MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
State Institution "South-Ukrainian National Pedagogical University
named after K. D. Ushynsky"

A. A. Yumrukuz

English for maths teachers

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А.А. Юмрукуз
Англійська мова для вчителів математики. Одеса: Магістр, 2020. – 201с.

Запропонований навчальний посібник містить матеріал до дисципліни «Іноземна мова за професійним спрямуванням» для студентів І року навчання фізико-математичного факультету. Навчальний матеріал викладено у формі чотирьох розділів. Вправи, що передбачені посібником, спрямовані на подальший розвиток усіх видів мовленнєвої діяльності – письма, читання, говоріння та аудіювання.

До посібника додається аудіозапис текстів, начитаних носіями англійської мови.

CONTENTS

PREFACE

Modern educational system adjusting to European standards and integrating to the Bologna process sets new challenges for a university teacher. Its key focus is on training a specialist capable of divergent solutions of practical tasks which requires development of general, professional and subject competences. Foreign language competence has occupied its own important role in the framework of other professional competences in light of globalization tendencies. Thus, the goal of this manual is to provide learners with adapted and well-structured material to form skills of four types of speech activity – reading, listening, speaking and writing in the professional field of mathematics.

The book consists of four Units, Final Module Test, tasks for summarizing a newspaper article, project work section, Vocabulary list, useful phrases for discussion and supplementary texts for reading. Each Unit includes the sections: Warm-Up, Vocabulary Practice, Reading Practice, Listening Practice, Speaking Practice, Writing Practice and Work with Phraseological Units.

The Warm-Up section is constructed to emerge students into English-speaking environment.

The purpose of Vocabulary Practice section is to present the key vocabulary of the unit and to work it through in exerices.

Reading, Listening, Speaking and Writing practice sections aim to develop students' relevant skills in these types of speech activity.

The Work with Phrasal Verbs section provides students with the list of phraseological units and tasks to well understand their contextual meaning.

The Vocabulary List Section contains grouped active topical vocabulary units.

On completing the Module, the students are expected:

✓ to master the topical vocabulary (223 vocabulary items);

    to be able:

✓ to convey correctly (logically and grammatically) their thoughts in both oral and written forms;

✓ to understand the general idea and the specific information of audio- and videofragments;

✓ to read and comprehend authentic English texts in mathematics;

✓ to use relevant phraseological units in appropriate context;

✓ to understand sociolinguistic and sociocultural peculiarities of the native speakers' language use and react appropriately;

✓ to carry out self-guided project and research activity in the field of mathematics.
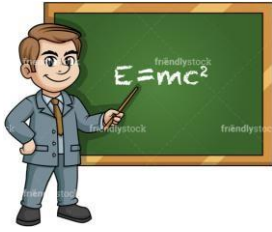
Unit 1. Pedagogical Education in Ukraine: Training Future Teachers of Mathematics

Warm-Up

1. Arrange the following reasons why you decided to be a teacher of mathematics in order from the most important (10) to the least important (1) for you.

- ✓ money
- ✓ love for teaching
- ✓ long summer vacations
- ✓ satisfaction
- perks (insurance, accommodation etc.) ✓ challenges
- ✓ feedback
- ✓ love for children
- ✓ self-realization
- ✓ opportunities of self-development

Vocabulary

2. Read the following text.

I am a Student of Pedagogical University

Hi! I am Kovalenko Maks and I'm a student now. I'm a first-year student of the day-time department. I've entered the state institution "South-Ukrainian national Pedagogical university named after K. D. Ushynsky" after finishing a secondary school. You know, that was my dream to enter this University. No wonder, as all members of our family are teachers.

My father teaches me to understand and love mathematics. I realize now mathematics is a corner-stone of all sciences. My father works as an Associate Professor at the Mathematics Department of the Mechnikova university.

My mother's a physics teacher at a comprehensive school. She likes her specialty very much. She often says that although teaching is rather challenging activity, it gives her satisfaction when she has the feedback.

I've got also a sister. She is twenty-six. And she is also a teacher. She teaches physics to the second-year students at my university. She combines her work with studying. She's a postgraduate student now, that is, she is working on her PhD thesis.

As you can see, I took my parents' way. I worked hard to pass my entrance examinations with flying colours. And now I've become a happy member of the great, young family of students.

The Faculty of Physics and Mathematics was founded in 1930. Now it is an important educational and research centre of the South of Odesa region. About 7,000 graduates have become teachers of physics, mathematics, computer science, economics at institutions of general education, higher education and research.

The Department of Physics and Mathematics provides training of undergraduate, postgraduate students and doctoral candidates. There is a Specialized Academic Council for defending PhD theses at the Faculty. Students are trained in such fields of study as "Secondary Education (Physics)", "Secondary Education (Mathematics)", "Secondary Education (Computer Science)" with extra specialties in computer science, the English language and literature, physics.

Teaching process is provided by the Departments of Algebra and Geometry; Advanced Mathematics; Applied Mathematics and Computer Science; Physical and Mathematic Modelling, and the Department of Physics.

Lecturers of the Faculty work closely with research and educational institutions of Ukraine, Germany, Canada, the USA, Italy, France etc; they carry out research according to grant projects of science foundations.

Many new things and notions came into my life with it. At first, I didn't know what they meant. Now I became familiar with such words as "a freshman", "a sophomore", "an undergraduate" and such terms as "a period", "a seminar", "labworks". I know what it means "to take notes", "self-guided work", etc.

I want still to learn more, and, first of all, how to save time to be able to not only study well, but to take an active part in the students' life, to join some students' scientific society and to sing in our Univeristy choir, to become a member of our University famous football team and to visit interesting students' night parties.

I'm fond of everything at my University. I like its great beautiful building, sport complex, lecture halls, laboratories, and, definitely, the teaching staff.

I'm a freshman, as they call the first-year students in the USA. And I realize pretty well that it'll take time to learn everything I want about my University and the specialty I've chosen. But I'm determined and, in fact, that is why I'm here.

Comments

a student of the day-time department – студент денного відділення ; *syn.* a full-time
  student vs. part-time department / distant student, Open university student –

no wonder – не дивно

all the members – всі члени

Associate Professor – доцент

comprehensive school – загальноосвітня школа

post-graduate student – аспірант

to pass with flying colours – скласти (іспит) дуже легко

PhD thesis – дисертація кандидата (доктора) наук
  to defend PhD thesis – захищати дисертацію кандидата (доктора) наук

to take somebody's way – піти чиїмось шляхом

at first – спочатку; first of all – перш за все

...**became familiar with...** – дізналась

a freshman – a first-year student; **a sophomore** – a second-year student;
  undergraduate – student of senior courses

I am still to learn more –я маю дізнатись ще більше

to join some students' scientific society – стати членом студентського наукового
  гуртка
  to join the army – піти до армії
  to join a team – увійти до складу команди (спортивної)

students' night parties – студентські вечори

a lot more – багато іншого; a lot of – багато
  a lot of books, a lot of time, *syn.* many, much, a great deal of, plenty of

to be fond of – любити, подобатись; *syn.* to like

like – подібно як; to be like – бути схожим

He is like his father – Він схожий з батьком

He likes skating – Він любить кататися на ковзанах

He is a student like me – Він, як і я, студент

It'll take time – знадобиться час

graduate – випускатися (з університету, коледжу, курсів і т. ін.)

