited a dentist this month?*

З цими обставинами часу вживається також Past Indefinite, якщо в реченні є слова, які вказують на дію в минулому:

*A letter came from them today when he was at work.*

в) з прислівниками неозначеного часу і частотності: **ever** – коли-небудь; **never** – ніколи; **often** – часто; **seldom** – рідко; **already** – вже; **just** – щойно:

*Have you ever thought about it? I've often heard him tell the tale. We've just arrived.*

З цими прислівниками вживається також ***Past Simple***:

*I told you already. I never saw him in my life.*

***Present Perfect*** не вживається з обставинними словами та словосполученнями, які уточнюють час минулої дії: **yesterday** – вчора; **last week** – минулого тижня тощо:

*She went yesterday. When did you see him?*

***Present Perfect*** вживається для вираження дії або стану, що триває з якогось моменту в минулому до моменту мовлення. У цьому значенні ***Present Perfect*** вживається переважно з дієсловами, що не мають форми ***Continuous***:

*I have known her for years.*

*I have not seen you for a whole month.*

**ПАСИВНИЙ СТАН**

Пасивний стан ***Present Perfect*** утворюється за допомогою допоміжного дієслова **to be** в ***Present Perfect*** і ***Past Participle*** основного дієслова:

*I have been examined*
*you have been examined*
*he has been examined*
*she has been examined*
*it has been examined*
*we have been examined*
*you have been examined*
*they have been examined*

**МИНУЛИЙ ЗАВЕРШЕНИЙ ЧАС**

**THE PAST PERFECT TENSE**

**УТВОРЕННЯ**

***Past Perfect*** утворюється за допомогою допоміжного дієслова **to have** в ***Past Simple*** і дієприкметника минулого часу ***(Past Participle)*** основного дієслова. Дієслова в ***Past Perfect*** не змінюються за особами й числами:

*I (she, he, it, we, you, they)* ***had*** *bak****ed****.*

У розмовній мові замість **had** вживається скорочена форма **'d**, яка на письмі приєднується до підмета:

*I****'d*** *(he****'d****, she****'d****, we****'d****, you****'d****, they****'d****) cooked.*

У *питальній формі* допоміжне дієслово ставиться перед підметом:

***Had*** *you helped?*

У *заперечній формі* після допоміжного дієслова вживається заперечна частка **not:**

*I had* ***not*** *ordered.*

У розмовній мові в заперечній і питально-заперечній формах вживається скорочена форма **hadn't:**

*He* ***hadn't*** *required.* ***Hadn't*** *he required?*

**ВЖИВАННЯ**

**Past Perfect** вживається для вираження:

1) дії, яка відбулася раніше іншої минулої дії, позначеної дієсловом у ***Past Simple:***

*I told you I had met her.*

2) минулої дії, що вже закінчилася до певного моменту в минулому. Цей момент позначається такими словосполученнями: **by two o'clock** – до другої години, **by that time** – до того часу тощо:

*I had done my homework by eight o'clock.*

Заперечна форма ***Past Perfect*** вказує на те, що до певного моменту в минулому дія ще не закінчилася:

*I had not read the book by that time.*

3) дії, що почалася до певного моменту в минулому і тривала до цього моменту. У цьому значенні ***Past Perfect*** вживається переважно з дієсловами, які не мають форми ***Continuous***:

*When he came I had been there for an hour.*

**ПАСИВНИЙ СТАН**

Пасивний стан ***Past Perfect*** утворюється за допомогою допоміжного дієслова **to be** в ***Past Perfect*** і ***Past Participle*** основного дієслова:

*I (he, she, it, we, you, they)* ***had been*** *examin****ed****.*

У *питальній формі* допоміжне дієслово ставиться перед підметом:

***Had*** *he been examined?*

У *заперечній формі* після допоміжного дієслова **had** ставиться заперечна частка **not:**

*He* ***had not*** *been examined.*

**МАЙБУТНІЙ ЗАВЕРШЕНИЙ ЧАС**

**THE FUTURE PERFECT TENSE**

**УТВОРЕННЯ**

*Стверджувальна форма* дієслова у ***Future Perfect*** утворюється за допомогою допоміжного дієслова **to have** у ***Future Simple*** і дієприкметника минулого часу ***(Past Participle)*** основного дієслова:

*I shall have done it*
*you will have done it*
*he will have done it*
*she will have done it*
*it will have done it*
*we shall have done it*
*you will have done it*
*they will have done it*

У *питальній формі* перше допоміжне дієслово **shall/will** вживається перед підметом:

***Shall** we have believed? **Will** he have believed?*

У *заперечній формі* після першого допоміжного дієслова **shall/will** вживається заперечна частка **not:**

*We **shall not** have done it. He **will not** have done it.*

У розмовній мові вживаються такі самі скорочення, як і у ***Future Simple***:

I**'ll** have done it.

I **shan't** have done it.

He **won't** have done it.

**ВЖИВАННЯ**

***Future Perfect*** вживається для вираження майбутньої дії, що закінчиться до певного моменту або до початку іншої дії в майбутньому:

*You'll have forgotten me by then.*

*I shall have read the story by the time you come.*

**ПАСИВНИЙ СТАН**

Пасивний стан ***Future Perfect*** утворюється за допомогою допоміжного дієслова **to be** у ***Future Perfect*** і ***Past Participle*** основного дієслова:

*I (we) shall have been examined.*

*He (she, it, you, they) will have been examined.*

**ТЕПЕРІШНІЙ ПЕРФЕКТНО-ТРИВАЛИЙ ЧАС**

**THE PRESENT PERFECT CONTINUOUS TENSE**

**УТВОРЕННЯ**

***Present Perfect Continuous*** утворюється за допомогою допоміжного дієслова **to be** в ***Present Perfect*** і дієприкметника теперішнього ***(Present Participle)*** часу основного дієслова:

*I **have been** writ**ing***
*you **have been** writ**ing***
*he **has been** writ**ing***
*she **has been** writ**ing***
*we **have been** writ**ing***
*you **have been** writ**ing***
*they **have been** writ**ing***

У *питальній формі* перше допоміжне дієслово ставиться перед підметом:

***Have** you been working?*

У *заперечній формі* після першого допоміжного дієслова вживається заперечна частка **not:**

*He **has not** been coming.*

У *питально-заперечній формі* перше допоміжне дієслово ставиться перед підметом, а частка **not** – після підмета:

***Have** they **not** been writing?*

У розмовній мові вживаються такі самі скорочення, як і в ***Present Perfect***.

Стверджувальна форма: *I'**ve** been sewing. He's been sewing.*

Заперечна форма: *I **haven't** been sailing. He hasn't been sailing.*

Питально-заперечна форма: ***Haven't** you been rowing?*

**ВЖИВАННЯ**

**Present Perfect Continuous** вживається для вираження дії, що почалася в минулому і тривала протягом певного періоду, або все ще продовжується в цей момент, або щойно закінчилася:

*I **have been learning** English for 5 years.*

*He **has been waiting** for her for two hours but she still hasn't come.*

*I**'ve been doing** my homework since dinner.*

***Present Perfect Continuous*** може вживатися без вказівки на тривалість дії:

*What **have** you **been reading**? I**'ve been expecting** you.*

Здебільшого на період тривалості дії вказують обставини часу, часто з прийменником **for:**

*He has been sleeping **for an hour**.*

Слово **since** вказує на початок періоду, протягом якого тривала дія:

*I have been teaching English **since 1995**. What have you been **doing since you left us**?*

*Present Perfect Continuous* вживається в питальних реченнях з питальними словами since **when** – з якого часу, відколи; **how long** – як довго, скільки часу, якщо мова йде про період, що безпосередньо передує моменту мовлення:

***How long** have you been learning French?*

*Since **when** have they been working here?*

**МИНУЛИЙ ПЕРФЕКТНО-ТРИВАЛИЙ ЧАС**

**THE PAST PERFECT CONTINUOUS TENSE**

**УТВОРЕННЯ**

**Past Perfect Continuous** утворюється за допомогою допоміжного дієслова **to be** в ***Past Perfect*** і дієприкметника теперішнього часу ***(Present Participle)*** основного дієслова:

| | |
|---|---|
| *I **had been** read**ing*** | *we had been read**ing*** |
| *you **had been** read**ing*** | *you had been read**ing*** |
| *he **had been** read**ing*** | *they had been read**ing*** |
| *she **had been** read**ing*** | |

У *питальній формі* перше допоміжне дієслово ставиться перед підметом:

***Had** he been reading?*

У *заперечній формі* після першого допоміжного дієслова вживається заперечна частка **not:**

*He **had not** been reading.*

У *питально-заперечній формі* перше допоміжне дієслово і частка **not** ставляться перед підметом:

***Hadn't** they been taking photos?*

У розмовній мові вживаються такі самі скорочення, як і в ***Past Perfect***.

Заперечна форма: *I **hadn't** been collecting coins. He **hadn't** been working.*

Питально-заперечна форма: ***Hadn't** you been collecting coins?*

**ВЖИВАННЯ**

**Past Perfect Continuous** вживається для вираження тривалої дії, яка почалася до якогось моменту в минулому, або продовжувалася у цей момент, або закінчилася безпосередньо перед ним:

*I explained that I **had been looking** for him for the last two hours.* Я пояснив, що вже дві години шукаю його,

*He felt tired because he **had been playing** football.* Він почувався втомленим тому що грав у футбол уже дві години

З дієсловами, що не мають форми ***Continuous***, замість ***Past Perfect Continuous*** вживається ***Past Perfect:***

*When we came to see Kate, she **had been ill** for three days*. Коли ми прийшли провідати Катрусю, вона вже три дні хворіла.

## МАЙБУТНІЙ ПЕРФЕКТНО-ТРИВАЛИЙ ЧАС
## THE FUTURE PERFECT CONTINUOUS TENSE

**УТВОРЕННЯ**

***Future Perfect Continuous*** утворюється за допомогою допоміжного дієслова **to be** у ***Future Perfect*** та дієприкметника теперішнього часу ***(Present Participle)*** основного дієслова:

I shall have been going
you will have been going
he will have been going
she will have been going
it will have been going
we shall have been going
you will have been going
they will have been going

У *питальній формі* допоміжні дієслова **shall, will** і **have** ставляться перед підметом:

***Will** you have been waiting?*

У *заперечній формі* після допоміжних дієслів **shall** і **will** вживається заперечна частка **not:**

*He **will not** have been waiting.*

У *питально-заперечній формі* допоміжні дієслова **shall, will** і частка **not** ставляться перед підметом:

***Won't** they have been waiting?*

У розмовній мові вживаються такі самі скорочення, як і у ***Future Perfect***.

Стверджувальна форма: *I'**ll** have been looking for*.

Заперечна форма: *I **shan't** have been looking for*.

**ВЖИВАННЯ**

**Future Perfect Continuous** вживається для вираження тривалої дії, яка почнеться до якогось моменту в майбутньому, або все ще триватиме в цей момент, або закінчиться безпосередньо перед ним:

*I hope that I shall have not been looking for him for a long time before I find him.* Я сподіваюся, що не шукатиму його довго до того, як знайду.

*He will have been learning English for half a year by June.* До червня він вивчатиме англійську мову вже півроку.

З дієсловами, що не мають форми ***Continuous***, замість ***Future Perfect Continuous*** вживається ***Future Perfect***:

*I **shall have not seen** the earth before we land.* Я не бачитиму землю, аж доки ми не приземлимося.

# НАКАЗОВИЙ СПОСІБ
# THE IMPERATIVE MOOD

Наказовий спосіб в англійській мові, як і в українській, виражає спонукання до дії, тобто прохання, наказ, пораду, запрошення, застереження тощо.

В англійській мові форма наказового способу збігається з інфінітивом, без частки **to**:

*To take - Take!* Візьми! Візьміть!

*To write - Write!* Пиши! Пишіть!

*Bring me this book.* Принеси мені цю книжку

*Be a good boy.* Будь хорошим хлопчиком.

Заперечна форма наказового способу утворюється з допоміжного дієслова **to do**, заперечної частки **not** та інфінітива основного дієслова без **to**. В усному мовленні замість **do not** звичайно вживається скорочена форма **don't**:

*Don't go to the theatre today.* Не йди сьогодні в театр.

*Don't be angry.* Не сердься.

Допоміжне дієслово **do** може вживатися і у стверджувальній формі наказового способу для підсилення прохання. У цьому разі воно ставиться перед смисловим дієсловом:

*Do tell me about it.* Розкажіть же мені про це.

У першій і третій особі однини й множини спонукання до дії виражається сполученням дієслова **let** з інфінітивом основного дієслова без частки **to**. Між дієсловом **let** та інфінітивом ставиться іменник у загальному відмінку або особовий займенник в об'єктному відмінку, що позначає особу, яка має виконати дію.

*Let the man listen to me.* Хай цей чоловік слухає мене.

*Let him listen to me.*

*Let us (Let's) go to the theatre.* Ходімо в театр.

У заперечній формі **let** вживається з **don't**.

*Don't let him talk about it.*

*Don't let them go there.*

## УЗГОДЖЕННЯ ЧАСІВ
## SEQUENCE OF TENSES

В англійській мові існує певна залежність у вживанні граматичного часу дієслова-присудка підрядної частини від граматичного часу, в якому стоїть дієслово-присудок головної частини. Це правило називають *правилом узгодження,* або *послідовності часів.*

Правило узгодження часів характерне переважно для додаткових підрядних частин. Воно полягає у такому:

1. Якщо дієслово-присудок головної частини стоїть у *теперішньому* або *майбутньому часі,* дієслово-присудок підрядного додаткового може стояти у будь-якій часовій формі, якої вимагає зміст:

*I* ***think*** *you* ***are right.*** *Я думаю,* що ви *маєте рацію*.

***Do*** *you* ***know*** *why he* ***was absent*** *yesterday?* Чи ви *знаєте,* чому його *не було* вчора?

*I'****ll tell*** *you what you* ***will have to do.*** *Я скажу* вам, що вам *треба буде зробити.*

2. Якщо дієслово-присудок головної частини стоїть у *минулому часі* (звичайно у ***Past Indefinite***), то і дієслово-присудок додаткової частини має стояти в *одному з минулих часів* або *в майбутньому з погляду минулого* ***(Future-in-the-Past)***. Такої залежності в українській мові немає:

*I* ***did not know*** *he* ***could speak*** *English.* *Я не знав,* що він *розмовляє* англійською.

*He* ***told*** *me that you* ***were writing*** *your composition.* Він *сказав,* що ти *пишеш* твір.

*I* ***hoped*** *he* ***would come.*** *Я сподівався,* що він *прийде.*

При цьому для позначення дії, *одночасної* з дією, вираженою присудком головної частини, у підрядній частині вживаються ***Past Simple*** або ***Past Continuous*** (в українській мові – теперішній час):

*I* ***thought*** *you* ***were ready.*** *Я думав,* що ти *готовий.*

*He **told** me that he **was preparing** for his exams*. Він *сказав* мені, що *готується* до екзаменів.

Для позначення дії, яка *передує дії,* вираженій присудком головної частини, звичайно вживається ***Past Perfect*** (в українській мові – минулий час).

*I **didn't know** she **had gone** away**.** Я не знав,* що вона *пішла.*

Якщо вжито означений час *(in 2010, yesterday)*, то попередню дію виражають за допомогою ***Past Simple***:

*I **thought** you **were born** in 1985.*

*I **thought** you **came back** from your trip yesterday.*

Для вираження *майбутньої дії з погляду минулого часу* вживають форми ***Future-in-the-Past*** із допоміжним дієсловом **would** (в українській мові – майбутній час).

*I **didn't expect** you **would be late.*** Я *не сподівався,* що ти *спізнишся.*

*He **told** me that he **would meet** us at the stadium*. Він *сказав,* що *зустріне* нас на стадіоні.

## ПРЯМА І НЕПРЯМА МОВА
## DIRECT AND INDIRECT SPEECH

При перетворенні прямої мови у непряму в англійській мові слід дотримуватися певних правил.

У непрямій мові можна передавати твердження, питання, накази та прохання.

1. Твердження трансформується в підрядне речення зі сполучником **that**. Сполучник **that** може опускатися. Якщо в реченні вказується особа, до якої звертаються, дієслово *say* замінюється на *tell*.

*He says, "I am thirsty". – He tells me that he is thirsty.* Він говорить: "Я хочу пити". – Він каже мені, що він хоче пити.

2. Наказовий спосіб в прямій мові, трансформується в інфінітив в непрямій мові.

*The teacher says to the students,"Do all the homework in time". – The teacher asks her students to do all the homework in time.*

Вчитель говорить студентам: "Робіть домашнє завдання вчасно". – Вчитель просить студентів робити домашнє завдання вчасно.