Doctoral candidate, PhD – кандидат (доктор) наук

Specialized Academic Council – Спеціалізована вчена раді із захисту дисертацій

Department – факультет, кафедра

Faculty – викладачі кафедри, факультету

lecturer – лектор, викладач

self-guided work – самостійна робота (студента)

3. Match the words from the left column with their Ukrainian equivalents in the right one.

1. Department	a. увійти до складу команди (спортивної)
2. lecturer	
3. graduate	b. захищати дисертацію кандидата (доктора) наук
4. a student of the day-time department	
5. all the members	c. всі члени
6. Associate Professor	d. загальноосвітня школа
7. comprehensive school	e. студент денного відділення
8. post-graduate student	f. викладач, лектор
9. to pass with flying colours	g. аспірант
10. PhD thesis	h. факультет, кафедра
11. to defend PhD thesis	i. випускник
12. a freshman	j. першокурсник
13. to join some students' scientific	k. скласти (іспит) дуже легко

society

14. students' night parties

l. дисертація кандидата (доктора) наук

m. доцент

n. стати членом студентського наукового гуртка

о. студентські вечірки

m. піти чиїмось шляхом

4. Use the words and word combinations given in Exercise 3 in the sentences of your own.

5. Translate the following sentences.

A) 1. He took his brother's way and became a teacher. 2. How much does it take you to get to the Institute? It takes me ten minutes. 3. How much will it take you to get to Lviv by train? It will take me 14 hours. 4. It will take him two hours to translate this article. 5. He takes after his father. 6. When going to the Institute he takes a bus. 7. She took the shortest way to get to the library. 8. It'll take time to forget this event.

B) 1. He is like his father. 2. He likes Atomic physics very much. 3. My friend does this work like me. 4. It looks like snow. 5. This book costs something like 1 dollar. **6.** They mustn't talk like that. 7. He was running like a sportsman. 8. My sister likes dancing. 9. I should like to take my father's way. 10. He should like to be the first student in his group.

C) 1. I'll join you in your work. 2. My friend joined the National Guard. 3. The best students of our group joined Scientific Societies. 4. My junior brother will soon join the school volleyball team.

6. Complete the following sentences.

1. Max has become a student of ... . 2. All the members of his family are   3. His father works as ... . 4. His sister works ... . 5. Max ... worked hard to pass........ 6. He

became familiar with ... . 7. Max is still to know how ... . 8. He will take an active part in ... .

7. Say if it is right

1. Max's dream was to enter the Medical institute. 2. Max's mother is a doctor. She works at a hospital. 3. Max's sister works at a plant. She is a freshman. 4. Max didn't take her parents' way. 5. Max doesn't know what it means "to make notes".

8. Answer the following questions

1. What higher school has Max entered? 2. Is he a sophomore or a freshman?
3. Whose way did he take? 4. What are all the members of his family? 5. Who taught him to understand and love teaching? 6. Where does Max's father work? 7. What is Max's mother? 8. What does Max's sister work as? 9. Is Max's sister a full-time student? 10. Why did Max pass his entrance exams well? 11. What did Max become familiar with? 12. What is Max still to know more? 13. What does it mean to take an active part in the student's life at the Institute? 14. What does Max like at the University? 15. Which departments provide work of the Department? 16. What world institutions does the department cooperate with?

9. Speak about yourself using the vocabulary of the text.

10. Put the following words into three categories:

People in education	Types of schools / courses	Miscellaneous

Primary school, vice-rector, record card, undergraduate course, post-graduate course, grammar school, first-year student, comprehensive school, secondary modern school, transcript, head of department, faculty, score, to apply for admission, grade, college

admission tests, Dean, Assistant Dean, Laboratory assistant, tutor, bachelor, examination board.

11. Learn the expressions and use them in the sentences of your own.

to be angry, to be hungry, to be thirsty, to be cold (hot), to be in (out), to be fond of, to be interested in, to be well (bad), to be about, to be away, to be late for, to be in time for.

Reading years:
1826 – eighteen twenty-six,
1400 – fourteen hundred
2000 – two thousand
1960–1969 – the '60s – pronounced 'the sixties'
2000 – 2009 – the 2000s – pronounced 'the two thousands'

Reading dates:
- If you put the day before the month, use the definite article before the day and the preposition *of* before the month.

e.g. 5 October 2004 - the fifth of October, two thousand and four
- If you put the month before the day, use the definite article before the day in British English. In American English, the definite article can be dropped.

e.g. October 5, 2004 - October (the) fifth, two thousand and four

Note:

In British English, the date usually begins with the day followed by the month, while in American English the month is normally first. This is also true when we abbreviate a date into three numbers. For example, 1st December, 2017 becomes:
1/12/2017 in British English
12/1/2017 in American English.

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12. Read the following years and dates:
- 1956, 1654, 1300, 1805, 2018, 2002, 1999, 1478, 1234, 1523, 1900, 1970-1980, 1550-1560, 1940-1950;

- November, 6, 2017; September, 13, 2018; June, 23, 2003; February, 15, 1600; March, 8, 2020.

Grammar

> ✓ *Don't forget!*
>
> *Forms of the verb* <u>**to be**</u>
>
> I **am** a student.   We **are** students.
> You **are** a student.   You **are** students.
> He, she **is** a student.   They **are** students.

13. Fill in the blanks with the proper form of the verb to be.

1. Ben_____ my friend. 2. He_____ a teacher. 3. I_____ in my room. 4. «___ Tom my and Billy babies?". "Yes, they_____ ". 5. We_____ students. 6. She ___ a teacher. 7. __ _ you a student? 8. "_ _ they doctors?". "No, they_ _ not. They __ students". 9. This ____ a cup. It__ yellow. 10. The spoons__ on the table. The table ___ in the room. 11. _ _ those men friends?

Countable and Uncountable Nouns

- Anything that can be counted, whether singular – *a dog, a house, a friend*, etc. or plural – a few books, lots of oranges, etc. is a countable noun. Notice that singular verbs are used with singular countable nouns, while plural verbs are used with plural countable nouns.