*The instructor says, "Do not turn on this road". – The instructor warns not to turn on this road.* Інструктор каже: "Не варто повертати на цю дорогу". – Інструктор попереджає мене не повертати на цю дорогу.

*"Are you free tomorrow?" – I asked her if she was free the next day.*

*"Do you speak English?"– She asked me whether I spoke English.*

3. Питальні речення трансформуються згідно з такими правилами:

- **Загальні питання** – підрядне речення вводиться сполучниками **if, whether**. Порядок слів прямий.

*He asks us, "Do you believe me?" – He asks* ***whethe****r we believe him.* Він питає нас: "Ви мені вірите?" – Він питає, чи віримо ми йому.

- **Спеціальні питання** – підрядне речення вводиться сполучником, відповідним до питального займенника Порядок слів стає прямим.

*"When will the bank open tomorrow?" – She asks when the bank will open tomorrow.*

*"Where are you going?" He asked me where I was going.*

*"What do you think about it?" I asked Mary what she thought about it.*

Згідно з *правилом узгодження часів* при перетворенні прямої мови у непряму відбуваються такі зміни граматичного часу присудка підрядного речення:

***Present Indefinite → Past Indefinite***

***Present Continuous → Past Continuous***

***Present Perfect → Past Perfect***

***Past Indefinite → Past Perfect***

***Past Continuous → Past Perfect Continuous***

***Past Perfect → Past Perfect***

***Future Indefinite → Future-in-the Past***

Непряма мова в англійській мові також потребує відсутності лапок, зміни вказівних займенників, прислівників часу і місця:

| **Direct Speech** (пряма мова) | | **Indirect Speech** (непряма мова) |
|---|---|---|
| *this* | → | *that* |
| *these* | → | *those* |
| *here* | → | *there* |
| *now* | → | *then* |
| *yesterday* | → | *the day before* |
| *today* | → | *that day* |
| *last week* | → | *the week before* |
| *earlier* | → | *before* |
| *2 days ago* | → | *2 days before* |
| *tomorrow* | → | *next day* |
| *next year* | → | *the next year* |
| *in 2 days* | → | *2 days later* |

| **Характер дії в підрядному реченні** | **Пряма мова** | **Непряма мова** |
|---|---|---|
| *Одночасна дія* | ***Present Simple / Continuous*** | ***Past Simple / Continuous*** |
| | *He said, `I like winter`* | *He said (that) he liked winter.* |
| | *He said, `Serg is waiting for me.`* | *He said (that) Serg was waiting for him.* |
| | *He said. `I can do it myself.`* | *He said (that) he could do it himself.* |
| *Попередня дія* | ***Present Perfect / Perfect Continuous / Past Simple / Continuous*** | ***Past Perfect / Perfect Continuous*** |

| | | |
|---|---|---|
| | *He said, `I have found a new job.`* | *He said (that) he had found a new job.* |
| | *He said, `I've been sitting here for two hours.`* | *He said he had been sitting there for two hours.* |
| | *He said, `I sent her a birthday present.`* | *He said he had sent her a birthday present.* |
| | *He said, `She have been working on my paper all day.`* | *He said he had been working on his paper all day.* |
| *Подальша дія* | ***Future Present / Continuous*** | ***Future in the Past*** |
| | *He said, `I shall see her on Monday.`* | *He said he would see her on Monday* |
| | *He said, `I will be giving a lecture on Tuesday.`* | *He said he would be giving a lecture on Tuesday.* |

**МОДАЛЬНІ ДІЄСЛОВА**

**MODAL VERBS**

**ЗАГАЛЬНІ ВІДОМОСТІ**

У сучасній англійській мові виділяють 12 дієслів, які є модальними, або ж виступають у значенні модальних: ***can, may, must, should, ought, shall, will, would, need, dare, to be, to have (to have got)*.**

До категорії модальних дієслів належать ***can, may, must, ought, need*, *dare***

Модальні дієслова не виражають дії чи стану, а лише можливість, необхідність, бажання, ймовірність, сумнів, дозвіл, заборону, здатність виконання дії, позначеної інфінітивом. Тому модальні дієслова вживаються не самостійно, а лише в сполученні з інфінітивом іншого дієслова. Інфінітив, з яким поєднуються модальні дієслова, вживається без частки **to** (крім інфінітива, який слідує за дієсловом ***ought***).

*I can help you.* Я можу допомогти вам.

*He must go there.* Він мусить іти туди.

Без інфінітива іншого дієслова модальні дієслова вживаються лише тоді, коли інфінітив зрозумілий з контексту:

*Can you do it? Yes, I **can**.* Ви можете зробити це? Так.

*I wanted to open the window but I **couldn't**.* Я хотіла відчинити вікно, але не змогла.

Модальні дієслова не мають усіх основних форм, властивих іншим дієсловам, і тому їх називають також *недостатніми* ***(Defective Verbs)***:

***1.*** Дієслова **can** та **may** мають форми теперішнього і минулого часу (**could** і **might**), а дієслова **must, ought i need** мають тільки одну форму – теперішнього часу.

***2.*** Модальні дієслова не мають неособових форм – інфінітиву, герундія і дієприкметника.

***3.*** Модальні дієслова не мають закінчення **-s** в 3-й особі однини:

*He can do it.* *He may do it.*

*He must do it.* *He ought to do it.*

Питальна і заперечна форми модальних дієслів в ***Present*** і ***Past Simple*** утворюються без допоміжного дієслова **to do**. У питальній формі модальне дієслово ставиться перед підметом:

*Can you do it?* *May you do it?* *Must you do it?*

*Need he do it?* *Ought she to do it?*

У заперечній формі частка **not** ставиться відразу після модального дієслова. Дієслово **can** і заперечна частка **not** у теперішньому часі пишуться разом: **cannot**.

*He cannot do it.* Він не може цього зробити.

*You may not smoke here.* Тут курити не дозволяється.

Модальні дієслова мають такі скорочені заперечні форми**: can’t, mayn’t, couldn’t, mightn’t, needn’t, mustn’t.**

**ЗНАЧЕННЯ І ВЖИВАННЯ МОДАЛЬНИХ ДІЄСЛІВ**

**МОДАЛЬНЕ ДІЄСЛОВО CAN**

Дієслово **can** має дві форми: теперішнього часу **can** і минулого часу **could:**

*I can swim.* Я вмію плавати.

*He could read when he was five.* Він умів читати, коли йому було п'ять років.

Дієслово **can** виражає фізичну чи розумову здатність, уміння чи можливість виконати дію в теперішньому або минулому часі:

*He can lift this weight.* Він може підняти цю вагу.

*Can you see anything?* Ви що-небудь бачите?

*I couldn't solve the problem.* Я не зміг розв'язати задачу.

Після форми **could** у цих значеннях може вживатися перфектний інфінітив, який вказує на те, що дія, яка мала відбутися, не відбулася:

*He could have guessed it.* Він міг здогадатися про це. *{але не здогадався)*

Дієслово **can** не має майбутнього часу. У майбутньому часі замість **can** вживається сполучення **to be able** – бути спроможним. Інфінітив після нього вживається з часткою **to.** Вираз **to be able** іноді вживається також у теперішньому і минулому часах:

*He is able to help you.* Він може допомогти вам.

*She was not able to answer.* Вона не могла відповідати.

*If we weigh the lamp with the alcohol in it before and after the experiment we shall be able to determine the amount of alcohol burned.* – Якщо ми зважимо лампу, наповнену спиртом, до, і після досвіду, ми зможемо (будемо в змозі) визначити кількість спирту, який згорів.

Дієслово **can** в поєднанні з ***Indefinite Infinitive Active*** перекладається українською мовою словом *може*, в поєднанні з ***Indefinite Infinitive Passive*** дієслово **can** перекладається словом можна з наступним інфінітивом:

*The burden will fall on me but I can carry it* – (Вся) тяжкість ляже на мене, але я можу витерпіти її.

*When a body can do work it is said to possess energy* – Коли тіло може виконувати роботу, кажуть, що воно володіє енергією.

*How can the motion be explained?* – Як можна пояснити рух?

Дієслово **can** в заперечній формі з подальшим ***Indefinite Infinitive Passive*** зазвичай перекладається українською мовою словом не можна: *It cannot be done.* Цього не можна зробити.

**Примітка.** Поєднання **cannot but** плюс ***Indefinite Infinitive*** перекладається *не можна не, не можу не* (*не може не* і т. д.):

*I cannot but agree with you.* Не можна не погодитися з вами. (Я не можу не погодитися з вами.)