- Anything that cannot be counted is an uncountable noun. Even though uncountable nouns are not individual objects, they are always singular and one must always use singular verbs in conjunction with uncountable nouns:

*There is no more **water** in the pond.*

*Please help yourself to some **cheese**.*

*I need to find **information** about Pulitzer Prize winners.*

Be attentive:

There are some nouns which are countable in English, but uncountable in Ukrainian and vice versa:

e.g. ***advice – countable in Ukrainian, uncountable in English***

13

> *gate – countable in English, uncountable in Ukrainian*

14. State whether the following nouns are countable or uncountable?

1. The <u>children</u> fell asleep quickly after a busy day of fun.

2. Be careful! The <u>water</u> is deep.

3. The parade included <u>fire trucks</u> and police cars.

4. We like the large <u>bottles</u> of mineral water.

5. My mother uses real <u>butter</u> in the cakes she bakes.

6. How many <u>politicians</u> does it take to pass a simple law?

7. Most kids like <u>milk</u>, but Joey hates it.

8. Most pottery is made of <u>clay</u>.

9. Michael can play several different musical <u>instruments</u>.

10. I was feeling so stressed that I ate an entire box of <u>cookies</u>.

15. Fill in *is* or *are*.

1. Your jeans_____ in the wardrobe.

2. Where_____ my scissors?

3. There_____a lecture on economics today.

4. The shopping_____extremely heavy.

5. Where_____my boxing gloves?

6. This information ____incorrect!

7. Her hair_____beautiful.

8. Your socks ____in the drawer.

9. Her furniture _____very expensive.

10. His accommodation____ luxurious.

11. Evidence_____needed before the trial can continue.

12. The news____is exciting.

13. Mumps _____a common illness among young children.

14. Where ____my glasses?

15. German____ difficult to learn.

16. Where ____the kitchen scales?

17. Chess ____a popular game.

18. Her work ____very tiring.

19. People ____starving in many countries.

20. Happiness __ key to her success.

> ✓ To make uncountable nouns countable such quantifiers as *a piece of, a bit of, a pinch of* can be used:
>
> *e. g. a piece of advice; a slice of cheese; a bar of soap.*

Uncountable	Countable
advice	**a piece** of advice – piece**s** of advice
luggage	**a suitcase**, **a bag** or **a piece** of luggage – suitcase**s**, bag**s** or piece**s** of luggage
money	**a note**, **a coin** – note**s**, coin**s**
cake	**a slice** of cake, **a piece** of cake – slice**s** or piece**s** of cake
furniture	**a table**, **a chair**, **a piece** of furniture – table**s**, chair**s**, piece**s** of furniture
bread	**a slice** of bread, **a loaf** of bread, **a piece** of bread – slice**s**, loave**s**, piece**s** of bread
knowledge	**a fact** – fact**s**
travel	**a journey**, **a trip** – journey**s**, trip**s**
toothpaste	**a tube** of toothpaste – tube**s** of toothpaste
wine	**a bottle** of wine, **a glass** of wine – bottle**s** of or glasse**s** of wine
butter	**a pat** of butter – pat**s** of butter
cheese	**a slice** of cheese, **a chunk** of cheese, **a piece** of cheese – slice**s**, chunk**s** or piece**s** of cheese
sugar	**a sugarcube**, **a spoonful** of sugar, **a bowl** of sugar – sugarcube**s**, spoonful**s** of sugar, bowl**s** of sugar
salt	**a pinch** of salt – pinch**es** of salt
soap	**a bar** of soap – bar**s** of soap
hair	**a strand** of hair – strand**s** of hair

glass	**a sheet** of glass, **a pane** of glass – shee**ts** or pane**s** of glass

16. Insert the appropriate quantifiers into the gaps below:

1) We need to buy a _____ of sugar.

2) Would you like another _____ of wine?

3) There's a_____ of bread in the kitchen.

4) I'm going to make myself another _____ of tea.

5) Put that _____ of mayonnaise back in the fridge.

6) He gave me a_____ of flowers for our anniversary.

7) Where's the _____ of toothpaste?

8) We've already finished those two_____ of cereal.

9) Buy one_____ of lettuce and one __ of cabbage.

10) Shall we open a_____ of biscuits?

17. Translate the following sentences into English.

1. Він завжди дає мені добрі поради. 2. Ці сходи ведуть до моря. 3. Добрі новини – це завжди приємно! 4. Гроші на столі, можеш взяти. 5. В акваріумі п'ять рибок. 6. Ворота відкриті чи зачинені? 7. Ці відомості дуже важливі. 8. Математика – дуже складний предмет. 9. Дай мені три мила, будь-ласка. 10. Зміст листа мені невідомий. 11. Я завжди кладу в суп дві моркви. 12. Джек хоче розповісти нам декілька важливих новин.

Plural Nouns

1. The plural noun is generally formed by adding **-s** to the singular:
cow – cows
boy – boys
girl – girls
2. Nouns ending in **-s, -sh, -ch** or **-x** form the plural by adding **-es** to the singular:
class – classes
brush – brushes
match – matches
3. Most nouns ending in **-o** also form their plural by adding **-es** to the singular:

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mango – mangoes
hero – heroes
potato – potatoes
       Note that a few nouns ending in **-o** merely add **–s:**

Piano	–	*pianos*
Photo	–	*photos*
Logo	–	*logos*

Kilo – kilos

4. Nouns ending in a consonant + **y** form their plural by changing -**y** into -**i** and adding **–es:**

baby – babies

lady – ladies;

city – cities

5. The nouns ending in -**f** /-**fe** form their plural by changing –**f**/-fe into **v** and adding **–es**:

thief – thieves

wife – wives

leaf – leaves

      Exceptions from this rule are:
          chief   *handkerchief*
          gulf   *dwarf*
          safe
          proof

6. A few nouns form their plural by making some changes to root vowels:

foot – feet

man – men

woman – women

tooth – teeth

mouse – mice

goose – geese

7. Compound nouns are formed by adding **–s** to

- the first word in case when the noun has a preposition:

  editor-in-chief – editors-in-chief

- the final word if there is no preposition or the compound noun has any part of speech which is not noun:

  lady-bird – lady-birds

  forget-me-not – forget-me-nots

18. Make the following singular nouns plural.

photo		glass	
pen		car	
thief		baby	
kiss		lady	
knife		tooth	
life		calf	
key		ox	
potato		toy	
cow		house	
trolley		toe	
star		apple	
book		woman	
desk		toffee	
boy		fish	
child		party	
foot		man	
strawberry		monkey	
wolf		brush	
phone		bear	
family		day	

19. Make the following compound nouns plural.

Room-mate, fellow-worker, court-martial, man-of-war, boy-messenger, onlooker, passer-by, sister-in-law, postman, so-in-law, fisherman, schoolgirl, textbook, pocket-knife, statesman, editor-in-chief.

20. Change the number of the noun in bold type making any other necessary changes.

1. I have hurt my <u>foot</u>. 2. The last <u>leaf</u> fell from the tree. 3. The <u>roof</u> of the house has covered with snow. 4. There is a <u>potato</u> in the plate. 5. Where is a <u>glass</u>? 6. The <u>deer</u> is a graceful animal. 7. What's the <u>news</u> this morning? The <u>news</u> is good. 8. He gave me his <u>advice</u>. 9. There was a <u>fish</u> in the net. 10. This <u>shelf</u> contains several books on different subjects. 11. The <u>sheep</u> is grazing in the meadow.