*One cannot but admit …* - Не можна не визнати …

Дієслово **can (could)** у поєднанні з дієсловами, що позначають почуття і сприйняття (to see, to hear, to feel, to smell, to taste і т. д.), українською мовою не перекладається. У такому випадку дієслово *can* надає відтінок зусилля у виконанні дії, вираженого дієсловами, що позначають почуття і сприйняття:

*Look over there, can you see that house in the distance?* – Подивіться туди. Бачите ви цей дім в далині?

*Can you hear that strange noise?* – Ви чуєте цей дивний шум?

**МОДАЛЬНЕ ДІЄСЛОВО MAY**

Дієслово **may** має наступні значення:

**1)** Дозвіл:

*You may use dictionaries.* Ви можете (вам дозволяється) користуватися словниками.

*May I ask you a question?* Можна (дозвольте) задати питання?

У цьому значенні замість дієслова may (might) і замість відсутніх форм дієслова **may** вживається поєднання **to be allowed** з наступним інфінітивом з часткою **to**:

*He has been allowed to stay here.* **–** Йому дозволили залишитися тут.

Форма минулого часу від дієслова **may – might** – вживається в значенні дозволу лише в непрямій мові. У всіх інших випадках в цьому значенні в минулому часі вживається вираз **to be allowed**.

**2)** Можливість:

*The answer may give the key to the whole problem.* – Відповідь (на це питання) може дати ключ до всієї проблеми.

*A body may be divided into separate tiny particles.* – Тіло може бути розділене (можна розділити) на окремі дрібнесенькі частинки.

**3)** Припущення, сумнів, невпевненість з боку мовця у можливості дії, вираженої наступним інфінітивом. **May (might)** у поєднанні з ***Indefinite Infinitive*** вживається у відношенні теперішнього і майбутнього часу; **may (might)** у поєднанні з ***Perfect Infinitive*** вживається відносно минулого часу.

Різниця у значенні між **may** і **might** в даному вживанні полягає в тому, що **might** висловлює більш сильну ступінь сумніву, невпевненості з боку мовця, ніж **may**:

*He may (might) come today or tomorrow.* – Він, можливо, приїде сьогодні або завтра.

*So you say he may have been one of those two passengers?* – Отже, ви кажете, що він, можливо, був одним з тих двох пасажирів?

**4)** Вираз докору, зауваження. У цьому значенні вживається тільки дієслово **might. Might** в поєднанні з ***Indefinite Infinitive*** належить до теперішнього, минулого і майбутнього часу; в поєднанні з ***Perfect Infinitive*** **might** виражає докір, жаль про невиконану дію і відноситься лише до минулого часу:

*You might do it yourself.* Ви могли б зробити це самі.

*You might have told me about it long ago.* Ви могли б давно сказати мені про це.

Дієслово **may (might)** у поєднанні з інфінітивом вживається в складносурядних реченнях цілі після сполучників **that, so that, in order that –** *для того щоб, щоб*.

*I have told him to meet me next morning so that we may work together.* Джері велів йому зустріти його наступного дня вранці, для того щоб разом працювати (щоб вони могли разом працювати).

**МОДАЛЬНЕ ДІЄСЛОВО MUST**

Дієслово **must** виражає необхідність, моральний обов'язок і відповідає в українській мові словами *повинен, потрібно, треба*.

*I must hurry, I must warn him of the danger.* Я мушу поспішати, я повинен попередити його про небезпеку.

*As soon as the shell is shot from the gun it must overcome the resistance of the air.* Як тільки снаряд випущений з гармати, він повинен подолати опір повітря.

**Must** вживається у відношенні теперішнього і майбутнього часу. Відносно минулого часу дієслово must вживається тільки в непрямій мові:

*He decided he must speak to Doctor Page himself.* – Він вирішив, що повинен поговорити з самим доктором Пейджем.

**Примітка.** У відповідях на запитання, що містить дієслово must, в позитивній відповіді вживається **must**, в негативній – **needn't**:

*Must I go there? Yes, you must. No, you needn't.* Треба мені йти туди? Так, потрібно. Ні, не потрібно.

**Mustn't** означає не можна і вживається в заперечній відповіді на питання *May I …?* (Можна?)

Дієслово **must** може мати значення ймовірності, можливості дії. У цьому значенні дієслово **must** перекладається українською мовою *можливо, мабуть*. У поєднанні з *Perfect Infinitive* дієслово **must** зазвичай вживається у вказаному значенні відносно дії, що відноситься до минулого.

*Wait a little, the rain must stop soon.* Зачекайте трохи, дощ, можливо, скоро перестане.

*It occurred to Bert that he must have said the wrong thing.* Берту спало на думку, що він, мабуть, сказав не те, що потрібно.

Дієслово **must** має лише одну форму теперішнього часу

Для вираження необхідності стосовно минулого і майбутнього часів вживається дієслово **to have** у відповідних часових формах. Воно може заміняти дієслово **must** і в теперішньому часі. Як модальне дієслово **to have** у поєднанні з інфінітивом вживається для вираження необхідності виконати дію в

силу певних обставин. Після дієслова **to have** інфінітив вживається з часткою **to:**

*She had to wait for an hour.* Вона мусила чекати цілу годину.

*I shall have to pay him.* Мені доведеться заплатити йому.

Для вираження необхідності в минулому часі вживається також дієслово **to be.** Воно може вживатися замість дієслова **must** і в теперішньому часі. Дієслово **to be** вживається для вираження необхідності виконати дію згідно з попередньою домовленістю або завчасно складеним планом. Після дієслова **to be** інфінітив вживається з часткою **to:**

*We were to come at 5 o'clock.* Ми мали прийти о п'ятій.

**МОДАЛЬНІ ДІЄСЛОВА SHOULD, OUGHT**

Дієслова **should, ought** майже не відрізняються за значенням. Вони виражають моральний обов'язок, пораду, рекомендацію, бажаність дії, що відноситься до теперішнього і майбутнього часу. Українською мовою вони перекладаються *слід було б, потрібно, повинен, мусиш*. **Should** вживається з інфінітивом без частки **to.** Після **ought** інфінітив вживається з часткою **to:**

*You should visit her.* Вам слід відвідати її.

*He should go in for sport.* Йому слід займатися спортом.

*You ought to do it at once.* Вам слід (варто було б, ви повинні) зробити це зараз.

*His brother has measles. He ought to be isolated.* У його брата кір. Його слід ізолювати.

Дієслово **ought** в поєднанні з ***Perfect Infinitive*** вживається по відношенню до минулого часу і вказує на те, що дія не була виконана:

*You ought to have done it at once.* Вам слід було б зробити це відразу ж (але ви не зробили).

**МОДАЛЬНЕ ДІЄСЛОВО NEED**

Дієслово **need** в якості модального дієслова в поєднанні з ***Indefinite Infinitive*** виражає необхідність здійснення дії стосовно теперішнього і майбутнього часу. **Need** вживається в питальних і заперечних реченнях, а також

у стверджувальних реченнях, що містять такі прислівники з заперечним значенням, як *hardly, scarcely* та ін:

*Need you go there so soon?* Чи потрібно вам (чи повинні ви) їхати туди так скоро?

*You need hardly remind me of it.* Вам навряд чи треба нагадувати мені про це.

*I need not tell you how important that is.* Мені не потрібно говорити вам, як це важливо.

Дієслово **needn't** в поєднанні з ***Perfect Infinitive*** вживається по відношенню до минулого часу і означає, що у виконанні дії не було необхідності:

*You needn't have done it.* – Вам не треба було цього робити.

**Примітка.** Дієслово **need** як самостійне дієслово означає *мати потребу*. У цьому значенні **need** має звичайні дієслівні форми:

*Here is the book you needed so much.* Ось книга, яка була вам так необхідна.

# ГРАМАТИКА В ТАБЛИЦЯХ ТА СХЕМАХ
# СТРУКТУРА РЕЧЕННЯ

## *1. Розповідне речення*

a) He is a student.
b) It was a very interesting film.
c) There are address books on the shelf.
d) The secretary leaves a detailed report on his desk every day.

**1.1**

**<u>Підмет</u> + <u>присудок</u> + додаток + обставина (способу дії, місця, часу).**

**1.2**

| **Підмет** | **присудок** | **додаток** | | | **обставина** (часу) |
|---|---|---|---|---|---|
| | | непрямий | прямий | | |
| | | | означення | | |
| She | gave | me | a beautiful | flower | in the morning. |

## *2. Заперечне речення*

**2.1**

**<u>Підмет</u> + (<u>присудок + not</u>) + інші члени речення.**

a) He isn't a student.
b) It wasn't a very interesting film.
c) There aren't address books on the shelf.