The Possessive Case

   The Possessive Case is used to express that something belongs to someone or to show a relationship between two or more people. We show this ownership by adding an **apostrophe** and an **-s** to the noun if the noun is a person or an animal.

   1). With **<u>persons and animals</u>**:

   - Singular: **'s**   Plural: **s'**
     This is Tom's bike.   *These are the boys' bikes.*
     This is Kathy's mother.   *This is the girls' mum.*

   - **'s** with irregular plural forms:
     These are our children's cell phones.

   - **'s** or **s'** with people's names ending in "s":
   - This is Charle**s'** / Charles**'s** car.

   To express an ownership for two or more people put the **'s** to the final name:
       This girl is Ken and Bob's sister.

2).   With **<u>things</u>** we use generally "**of**":
       *The colour **of** the table is black.*   *The second chapter **of** this book.*

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21. Use the Possessive Case instead of "of-phrase".

1. The new club of the workers; 2. The poems of Shevchenko; 3. The voice of her mother; 4. The pages of the book; 5. The orders of the commander; 6. The offer of the seller; 7. The conclusions of the expert; 8.The birthday of my friend; 9.The streets of Kyiv. 10. A flock of birds. 11. The house of the doctor; 12. The location of the enemy.

22. Use "of-phrase" instead of the Possessive Case in the following sentences.

1. Britain's climate is not cold in winter. 2. This country's wealth is oil. 3. My friend's garden is beautiful. 4. The student's lessons begin at 9 o'clock. 5. This writers' works were published many times. 6. Our city's streets are green and wide. 7. The miners'

meeting was held on the outskirts of the town. 8. We admire Repin's and Levitan's pictures. 9. Everything in the children's room was the work of the children.

23. Translate the following sentences into English.

1. Син моєї сестри добре вчиться. 2. Мені дуже подобається квартира Марини. 3. Вона багато пише листів сестрам Джона. 4. Комната Бес велика і світла. 5. Вчитель повернув зошити студентів. 6. Я не пам'ятаю імені сестри мого друга. 7. Це книги колег мого сина. 8. Вам подобається нова книга цього письменника? 9. Ти не знаєш де зошит з фізики Антона? 10. Ми вчимо слова першого уроку зараз.

Articles

There are three articles in English – indefinite (a/an), definite (the) and zero article (-).

*The indefinite article **a/an** is used:*

- when we talk about something for the first time:
    They've got a swimming pool.
- when we say what smb's job is:
    He's a dentist.
- when there is a descriptive attribute before the noun:
    *I saw **a** beautiful flower.*

*The definite article **the** is used:*

- when we talk about smth again:
    There is a cinema and a café. The café is cheap.
- before the nouns which are unique in general or in the given situation:
    The sun was shining brightly.
    Open the door please.
- before nouns denoting a concrete object:
    The flat is quite large and comfortable.
- before the superlative degree of adjective:
    This is the most beautiful sea I've eer seen.
- before the substantivized nouns:
    The old always need care.
- before the ordinal numerals:
    We are sitting in the second raw.
- with nouns denoting families and nationalities:
    The Browns are sitting in the living room. The British are good at football.

*Zero article (**-**) is used:*

- before abstract nouns:

> *Our country is rich in coal. Snow is white.*
- before a noun followed by a numeral:
  > *Where is room 102?*
- before proper nouns:
  > *My name is Pete. London is the capital of England.*
- before plural countable nouns denoting things in general:
  > *This plant is engaged in the production of fans.*
  > *Geographical names are confusing because some require **the** and some do not.*

◊ **Use** *the* **with**: united countries, large regions, deserts, peninsulas, oceans, seas, gulfs, canals, rivers, mountain ranges, groups of islands

the Gobi Desert
the United Arab Emirates
the Sacramento River
the Aleutians

◊ **Do <u>not</u> use** *the* **with**: streets, parks, cities, states, counties, most countries, continents, bays, single lakes, single mountains, islands

Japan, but the Netherlands, the USA
Chico
Mt. Everest
San Francisco Bay

24. Put in the definite (the) or the indefinite (a/an) article where necessary.

1. They learned English for half_____hour and then began to read _____historical novel. 2. Does _____ sun shine brightly in____ winter? No, it doesn't. 3. He is____ chief of the book-keeping department of _ large organisation. 4. Will you please give me___ pen and____ sheets of paper. 5. Is there ___ letter for me? 6. What _ strange man! 7. Yesterday I spoke to man who had just returned from__Arctic expedition. 8. Here is ___ book you need. 9. He is_ man whom we all admire. 10. Students from foreign countries of__ Europe, _ Africa and _____ Latin America study in Kyiv. 11. __clock in __hall is slow. 12. Is that__ man whom they are looking for? 13.___ English people often talk about ____weather. 14. Autumn is _ season of harvesting. 15. ____ Thames flows through London. 16. Is __ ring made of ____gold? Yes, it is. 17. Do you live in _____ Franko street? 18. My mother lives in _____Lysenko Street. 19. There are some theatres near _____ Myr Square. 20. There are always a lot of people in_____ Independence Square. 21. Do you live near Central Park? 22. There are a lot of apartment houses near _____ Rylski Park.

23. Yuri Belov lives near _____ Shulavska Metro Station, doesn't he? 24. They're going to ____ Shevchenko Museum. 25. My brother lives near _____ Boryspil Airport. 26. In __big cities __streets are broad and straight, there are ___ lot of squares and ___ beautiful parks. 27. When __trafficlights changed from yellow to green, we crossed street and entered _ underground station, paid our fares, went down ____ escalator, got on_____train and rode as far as _____University Station. 28. We went by metro as far as _____Nyvky Station and then changed for ____ trolley-bus. 29. Do you happen to know the way to ____ Picture Gallery? 30. Last summer we had _ lovely time in _ South.

25. Translate these sentences. Explain the absence of the article with the nouns in bold type.

1. He never showed any fear in face of <u>danger</u>. 2. What cold rainy <u>weather</u> we are having! 3. We turned <u>west</u> and soon sighted land in the distance. 4. When <u>tea</u> was ready we sat down to table. 5. <u>Winter</u> is almost gone; <u>spring</u> is coming soon. 6. The apple tree was in full <u>blossom</u>. 7. <u>Elbrus</u> is the highest mountain in the Caucasus. 8. <u>Snow</u> covered the ground.

26. Fill in the appropriate article (a/an, the, –).

1. ____ tower of London is____ popular tourist attraction.
2. Newcastle is___ town in ____north of____England.
3. ___Princess lives in___ palace in___London.
4. ____ Buckingham Palace is where___ Queen of England officialy lives.
5. She bought ___expensive necklace at_____Harrods.
6. The supermarket is in___ Kendell Street opposite___Lloyds Bank.
7. Anna was born in ____Italy, but she lives in ____USA now.
8. He went on ___expensive holiday to___ Bahamas.
9. ___Statue of Liberty is in _____New York.
10. _____expedition to ___South Pole needs a lot of careful planning.