**2.2**

**<u>Підмет</u> +((<u>допом. дієслово + not</u>)+ <u>смислове дієслово</u>)+ ін. члени речення.**

d) <u>The secretary</u> <u>doesn't leave</u> a detailed report on his desk every day.

## *3. Питальне речення*

### *3.1 Загальне питання*

*3.1.1*

**<u>Присудок</u> + <u>підмет</u> + інші члени речення ?**

a) Is he a student?
b) Was it a very interesting film?
c) Are there address books on the shelf?

*3.1.2*

**<u>Допоміжне дієслово</u> + <u>підмет</u> + <u>смислове дієслово</u> + інші члени речення ?**

d) <u>Does</u> <u>the secretary</u> <u>leave</u> a detailed report on his desk every day?

### *3.2 Спеціальне питання*

*3.2.1 До підмета*

**Питальний займенник (замість підмета) + <u>присудок</u> + інші члени речення ?**

a) Who is a student?
d) Who leaves a detailed report on his desk every day?

*3.2.2 До інших членів речення*

**Питальний займенник + <u>допом. дієслово</u> + <u>підмет</u> + <u>смислове дієслово</u> + …?**

c) What are there on the shelf?
d) What <u>does</u> <u>the secretary</u> <u>leave</u> on his desk every day?
d) Where <u>does</u> <u>the secretary</u> <u>leave</u> a detailed report every day?

## СИСТЕМА ЧАСІВ

| Час | Indefinite / Simple *(факти, повторювані дії, характеристика)* | Допоміжне дієслово | Continuous *(дії, що відбуваються у певний момент чи період)* **be + V-ing** | Perfect *(дії, що передують певному моменту чи дії)* **have + Participle II** |
|---|---|---|---|---|
| **esent** | I ask<br>We, you, they ask<br>He, she, it asks | do<br>do<br>does | I am<br>We, you, they are asking<br>He, she, it is | I have<br>We, you, they have asked<br>He, she, it has |
| **Past** | I<br>He, she, it asked<br>We, you, | did | I was<br>He, she, it was asking<br>We, you, they were | I<br>He, she, it had asked<br>We, you, they |
| **Future** | I shall / will<br>We shall / will ask<br>He, she, it will | | I shall<br>We, you, they shall be<br>He, she, it will asking | I shall<br>we,you,they shall have asked<br>He, she, it will |

## АРТИКЛЬ
## THE ARTICLE

| **The Indefinite Article**<br>**A, an** | **The Definite Article**<br>**The** |
|---|---|
| a table<br>an apple | the [ðə] table<br>the [ði] apple |
| Один | Один, кілька, багато |
| 1. Якийсь, будь-який. | 1. Цей. Саме цей! |
| 2. Згаданий вперше. | 2. Згаданий повторно. |
| 3. Один з ряду однотипних. | 3. Єдиний у своєму роді. |
| 4. Одиничний представник чи екземпляр роду | 4. Весь рід у цілому через назву одного представника |
| | 5. Людина чи предмет, який у даній фразі супроводжує будь-яке означення, що виділяє його з ряду однотипних. |

| | |
|---|---|
| *1. Here is a letter for you.* | *1. This is the letter you are expecting.* |
| *2. Suddenly I saw a strange man.* | *2. The man was looking around.* |
| *3. Cristopher Wren was a great English architect.* | *3. Taras Shevchenko was in his time the most distinguished poet in Ukraine.* |
| *4. I took a taxi.* | *4. The taxi is a car with a taxi-meter.* |

**Неозначений артикль *a, an* вживається:**

1. Перед іменниками, що не конкретизуються ні контекстом ні ситуацією.
   *I've got a son and a daughter.*
2. Перед злічуваними іменниками у значенні "один".
   *Wait a minute!*

*How many times a months do you go to the theatre?*
*half an apple, half an hour etc.*

3. Перед назвами професій, національностей, партійності.
*Mr.Smith, an engineer at our factory, made an invention.*

4. Перед злічуваними іменниками в однині після ***what*** в окличному реченні та перед ***such, quite, rather, most*** (в значенні "дуже").
*What a wonderful day!*
*He is quite a young man.*
*It is a most interesting book.*

5. Перед абстрактними іменниками при наявності означення.
*They lived a quiet life.*

**Означений артикль *the* вживається:**

1. До 3 пункту таблиці – перед іменниками єдиними у своєму роді, а також за даних обставин:

| | | | |
|---|---|---|---|
| *the sun* | *the capital* | *the head* | *the ceiling* |
| *the sky* | *the government* | *the brain* | *the floor* |
| *the moon* | *the population* | *the heart* | *the walls* |

2. До 5 пункту таблиці – при наявності обмежувального/уточнюючого означення, яким може виступати

a) прикметник у найвищому ступені
*July is the warmest month in the year.*

b) порядковий числівник
*We have seats in the second row.*

c) прийменникова група
*The walls of my room are light green.*

d) дієприкметниковий зворот
*The boy running across the street is my brother.*

e) означальне підрядне речення
*The armchair I am sitting in is very comfortable.*

3. Перед іменниками, що означають речовину у певній кількості чи за певних обставин
*Pass me the salt, please.*
*The snow is dirty.*

4. З деякими власними назвами:

1) позначаючи всю родину
*I haven't seen the Browns since last month.*

2) перед назвами держав, що включають загальну назву з одним чи кількома означеннями
*The United States of America, the United Kingdom of Great Britain and Northern Ireland*
Викл.: *the Netherlands, the Cameroon, the Senegal, the Hague*

3) перед деякими географічними назвами

- Океанів, морів, рік, озер, водоймищ, проливів, заливів, водоспадів
*The Black Sea, the Gulf of Mexico, the English Channel, the Thames, the Ontario*

***But:*** *Lake Ontario*

- Груп островів
  *The British Isles, the Canaries, the Philippines*
  ***But:*** *Cuba, Sicily, Cyprus*
- Гірських масивів
  *The Urals, the Rocky Mountains, the Alps*
  ***But:*** *Everest, Mont Blanc, Vesuvius*
- Пустель

*The Sahara, the Gobi, the Kara-Kum*

4) перед назвами театрів, музеїв, картинних галерей, концертних залів, кінотеатрів, клубів, готелів

*The Opera House, the British Museum, the Louvre, the Albert Hall, the Empire, the Rotary Club, the Hilton*

5) перед назвами державних установ, організацій, політичних партій

*The National Trust, the London City Council, the Liberal Party*

**Викл.:** *Parliament (in GB), Congress (in the USA), NATO*

6) перед назвами кораблів, газет, журналів

*The Titanic, the Times, the Lancet*

7) перед назвами граматичних категорій

*The Past Simple, the Passive Voice, the Conditional Mood*

## СТУПЕНІ ПОРІВНЯННЯ ПРИСЛІВНИКІВ ТА ПРИКМЕТНИКІВ
## DEGREES OF COMPARISON OF ADVERBS AND ADJECTIVES

*The positive degree – the comparative degree – the superlative degree*

| **Synthetic forms** | **Analytical forms** |
|---|---|
| **1.** dark – dark**er** – dark**est**<br>hot – hot**t**er – hot**t**est<br>**2.** clever – clever**er** – clever**est**<br>simple – simpl**er** – simpl**est**<br>narrow – narrow**er** – narrow**est**<br>heav**y** – heav**i**er – hea**v**iest<br>**3.** po`lite – po`lit**er** – po`lit**est**<br>**4.** good – better – best<br>well<br>bad – worse – worst<br>badly<br>old – older – oldest<br>elder – eldest<br>far – farther – farthest<br>further – furthest<br>little – less – least<br>many – more – most<br>much | **1.** `famous – **more/less** `famous – **most/least** `famous<br>**2.** quietly – **more/less** quietly – **most/least** quietly<br>But: early – earl**i**er – earl**i**est<br>**3.** difficult – **more/less** difficult – **most/least** difficult |