11. Last month I saw____ film and then went to____ concert.____ film was brilliant, but____ concert was boring.

12. I applied for____ job last week.____ job involved dirving ____van around the country.

13. ____Mathematics and____ Physics are my favourite subjects.

14. ____ equilibrium is not correct, the teacher explained us it last week.

27. Translate the following sentences into English.

1. Батьки куплять мені гітару. Гітара буде з червоного дерева. 2. Він математик за фахом. 3. Він найбільш видатний фізик України. 4. Знання – це сила.

5. Математичні рівняння завжди складні для тих, хто не знає формул. 6. Давай поїдемо наступного року до Іспанії? – Я би краще з'їздила до США, та як раз буде проходити конференція з атомної фізики, то ж поєднаємо приємне з корисним. 7. Принеси мені, будь-ласка, води з кулера. Вода, що в крані, технічна. 8. Родина Лобановського оселилась на Півдні країни.

Present Tenses

In English, there are four present tenses: present simple, present perfect, present continuous, and present perfect continuous.
Present Simple
Form: Use the base form of a verb, adding an /s/ to the end of the verb if the subject is singular.
Uses:
- Actions that are habitual or routine:
  The sun rises. I brush my teeth twice a day.
- General, timeless facts:
  Spiders make webs. Babies drink milk.
- The "real" present (things that are happening right now), but ONLY when the verb is **stative**. Stative verbs* deal with the way the subject is, instead of what the subject does:
  That car looks old. They think that's a bad idea.
Present Continuous
Form: The present tense of "to be" (am/is/are)+ verb + ing
Uses:
- The "real" present (things that are happening right now), for all verbs except stative verbs
  I am sitting down right now. He can't come to the phone because

---

he is working. You can't see the children because they are hiding.

- Temporary actions that may not be happening right now, but have not yet been completed:

  I am taking an English course.
- Tendencies to changes:

  The Earth's climate is becoming warmr and warmer.
- To express irritation with word *always*:

  You are always telling me a lie!
- For future arrangements:

  Tomorrow I'm watching a new Ben Stiller film.

Present Perfect (Simple)

Form: Have or has + past form of a verb

Uses:

- Actions that started in the past, continue into the present, and may continue into the future:

  The children have felt sick ever since they ate lunch. My neighbor has lived next door to me for two years.
- Separate actions that happened in the past and may happen again in the future:

  That man has traveled overseas several times. We have eaten at that restaurant once or twice.
- Recently completed actions that still influence things happening in the present:

  The sun has risen and you need to wake up. They have finished their meeting, so now they can go.

Present Perfect Continuous

Form: Have or has + been + verb + ing

Uses:

- Actions that started in the past, continue into the present, and may continue into the future (note that this is the exact same use and meaning as Use 1 of present perfect):

  The children have been feeling sick ever since they ate lunch. My neighbor has been living next door to me for two years.

28. Choose the most appropriate answer.

1. She can't come to the phone now because she_____ for tomorrow's test.

  ○ studies ○ is studying ○ has studied ○ has been studying

2. They must be at the sports ground now. They usually_____basketball on Fridays.

  ○ play ○ are playing ○ have played ○ have been playing

3. I_____my work already. I'm ready to go for a walk with you.

○ finish ○ am finishing ○ have finished ○ have been finishing

4. I_____breakfast right now. Can you call a little later?

○ cook ○ am cooking ○ have cooked ○ have been cooking

5. I_____ this book. Can I borrow it for a week or so?

○ don't read ○ am not reading ○ haven't read ○ haven't been reading

6. Maria is good at languages. She_____French, Spanish and German.

○ speaks ○ is speaking ○ has spoken ○ has been speaking

7. So far, he _____five stories for children.

○ writes ○ is writing ○ has written

8. We_____for their answer for two months already.

○ wait ○ are waiting ○ have been waiting

9. She _____since Monday.

○ is sick ○ is being sick ○ has been sick ○ has been being sick

10. She_____since noon. Should we wake her up?

○ sleeps ○ is sleeping ○ has been sleeping

29. Use the word in brackets in the correct form.

1. I_____a letter now (write) .

2. Susan_____in the garden at the moment (work).

3. Jane _____to bed at 10 o'clock on weekdays (go).

4. I am in London this summer. I_____English (study).

5. My brother and sister _____ basketball every Friday (play).

6. The buses sometimes _____late (come).

7. You_____always_____the dog (tease)!

8. James is a student. But he _____this week (study).

9. Lions_____in Africa (live).

10. How long_____you in Ukraine? (live)

11. Congratulation! You _____ your final test! (pass)

12. _____they already? (arrive)

13. Lucy _____2000 metres today.

14. I _____ this equilibrium for two hours and_____yet! (solve, solve)

15. How long _____ you Simon? (know)

30. Put the verbs into the correct present tense form.

Sam is the captain of his local football team. He's talking to his brother, Dave.

Sam: Dave, I'm worried about the team.

Dave: But why? You _____ (win) every game this season.

Sam: Yeah, _____ (we/be) very lucky. That's_____ (what/cause) me problems now.

Dave: How come?

Sam: Well,_____ (we/practise) twice a week this season and_____ (that/really/make) a difference. Now, some of the guys say that's not necessary because_____ (we/always/win). I'm afraid that if _____ (we/not/practise) so often, we may lose our matches.___ (We/play) Donnington on Saturday and___ (everyone/agree) they're a really strong team. The trouble is, _ (we/not/practise) since Monday.

Dave: I can see ____ (you/have) a problem. What can you do?

Sam: I think the problem is Collin.

Dave: The big guy __ (who/play) for you since last season?

Sam: Yes. _____(He/usually/score) most of our goals. Since the summer _____ (he/arrive) for training really late. When I try to talk to him, _____(he/refuse) to listen to what _____ (I/say).

Dave: Well, tell him he can't play if_____ (he/not/listen) to you.

Sam: I guess I'll have to._____(I/not/like) it. What if he gets angry and leaves the team?

Dave: I'm sure he won't.

Sam: _____ (I/hope) not.

31. Complete the sentences with the verbs from the box in the correct form.

not/be	deal	not/finish	have	not/know	live	see	not/see
not/speak	stare	stay	suffer	wait	not/want	watch	

1. I _____ checking the emails because _____ with sums all morning.

2. Thank you, but I really_____any more juice. I_____ two large glasses already.

3. Paul _____from earache since the weekend. He _____ the doctor twice, but it's still not better.

4. We_____why Sara is upset, but she_____ to us for ages.

5. Why _____ you _____ at me like that? I suppose you_____ a woman on a motorbike before!

6. I _____ with my cousin in London for a few days. I_____here before, but he_____here for several years, so he can show me around.