# МНОЖИНА ІМЕННИКІВ
# THE PLURAL OF NOUNS

| |
|---|
| 1. a book + **-s** – book**s**<br>a table + **-s** – table**s** |
| 2. a book + **-s** – book**s**<br>a table + **-s** – table**s** |
| 3. a cla**ss** + **-es** – cla**ss**es<br>a bo**x** + **-es** – bo**x**es<br>a di**sh** + **-es** – di**sh**es<br>a mat**ch** + **-es** – mat**ch**es |
| 4. a fami**ly** + **-es** – fami**lies**<br>a d**ay** + **-s** – da**ys** |
| 5. a tomat**o** + **-es** – tomat**o**es<br>But: photo**s**, piano**s**, kilo**s**, kimono**s**, solo**s**, soprano**s**, dinamo**s** |
| 6. a wi**fe** + **-s** – wi**ve**s<br>a shel**f** + **-es** – shel**v**es<br>But: chie**fs**, handkerchie**fs**, roo**fs**, proo**fs**, sa**fes** |
| 7. a m**a**n – m**e**n<br>a wom**a**n – wom**e**n<br>a f**oo**t – f**ee**t<br>a t**oo**th – t**ee**th<br>a g**oo**se – g**ee**se<br>a m**ous**e – m**ic**e<br>a l**ous**e – l**ic**e<br>a child – childr**en**<br>an ox – ox**en**<br>a person – people |
| 8. a dat**um** – dat**a**<br>a phenomen**on** – phenomen**a**<br>a bas**is** – bas**es**<br>a nucle**us** – nucle**i**<br>a formul**a** – formul**ae** |
| 9. a boy-friend – boy-friend**s**<br>a m**a**n-of-war – m**e**n-of-war<br>a son-in-law – son**s**-in-law<br>a passer-by – passer**s**-by<br>a forget-me-not – forget-me-not**s** |
| sheep, deer, fish, swine, fruit, hair |
| news, wages, contents; billiards, dominoes, darts etc. |
| pants, pyjamas, trousers, glasses, spectacles, scissors etc. |
| clothes, goods, stairs, savings, arms, surroundings etc. |

# ЧИСЛІВНИК
# NUMERALS

**Cardinal numerals (кількісні числівники)**

- *Simple (прості)* 1-12; 100; 1,000; 1,000,000
- *Derived (похідні)*

1) 13-19 – -teen
Roots changed: three – `thir`teen; five – `fif`teen
2) tens – -ty
Roots changed: two – `twenty; three – `thirty; four – `forty; five – `fifty

- *Composite (складені)*

235 – two hundred **and** thirty-five
4,007 – four thousand **and** seven
1,694 – **a** (one) thousand six hundred **and** ninety-four
7,581,462 – seven million five hundred **and** eighty-one thousand four hundred **and** sixty-two

**Years**

1800 – eighteen hundred
1675 – sixteen seventy-five
1905 – nineteen hundred and five (nineteen five)

**Telephone numbers**

8 0512 39 77 46 – eight, O [ou]/zero five one two, three nine, double seven, four six

**Other cases**

| | | |
|---|---|---|
| Page twenty | Part two | Act one |
| Chapter five | Room three | Size forty-two |

**Ordinal numerals (порядкові числівники) – th**

- *Simple*
  - first, second, third
  - – th

Roots changed: five – fif**th**, twelve – twelf**th**, nine – nin**th**

- *Derived*

Sixty – sixt**ie**th

- *Composite*

Three hundred and sixty-**fourth**

**Dates**

17/9/1995 – the seventeenth of September nineteen ninety-five / September the seventeenth nineteen ninety-five

**Fractions (прості дробі)**

*Numerator* – cardinal
*Denominator* – ordinal

| | | |
|---|---|---|
| 1/7 – one seventh<br>3/7 – tree seventh**s** | **½** – a half (one half)<br>**¼ –** a quarter (one quarter) | 1 ¾ – one and three quarter**s**<br>3 4/5 – three and four fifth**s** |

**Decimals (десяткові дробі)**

35.204 – three five point two nought four
0.71 – (nought) point seven one

| **0** | | | |
|---|---|---|---|
| [ou] – telephone numbers<br>– years<br>– account numbers | nought [no:t](Br.) / zero [`zierou] – decimals | [nil] – football | [lʌv] – tennis |

## СПОСОБИ ВИРАЖЕННЯ МАЙБУТНЬОЇ ДІЇ
## FUTURE FORMS

***will***

1. The most common use of *will* is an auxiliary verb to show future time. It expresses a future fact or prediction.

*Tomorrow **will be** warm and sunny.*
*What time **will** she **be** back?*
*I'm sure you'**ll pass** your exam.*

2. *Will (‘ll)* expresses an intention or decision made at the moment of speaking.

*I**’ll give** you my phone number. Ring me tonight.*
*I'**ll** phone back later.*

***going to***

1. *Going to* expresses future plans, intention or decision made *before* the moment of speaking.

*We'**re going to have** a holiday in Sicily this summer.*
*My daughter'**s going to study** modern languages at Bristol University.*

2. We use *going to w*hen we can see that something is certain to happen.

*Look at those clouds. It'**s going to rain.***
*She **is going to have** a baby.*

***Present Continuous***

The Present Continuous can be used to express a future arrangement between people. It is common with verbs such as *go, come, see, visit, meet, have* (a party), *leave.* It usually refers to the near future.

*Pat and Peter **are coming** for dinner tonight.*
*I **am seeing** the doctor in the morning.*

Sometimes there is little or no difference between a future intention *(going to)* and a future arrangement *(Present Continuous)*.

*We'**re going to see** a play tonight.*
*We'**re seeing** a play tonight.*

***Present Simple***

1. Present Simple expresses a future event as a part of fixed timetable or programme.

*The last train **leaves** at 11.30*
*He **flies** to London next Sunday.*

2. We use Present Simple for future in adverbial clauses of time and condition.

*I’ll buy that novel when it **comes out**.*
*If it **rains** tomorrow, we shan’t go to the forest.*

# GLOSSARY

## Glossary of computer software terms

*From Wikipedia, the free encyclopedia*

*Application code*

executable program code running a user application, distinct from library code or underlying operating system code

*BASIC*

Beginner's All-purpose Symbolic Instruction Code - a family of general-purpose, high-level programming languages whose design philosophy emphasizes ease of use.

*Virus*

a computer program that can replicate itself and spread from one computer to another. The term "virus" is also commonly, but erroneously, used to refer to other types of malware, including adware and spyware programs that do not have a reproductive ability.

*memory access pattern*

the pattern with which a piece of software reads and writes memory, with implications for performance and security.

*library code*

software components re-usable between multiple applications

*operating system code*

software implementing an operating system

*kernel service*

Routines that provide the runtime kernel environment to programs executing in kernel mode. Kernel extensions call kernel services, which resemble library codes. In contrast, application programs call library routines

## Glossary of computer hardware terms

**A**

*accelerator*

a microprocessor, ASIC or expansion card designed to offload a specific task from the CPU, often containing fixed function hardware; a common example is a Graphics processing unit.

*accumulator*

a register in a CPU in which intermediate arithmetic and logic results are stored.

*address*

the unique integer number that specifies a memory location in an address space

*address space*

a mapping of logical addresses into physical memory or other memory mapped devices.

*AI accelerator*

an accelerator aimed running artificial neural networks or other machine learning and machine vision algorithms (either training or deployment), e.g. Movidius Myriad 2, TrueNorth, Tensor processing unit etc.

*ATX*

Advanced Technology extended - a motherboard form factor specification developed by Intel in 1995 to improve on previous DE factor standards like the AT form factor.

*AT*

The dimensions and layout (form factor) of the motherboard for the IBM AT.

*AGP*

Accelerated Graphics Port - a high-speed point-to-point channel for attaching a video card to a computer's motherboard, primarily to assist in the acceleration of 3D computer graphics.

**B**

*bus*

a subsystem that transfers data between computer components inside a computer or between computers.

*Blu-ray Disc*

a optical disc storage medium designed to supersede the DVD format.

**C**

*cache*

A small, fast local memory that transparently buffers access to a larger but slower or more distant/higher latency memory or storage device, organised into cache lines. Automatically translates accesses to the underlying resources address space to locations in the cache.

*cache line*

A small block of memory within a cache; the granularity of allocation,refills,eviction; typically 32-128 bytes in size.

*cache coherency*

The process of keeping data in multiple caches synchronised in a multi-processor shared memory system, also required when DMA modifies the underlying memory.

*cache eviction*

freeing up data from within a cache to make room for new cache entries to be allocated; controlled by a cache replacement policy. Caused by a cache miss whilst a cache is already full.

*cache hit*

finding data in a local cache, preventing the need to search for that resource in a more distant location (or to repeat a calculation).

*cache miss*

Not finding data in a local cache, requiring use of the cache policy to allocate and fill this data, and possibly performing evicting other data to make room.

*cache thrashing*

A pathological situation where access in a cache cause cyclical cache misses by evicting data that is needed in the near future.