7. I'm sorry I'm late. _____you _____ a long time?

8. We_____ this stupid film since lunchtime. Let's switch over to the other channel.

32. Translate the sentences into English.

1. Скільки часу ви вже йдете? 2. Завтра ми вирушаємо у похід. 3. Я готую обід, а ви приберіть у кімнаті. 4. Я чекаю на тебе з ранку. 5. Вони обговорюють це питання вже цілу годину. 6. Подивись, сніг йде? 7. Сніг йде вже півгодини. 8. Я пишу цей переклад з ранку. 9. Я добре фотографую. 10. У вас стільки цікавих книжок! 11. Ви занадто довго вибираєте. 12. Я сиджу тут уже годину. 13. Я працюю вже близько двох годин, чи не так? 14. Я крокую вже дві години і несу важкий рюкзак. 15. Фестиваль йде третій день. 16. Сьогодні цілий день йде дощ. 17. Зараз я підозрюю його. 18. Дощ йде кожної неділі. 19. Погода постійно псується. 20. Я починаю звикати до цього. 21. Мері гуляє вранці. 22. Мені це здається дивним. 23. Джон не володіє цим будинком. 24. Ми працюємо з

іноземними фірмами. 25. Гості все йдуть і йдуть. *(from Chernovaty, L. M. Practical English Grammar).*

Reading

Tips for being a super-organized student

Pre-Reading

33. In pairs, answer the following questions.

1. Are you a super-organized student?

2. How do you make sure you get your homework in on time?

3. What can be done to improve your self-organization skills?

4. Do you normally do your homework immediately after studies or later?

5. Why is it important to be self-organized?

34. Make sure you know these words:

tips – _____   folder – _____

be terrible at –_____   become a habit – _____

study diary – _____   common sense – _____

make a backup – _____   reminder –_____

Reading

35. Read the following text.

Tips for being a super-organised student

posted 2 hours ago by Amy

I have always admired students who hand their homework in on time and never forget to do it. Me, on the other hand, … OK, I admit. I'm terrible at getting myself organized!

But lately I've started keeping a small study diary. I write down everything I need to do and when it needs to be done by. Then I write a reminder a few days before the date just in case. It's helping.

So I was wondering, what are your tips for getting organised? Post a comment below. I'm hoping we can all share some tips to teach us all better study skills.

Comments

Hana

Good question, Amy. I always spend about five minutes at the end of the day tidying up the desktop on my computer. I make a backup of important documents. I delete things I don't need any more and put everything into the correct folder.

Amy

Nice tip, Hana. I think it's a good idea to do a little bit of tidying up every day. Then it becomes a habit and your desktop is always organised.

Gloria

The most important thing is to start studying a few weeks before the exams and not leave it until the night before! That's just common sense, I think.

Amy

Thanks, Gloria! I agree.

Lou

Hi, Amy. My tip is to have a big noticeboard in your bedroom, divided into different sections. I've got one. It's a whiteboard. I've got a section for each school subject and another one for other stuff. I use board pens to write reminders and I make sure I look at it every day. The best part is when I remove something from the board!

Amy

Great tip, Lou. I've got a cork board with pins. I use it in the same way.

Follow-Up

36. State whether the following sentences are True (T) or False (F).

1. Amy is very good at handing in her homework on time. ……………   T/F

2. Amy writes down the date she has to hand in her homework. ……..   T/F

3. Hana tidies her computer desktop twice a day. ……………………   T/F

4. Amy thinks Hana's tip is good. ………………………………….   T/F

5. Gloria thinks the date you start studying is important. …………….   T/F

6. Lou thinks the best thing about having a noticeboard is using board

pens. …………………………………………………………..   T/F

37. Write words from the text to fill the gaps.

Amy is asking for _____ about organizing school work. She keeps a _____ with a record of her homework. She also writes a _____ in case she forgets.

Hana thinks it's important to keep your computer _____ clean and tidy. She deletes things she doesn't need and puts her work into separate _____ .

Gloria says it's important to start studying in plenty of time and not to leave things until the night _____!

Lou's tip is to use a noticeboard, divided into sections for each _____. He thinks the best thing about this idea is the feeling he gets when he _____ an item!

38. Think of and write down your own tips for improving students' self-organization skills.

It's Ok I guess

Pre-Listening

39. In small groups, discuss the following questions:

1. What hobbies do you have?

2. When do you practise your hobby?

3. Why do you like it?

4. Is it difficult?

5. Do you attend any special place for doing your hobby?

40. Do you know what *evening classes* are? Make a list of everything you can study at the evening classes.

Listening

41. You're going to listen to two people talk about the evening classes they attend at a local college. Answer the next questions:

    1. Where does the conversation take place?

    2. What are the speakers' names?

42. In pairs, fill in the James' and Lucy's survey forms. Then swap your survey forms, listen again and check your partner's answers.

Peterbrooke College

Evening Class Survey

Name:	Lucy Smith
Class:	a ....
Teacher:	b ....
Time:	c ....
Opinion:	d ☐ Good
	☐ OK
	☐ Not so good
Reason:	e ....
	....

Peterbrooke College

Evening Class Survey

Name:	James Walker
Class:	a ....
Teacher:	b ....
Time:	c ....
Opinion:	d ☐ Good
	☐ OK
	☐ Not so good
Reason:	e ....
	....

Follow-Up

43. Prepare a similar conversation. Use can use the audioscript as a guide, but add your own ideas changing as many details as you can (names, classes, times). Role play the conversation.

Speaking

Exchanging opinions

Warm-up

44. Tick the things you like doing in your free time.

dancing	*playing chess*	*surfing the net*
eating out	*playing computer games*	*doing nothing*
listening to music	*shopping*	*walking out*

45. Read the dialogue below and underline phrases that mean:

1. I really like ...	*4. Would you like to ...*
2. I hate ...	*5. I don't like ... very much*
3. I prefer ...	

46. Listen to four dialogues. Answer the questions.

1. What hobby does each pair discuss?

2. Which pairs of speakers make a social arrangement?

47. Complete the sentences with the words below. Listen again and check.

absolutely   a bit   big   fan   fond   into   much

1. I'm not really a_____ .

2. I_____ prefer war films.

3. I'm a _____ fan of YouTube.

4. I_____love blogs.

5. I think the lives of celebrities are_____boring.

6. I'm _____ of reading.

7. I'm really _____sci-fi books.

48. Put the words in the correct order to make questions.

1. into/what/you/are/?   _____

2. like/do/at/doing/weekends/what/you/? _____

3. you/do/what/doing/like/else/? _____

4. TakeThat/do/you/of/what/think/? _____

5. you/into/are/films/of/kind/what/? _____

Speaking strategy

In a conversation, react to what the other person says using phrases such as:

That's interesting!   Really?   Cool!   No way! Me too!   Me neither.

Do you?   Wow! Are you?   Can you?