*cache ways*

The number of potential cache lines in an associative cache that a specific physical addresses can be mapped to; higher values reduce potential collisions in allocation.

*CD-R*

Compact Disc-Recordable; a variation of the optical compact disc which may be written to once.

*COMA*

Cache-only memory architecture, a multiprocessor memory architecture where an address space is dynamically shifted between processor nodes based on demand.

*Compact Disc-ReWritable*

a variation of the optical compact disc which may be written to many times.

*CD-ROM*

(Compact Disc Read-Only Memory) - a pre-pressed optical compact disc which contains data or music playback.

*chip*

(or integrated circuit) - a miniaturised electronic circuit that has been manufactured in the surface of a thin substrate of semiconductor material.

*control store*

the memory that stores the microcode of a CPU.

*core*

the portion of a CPU which actually performs arithemetic and logical operations. A CPU may have multiple cores (e.g. "a quad-core processor").

*core memory*

in modern usage, a synonym for main memory, dating back from the pre-semiconductor-chip times when the dominant main memory technology was magnetic core memory.

*CPU*

Central processing unit - the portion of a computer system that executes the instructions of a computer program.

*Conventional PCI*

Conventional Peripheral Component Interconnect - a computer bus for attaching hardware devices in a computer.

*Computer case*

Computer chassis, cabinet, box, tower, enclosure, housing, system unit or simply case - the enclosure that contains most of the components of a computer (usually excluding the display, keyboard and mouse).

*Computer form factor*

The name used to denote the dimensions, power supply type, location of mounting holes, number of ports on the back panel, etc.

*Chipset*

(or chip set) - a group of integrated circuits, or chips, that are designed to work together. They are usually marketed as a single product.

*Channel I/O*

a generic term that refers to a high-performance input/output (I/O) architecture that is implemented in various forms on a number of computer architectures, especially on mainframe computers..

**D**

*data cache*

*D-cache*

a cache in a CPU or GPU servicing data load and store requests, mirroring main memory (or VRAM for a GPU).

*Device memory*

local memory associated with a hardware device such as an graphics processing unit or OpenCL compute device, distinct from main memory.

*DASD*

(Direct Access Storage Device) A mainframe terminology introduced by IBM denoting secondary storage with random access, typically (arrays of) hard disk drives.

*DIMM*

(dual in-line memory module);A series of dynamic random-access memory integrated circuits. These modules are mounted on a printed circuit board and designed for use in personal computers, workstations and servers.

*DisplayPort*

DisplayPort is a digital display interface developed by the Video Electronics Standards Association (VESA). The interface is primarily used to connect a video source to a display device such as a computer monitor, though it can also be used to transmit audio, USB, and other forms of data.

*Direct mapped cache*

a cache where each physical address may only be mapped to one cache line, indexed using the low bits of the address. Simple but highly prone to allocation conflicts.

*DMA*

Direct memory access - the ability of a hardware device such as a disk drive or network interface to access main memory without intervention from the CPU, provided by one or more DMA channels in a system.

*DVD*

(Digital Video Disc or Digital Versatile Disc) - an optical compact disc - of the same dimensions as compact discs (CDs), but store more than six times as much data.

*DVI*

Digital Visual Interface (DVI) is a video display interface developed by the Digital Display Working Group (DDWG). The digital interface is used to connect a video source to a display device, such as a computer monitor.

*DRAM*

(Dynamic random-access memory) - a type of random-access memory that stores each bit of data in a separate capacitor within an integrated circuit and which must be periodically refreshed to retain the stored data.

*dual issue*

refers to a superscalar pipeline capable of executing 2 instructions simultaneously.

**F**

*Firewall*

A hardware device or software to protect a computer from viruses, malware, trojans etc.

*firmware*

fixed programs and data that internally control various electronic devices.

*floppy disk*

a data storage medium that is composed of a disk of thin, flexible ("floppy") magnetic storage medium encased in a square or rectangular plastic shell.

*floppy disk drive*

a device for reading floppy disks.

*Flash Memory*

a type of non volatile computer storage chip that can be electrically erased and reprogrammed.

**H**

*hard drive*

a non-volatile storage device that stores data on rapidly rotating rigid (i.e. hard) platters with magnetic surfaces.

*hardware*

the physical components of a computer.

*HDMI*

(High-Definition Multimedia Interface) - a compact interface for transferring encrypted uncompressed digital audio and video data to a device such as a computer monitor, video projector or digital television.

*Harvard architecture*

a memory architecture where program machine code and data are held in separate memories, more commonly seen in microcontrollers and digital signal processors.

**I**

*input device*

any peripheral equipment used to provide data and control signals to an information processing system.

*input/output*

the communication between an information processing system (such as a computer), and the outside world.

*IOPS*

(Input/Output Operations Per Second, pronounced eye-ops) - a common performance measurement used to benchmark computer storage devices like hard disk drives.

*instruction*

a group of several bits in a computer program that contains an operation code and usually one or more memory addresses.

*instruction cache*

*I-cache*

a cache in a CPU or GPU servicing instruction fetch requests for program code (or shaders for a GPU), possibly implementing modified Harvard architecture if program machine code is stored in the same address space and physical memory as data.

*Instruction fetch*

A stage in a pipeline that load the next instruction referred to by the program counter.

**K**

*keyboard*

an input device, partially modeled after the typewriter keyboard, which uses an arrangement of buttons or keys, to act as mechanical levers or electronic switches.

**L**

*Load/store instructions*

instructions used to transfer data between memory and processor registers.

*Load-store architecture*

An instruction set architecture where arithmetic/logic instructions may only be performed between processor registers, relying on separate load/store instructions for all data transfers.

*Local memory*

memory associated closely with a processing element, e.g. a cache, scratchpad, the memory connected to one processor node in a NUMA or COMA system, or device memory (such as VRAM) in an accelerator.

**M**

*mainframe*

powerful computer used mainly by large organizations for bulk data processing such as census, industry and consumer statistics, enterprise resource planning, and financial transaction processing.

*main memory*

the largest random access memory in a memory hierarchy (before offline storage) in a computer system; i.e. distinct from caches or scratchpads; usually consists of DRAM.

*memory address*

the address of a location in a memory or other address space.

*memory architecture*

*Computer memory architecture*

a memory architecture in a computer system, e.g. NUMA, uniform memory access, COMA, etc.

*memory access pattern*

The pattern with which software or some other system (a accelerator , or DMA channel) accesses memory, affecting locality of reference and parallelism.

*Modified Harvard architecture*

a variation of Harvard architecture used for most CPUs with separate non-coherent instruction and data caches (assuming that code is immutable), but still mirroring the same main memory address space, and possibly sharing higher levels of the same cache hierarchy

*motherboard*

the central printed circuit board (PCB) in many modern computers which holds many of the crucial components of the system, while providing connectors for other peripherals.

*memory*

devices that are used to store data or programs on a temporary or permanent basis for use in an electronic digital computer.

*monitor*

an electronic visual display for computers.

*mouse*

a pointing device that functions by detecting two-dimensional motion relative to its supporting surface; motion is usually mapped to a cursor in screen space; typically used to control a graphical user interface on a desktop computer or for CAD etc.

*Mini-VGA*

small connectors used on some laptops and other systems in place of the standard VGA connector.

*Microcode*

a layer of hardware-level instructions involved in the implementation of higher level machine code instructions in many computers and other processors.

*Mask ROM*

a type of read-only memory (ROM) whose contents are programmed by the integrated circuit manufacturer.

**N**

*network*

a collection of computers and other devices connected by communications channels, e.g. by ethernet or wireless networking

*NUMA*

Non-uniform memory access

*network on a chip*

*NOC*

a computer network on a single semiconductor chip, connecting processing elements, fixed function units or even memories and caches. Increasingly common in System on a chip designs.

*Non-volatile memory*

memory that can retain the stored data even when not powered.

*Non-volatile random-access memory*

random-access memory that retains its data when power is turned off.

**O**

*optical disc drive*

a disk drive that uses laser light or electromagnetic waves near the light spectrum as part of the process of reading or writing data to or from optical discs.

*Operating system*

the set of software that manages computer hardware resources and provide common services for computer programs, typically loaded by the BIOS on booting.

*Operation code*

Several bits in a computer program instruction that specify which operation to perform.

**P**

*pen drive*

another name for a USB flash drive.

*peripheral*

a device attached to a computer but not part of it.

*personal computer*

Any general-purpose computer whose size, capabilities, and original sales price make it useful for individuals, and which is intended to be operated directly by an end user, with no intervening computer operator.