Speaking

49. Work in pairs. Take turns to say and react to the sentences.

1. I'm not really into heavy metal.

2. I often go windsurfing at weekends.

3. I can't stand chocolate.

4. I prefer chatting on the phone to chatting online.

5. I quite like gymnastics.

50. Work in pairs and prepare a dialogue following the instructions below. You have met for the first time in a new group at university.

- Ask and answer questions about your hobbies.

- Give your opinion on your partner's hobbies.

- Agree on a hobby that you both like doing.

- Suggest meeting this weekend to do the hobby together.

Act out your dialogue in class.

 Writing

A Personal Profile

Pre-Writing

51. Read the profiles. Which information do both of the profiles contain? Tick the boxes.

1. their home town ☐

2. their personality ☐

3. the type of people they like ☐

4. the type of people they don't like ☐

5. their hobbies ☐

6. their ambitions ☐

Ross

 Hi! My name's Ross. I'm 18 years old and I live in Boston, USA. I'm a student of Mathematics department. I'm quite friendly person and rather sensitive. At least I think so! My friends say I'm

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sometimes slightly impatient and I can be a bit lazy about schoolwork! I like being around really confident people and also people who share the same interests as me. I enjoy outdoor activities. I do a lot of surfing and swimming, and a bit of rock-climbing too.

Abigail

Hi! I'm 17 years old and my home is in San Diego, California. I'm Pretty hard-working and very loyal. I get on well with funny people. I'm quite an ambitious person: I want to study physics at university. I'm not very tolerant of lazy people. I'm interested in books and I spend a lot of time reading. My hobbies are chess and computer games, and I'm crazy about rock music.

52. Complete the phrases for talking about hobbies and interests. Use the words below.

do   enjoy   hobbies   interested   crazy

1. I'm _____in ….
2. I_____ …
3. I'm _____about …
4. I_____ a bit of / a lot of …
5. My _____ are …

Modifying adverbs

We use modifying adverbs to make the meaning of adjectives stronger or weaker:
        very   slightly   a bit (informal)   quite   pretty   rather
It can sound too negative in English to use 'not' with an adjective, so we often use 'not very' instead – but the meaning is the same as 'not'.'
        e.g. *He's not very friendly = He's not friendly.*

53. Add the modifying adverbs in brackets to the sentences.

1. I'm creative. I'm ambitious. (pretty/not very)

2. My best friend is confident but impatient. (rather/a bit)

3. My brother is serious and shy. (pretty/slightly)

4. He's a friendly person, but he's arrogant. (very/a bit)

5. She's and honest person. She's sensitive. (quite/not very)

Writing

54. Write a personal profile about yourself. Include:

- basic information about yourself (name, age, etc.)
- some information about your personality.
- what type of people you like and/or don't like.
- information about your hobbies and interests.

Follow-up

55. Study the list of personal characteristics found on https://examples.yourdictionary.com/examples-of-personality-traits.html. Which of them can characterize your personality?

Work with Phrasal Verbs

56. Translate the following phrasal verbs into Ukrainian.

first of all _____

go over/through smth _____

leave smth out _____

rub smth out _____

take it in turns _____

swap places (with smb) _____

finish smth off _____

put smth away _____

call it a day _____

hand smth in/ hand smth out/hand smth round _____

57. Match the following definitions with the appropriate phrasal verbs from Exercise 56.

- take smb's seat or position so they can take yours;
- decide to stop what you are doing;
- before doing anything else;
- look at, check, or discuss smth carefully;
- put smth where you usually keep it, especially after using it;
- remove marks by a pencil, chalk, etc. using a rubber
- give smth to a person in authority;
- pass smth, especially food or drink, to people in a group;
- not do smth, e.g. an exercise;
- so smth one after another so that everyone has an opportunity to do it;
- give smth to each person in a group;
- do the last part of smth.

58. Complete the phrases below using words in the box.

| it   of   it   a day   places   over something   all   in turns   something out |

call …………………….   swap …………………...   take ………………………

go ………………………   hand …………………...   first ……………………….

59. Complete the teacher's instructions.

Silvia, first of _____, could you _____ out these worksheets, please? Thanks. Now everyone, I want you to do the first exercise and we'll go_____ _____ the answers when you've finished. If you use pencil, you can rub_____ the answers afterwards, and do it again later. Marco, I know you have to leave in a minute, so why don't you finish it _____ at home and

hand it _____ to me tomorrow?

60. Complete the last word in each sentence.

1. If you want to talk to Joe, we'll have to swap_____.

2. After you've used the CD player, remember to put it _____ _____ .

3. Paul, you can't use the computer all the time; you'll have to take it in _____ .

4. I think we've done enough; let's call it a _____.

5. If you can't do one of the questions, just leave it_____ _____.

6. As it was our last lesson, the teacher made cakes for the class and handed them____.

Warm-Up

1. Answer the following questions:

1. What images spring to mind when you hear the word 'science'?

2. Is science always good?

3. Do you always trust science?

4. Would you donate your body to science after you die?

5. Do you like visiting science museums?

6. What questions will science never answer?

7. What, in your opinion, will the next big discovery in science be?

8. The Japanese anime character Ikari Gendo said: "Science is the power of Man." What does this mean? Do you agree?

Vocabulary

2. Read the following text.

Science and its Fields

Science (Latin *scientia*, from *scire*, "to know"), is the term which is used, in its broadest meaning to denote systematized knowledge in any field, but applied usually to the organization of objectively verifiable sense experience. The pursuit of knowledge in this context is known as pure science, to distinguish it from applied science, which is the search for practical uses of scientific knowledge, and from technology, through which applications are realized.

Knowledge of nature originally was largely an undifferentiated observation and interrelation of experiences. The Pythagorean scholars distinguished only four sciences: arithmetic, geometry, music, and astronomy. By the time of Aristotle,

however, other fields could also be recognized: mechanics, optics, physics, meteorology, zoology, and botany.

Chemistry remained outside the mainstream of science until the time of Robert Boyle in the 17th century, and geology achieved the status of a science only in the 18th century. By that time the study of heat, magnetism, and electricity had become part of physics. During the 19th century scientists finally recognized that pure mathematics differs from the other sciences in that it is a logic of relations and does not depend for its structure on the laws of nature. Its applicability in the elaboration of scientific theories, however, has resulted in its continued classification among the sciences.

The pure natural sciences are generally divided into two classes: the physical sciences and the biological, or life, sciences. The principal branches among the former are physics, astronomy, chemistry, and geology; the chief biological sciences are botany and zoology. The physical sciences can be subdivided to identify such fields as mechanics, cosmology, physical chemistry, and meteorology; physiology, embryology, anatomy, genetics, and ecology are subdivisions of the biological sciences.