*prefetching*

The pre-loading of instructions or data before needed either by dedicated cache control instructions or predictive hardware, to mitgate latency.

*printer*

A peripheral which produces a text or graphics of documents stored in electronic form, usually on physical print media such as paper or transparencies.

*Process node*

refers to a level of semiconductor manufacturing technology, one of several successive transistor shrinks.

*Processor node*

a processor in a multiprocessor system or cluster, connected by dedicated communication channels or a network.

*Processing element*

an electronic circuit (either a microprocessor or an internal component of one) that may function autonomously or under external control, performing arithmetic and logic operations on data, possibly containing local memory, and possibly connected to other processing elements via a network, network on a chip, or cache hierarchy.

*Prefetch (cache)*

*Prefetch*

the process of pre-loading instructions or data into a cache ahead of time, either under manual control via prefetch instructions or automatically by a prefetch unit which may use runtime heuristics to predict the future memory access pattern.

*PSU*

Power supply unit - A unit of the computer that converts mains AC to low-voltage regulated DC for the power of all the computer components.

*PROM*

Programmable Read-Only Memory - a type of non-volatile memory chip that may be programmed after the device is constructed.

*PCIe*

Peripheral Component Interconnect Express - a computer expansion bus standard designed to replace the older PCI, PCI-X, and AGP bus standards.

*PCI-X*

PCI-eXtended - a computer bus and expansion card standard that enhances the 32-bit PCI Local Bus for higher bandwidth demanded by servers.

**R**

*RAID*

(Redundant Array of Independent Disks) - data storage schemes that can divide and replicate data across multiple hard disk drives in order to increase reliability, allow faster access, or both.

*RAM*

Random-access memory - any form of computer data storage that allow stored data to be accessed in any order (i.e., at random).

*ROM*

Read Only Memory - a type of memory chip that retains its data when its power supply is switched off.

**S**

*server*

a computer which may be used to provide services to clients.

*software*

computer programs and other kinds of information read and written by computers.

*SIMM*

Single in-line memory module - a type of memory module containing random access memory used in computers from the early 1980s to the late 1990s.

*Solid-state drive*

(or solid-state disk or electronic disk) a data storage device that uses integrated circuit assemblies as memory to store data persistently.

*SRAM*

Static random-access memory - a type of semiconductor memory that uses bistable latching circuitry to store each bit. The term static differentiates it from DRAM which must be periodically refreshed.

*storage device*

*SDRAM*

Synchronous dynamic random access memory - dynamic random access memory that is synchronized with the system bus.

**T**

*tape drive*

A peripheral storage device that allows only sequential access, typically using magnetic tape.

*terminal*

An electronic or electromechanical hardware device that is used for entering data into, and displaying data from, a computer or a computing system.

*trackpad*

Also known as a touchpad; a pointing device consisting of specialized surface that can translate the motion and position of a user's fingers or a stylus to a relative position on a screen.

**U**

*uop cache*

a cache of decoded micro-operations in a CISC processor (e.g x86). [1]

*USB*

Universal Serial Bus - a specification to establish communication between devices and a host controller (usually a personal computers).

*USB flash drive*

A flash memory device integrated with a USB interface. USB flash drives are typically removable and rewritable.

**V**

*VGA*

Video Graphics Array - the last graphical standard introduced by IBM to which the majority of PC clone manufacturers conformed.

*Volatile memory*

memory that requires power to maintain the stored information.

**W**

*Webcam*

A video camera that feeds its images in real time to a computer or computer network, often via USB, Ethernet, or Wi-Fi.

*Write back cache*

A cache where store operations are buffered in cache lines, only reaching main memory when the entire cache line is evicted

*Write through cache*

A cache where store operations are immediately written to the underlying main memory.

*Working set*

The set of data used by a processor during a certain time interval, which should ideally fit into a CPU cache for optimum performance.

**Glossary of Internet-related terms**

*ADSL*

Asymmetric Digital Subscriber Line is a technology for transmitting digital information at a high bandwidth on existing phone lines to homes and businesses. ADSL is asymmetric in the sense that it uses most of the channel to transmit

downstream to the user and only a small part to receive information from the user. This means, high download rates and slower upload rates. Generally if you see 2Mb ADSL broadband, it refers to 2 Mbit/s Max d/load rate. The upload rate will probably be around 256 kbit/s Max. (ADSL has a maximum download rate of 8 Mbit/s, ADSL2 is capable of up to 16 Mbit/s and ADSL2+ is rated at 24 Mbit/s maximum.)

*blogging*

writing on or otherwise using online journals known as web logs or blogs

*cable modem*

Primary competitor to ADSL, uses digital information transmitted over a cable television infrastructure.

*CSS*

Cascading Style Sheets; while HTML dictates the content of page, CSS regulates the format, including headers, footers, navigation bars, etc. While all of these elements can be created in HTML, such a method would have to be repeated on every web page. CSS on the other hand, is applied to all pages of a website.

*cyberbully*

A bully who harasses his or her victims online through various means such as spamming, defaming or negative impersonation of the victim.

*dial-up*

A method of connection to the internet using existing copper phone lines using a modem on the client's end to send information at a slow speed, normally reaching maximum speed at about 56 kbit/s. This technology uses the voice spectrum of the telephone lines to transmit data using a system of sounds that only the receiving modem or ISP understand.

*egosurfer*

someone who searches the Internet for references of themselves

*fail*

The opposite of "win", "fail" expresses an ability to incorrectly perform acts ranging from idiotically simple to impossibly difficult, often consisting of an amusing element.

*flamer*

A flamer is someone who makes degrading or insulting remarks on a forum or other Internet message board, the verb of which is "flame".

*friending*

the act of making and adding friends online through social networking sites such as Facebook and MySpace

*FTP*

Protocol to exchange files between two computers.

*the Game*

A popular mind game, often referred to on public message boards as a way to irritate other users.

*Googling*

searching through the Google search engine

*griefer*

A player of an online game who harasses other players.

*HTML*

HyperText Markup Language, the coding language used to create hypertext documents for the World Wide Web. In HTML, a block of text can be surrounded with tags that indicate how it should appear (for example, in bold face or italics). Also, in HTML a word, a block of text, or an image can be linked to another file on the Web. HTML files are viewed with a World Wide Web browser.

*ID-10-T*

clueless user; everybody giving a hard time to (computer) administrators

*leet*

Leet, or "1337", (from *elite*) is someone who is unnaturally adept at a certain trait or ability. Originally used as a slightly *infra dig* expression in the hacker community. Later usage centered around video games players.

*me too*

Used as a response on a threaded discussion when the new poster wanted the same information as the previous poster.

*mouse potato*

someone who spends a lot of time at the computer, in analogy to a couch potato who spends a lot of time watching TV. Also known as a "Comp Head" in relation to a crack cocaine addict, or "coke head".

N–Z

*noob*

A new or unexperienced person, someone who does not know the rules of a website, or has only recently joined. A wordplay on newbie.

*phishing*

The act of attempting to obtain private or sensitive information such as user names, passwords and credit card information through the use of fake emails from trustworthy sites.

*PHP*

PHP Hypertext Preprocessor, the coding language to create interactive web pages and so forth.

*POP3*

Protocol to retrieve email.

*Redditor*

A person who scours the Internet for media and posts the findings on the Reddit website. Once posted, other members can upvote or downvote the material based on their evaluation of it.

*SMTP*

Protocol to send email.

*spamming*

the act of sending unsolicited email or posting many useless messages in a forum website. (Possibly derived from a Monty Python sketch, in which Vikings repetitively sing about SPAM, annoying the other customers.)

*trashers*

someone who searches for information via whatever means needed which would compromise the security of a site. This activity often includes searching trash or refuse disposed in recycle bins from the facility.

*troll*

someone who attempts to gain infamy in chat or on forums by use of but not limited to links to disturbing items, bashing (fighting, put down) with others, copying or mimicking other's real posts into perverted messages.

*tweet*

a small message sent by a user of the website Twitter.

*unfriend*

The act of removing someone from a list of friends on social networking profiles of Facebook, MySpace or Bebo. It is also the Oxford dictionary's 2009 Word of the Year.

*win*

Similar to "leet", "win" expresses an ability to perform an otherwise impossible act through pure luck or practice, or an object or statement that constitutes an amusing or amazing element.

*YouTuber*

a person who produces video content for the video-sharing site YouTube.

## ЛІТЕРАТУРА ТА ІНФОРМАЦІЙНІ РЕСУРСИ


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