The applied sciences include such fields as aeronautics, electronics, engineering, and metallurgy, which are applied physical sciences, and agronomy and medicine, which are applied biological sciences. In this case also, overlapping branches must be recognized. The cooperation, for example, between astrophysics (a branch of medical research based on principles of physics) and bioengineering resulted in the development of the heart-lung machine used in open-heart surgery and in the design of artificial organs such as heart chambers and valves, kidneys, blood vessels, and inner-ear bones. Advances such as these are generally the result of research by teams of specialists representing different sciences, both pure and applied. This interrelationship between theory and practice is as important to the growth of science today as it was at the time of Galileo.

(*From* http://encarta.com)

Comments

1. **applied to** – ті, що застосовуються до

2. **applicability** – можливість застосування, прикладний характер

3. **pure science** – власне наука

4. **applied science** – прикладна наука

5. **could be recognized** – можна визнати

6. **mainstream science** – основний напрямок науки

7. **differs from** – відрізняється від

8. **the elaboration of scientific theories** – розробка наукових теорій

9. **resulted in** – призвело до

10. **can be subdivided** – можна розділити

11. **subdivision** – підрозділ

12. **overlapping branches** – галузі, що перехрещуються (накладаються)

13. **based on principles of** – засновані на принципах

14. **interrelationship between theory and practice** – взаємозв'язок теорії і практики

3. Answer the following questions by referring to the reading passage.

1. What does the term 'science' denote in its broadest meaning?

2. What is applied science known as?

3. In what way does pure math differ from other sciences?

4. What sciences are pure natural sciences generally classified into?

5. Are sciences independent of one another?

4. **Decide whether each of the following statements is true** *(T)*, **false** *(F)* **or with no information to clarify** *(N).*

1. The term Science is generally used to denote systematized knowledge in any field. …………………………………………………………….. T/F

2. Pure science is different from applied one. …………………………… T/F

3. The Pythagorean scholars were not as good as the later ones. ………. T/F

4. It was not until the 17th century that chemistry was realized as a

science... T/F

5. In the 18th century, physics dealt with the study of heat, magnetism, and

electricity. ………………………………………………………………. T/F

6. Mathematics is different from other sciences because it is the most

difficult one. ……………………………………………………………………. T/F

7. Mathematics plays an important role in the development of scientific

theories. …………... T/F

8. Both physical and biological sciences can be further divided into other

sciences. ………………………………………………………………………. T/F

9. All classifications of the pure sciences are unchanged. ………………… T/F

10. Many sciences are closely related to one another. ……………………… T/F

5. Find in the text from Exercise 2 English equivalents to the following words and phrases.

систематизовані знання – _____

емпіричний досвід – _____

досягти статусу – _____

логіка відносин – _____

закон природи – _____

прогрес – _____

розвиток науки – _____

6. Insert the words from the table into the gaps below.

applied science	*subdivision*	*applicability*	*achieve the status*	*results in*
	overlapping branches	*mainstream science*	*pure science*	

1. The various _____ of science can be seen in the existence of these hybrid fields: astrobiology; biochemistry; biophysics; ecology (biology and earth science); geochemistry, etc.

2. When something large or complex is split into smaller parts, you can call each part _____.

3. The _____ of a thing refers to how useful it is in a given situation.

4. _____ is the application of existing scientific knowledge to practical applications, like technology or inventions.

5. Within natural science, disciplines that are basic science, also called _____, develop basic information to predict and perhaps explain and understand phenomena in the natural world.

6. The department member helped the students to _____ of applicants in foreign university.

7. I've told you how the five of us began at Oxford, working to understand secrets hidden from _____ ...

8. Constant absence at classes _____ bad academic performance in the end of the term.

7. Study the following specific nouns connected with presenting ideas and phenomena.

Example	Comment
Repetition is an important *aspect of* speech development in children.	*one individual part of a situation, problem, subject etc.*
Automatic backup is a *feature of* the new software.	*a typical quality of something*
The political motives for the government's actions are *beyond the scope of* this essay.	*range of a subject covered by a book, discussion, class etc.*

The study revealed *a pattern of* results which could be interpreted in either of two ways.	*showed a regularly repeated arrangement*
During 2005, the **number of** violent attacks increased to an alarming degree.	*amount or level*

8. Match the beginning of each sentence with the most appropriate ending.

1. The study revealed a regular

2. The research focuses on one particular

3. The writer makes a powerful

4. The writers take an original

5. Until recently there was little

6. I think you should broaden the

7. To date, there has been little research

8. There are many important

a. scope of your research

b. awareness of the problem.

c. issues facing the world today.

d. into the environmental effects of nanoparticles.

e. approach to their theme.

f. aspect of modern society.

g. pattern of changes in temperature.

h. case for restructuring parliament.

9. Translate the following sentences into English.

1. Емпіричний досвід заснований на безпосередньому практичному досвіді та іноді протиставляється «теоретичному» досвіду. 2. Фундаментальні дослідження цього науково-дослідного інституту спрямовані на розробку нових теорій і методик. 3. Систематизовані знання повинні бути основою навчання будь-якої навчальної дисципліни у виші. 4. Варто відмітити, що навчання має прикладний характер, адже студенти 3-4 курсів університету вивчають іноземну мову за професійним спрямуванням. 5. Нерозуміння основ (fundamentals) математики призвело до одержання низького балу на іспиті. 6. Основні напрямки наукових досліджень кафедри переважно пов'язані з проблемами математичного і комп'ютерного моделювання. 7. Значний вклад у

розробку проблеми взаємодії теорії та практики у 50-60-ті рр. XX ст. зробив В. Сухомлинський.

Grammar

Past Tenses

In English, there are four past tenses: past simple, past perfect, past continuous, and past perfect continuous.

<div align="center">

Past Simple
</div>

Form: Add –ed to the verb if it is regular (play – played), or use the second form if it is irregular (speak – spoke).
Uses:

- description of an action, event or condition that occurred in the past or at a specified time:
  I learned all the words yesterday.
- description of an action or occurrence of an event that was done repeatedly and regularly:
  When I was a child, I often played in the yard with my friend Sam.
- Description of events that occurred in quick succession in the past:
  In the morning, I got up, brushed my teeth, had my breakfast and went off to my job.

<div align="center">

Past Continuous
</div>

Form: was/were+Verb(ing)
Uses:

- to show that someone is in the middle of an action:
  I was calling him when he came home.
- to show the process of some action happening at a specific time:
  Yesterday at 5 o'clock I was watching TV.

<div align="center">

Past Perfect
</div>

Form: had+Verb (Participle II)
Uses:

- description of an event or action which happened before a definite time in the past:
  I had finished reading yesterday by 7 p.m.
- description of an action that happened in the past before another action took place:
  We had cleaned up the terrace before the watchman arrived.

<div align="center">

Past Perfect Continuous
</div>

Form: had been+Verb(ing)
Uses:

- description of an action that has occurred over a period of time having begun in the past and finished before a definite moment in the past or before another

action in the past:

I had been running here and there all morning, that's why I was so tired in the evening.

Used to/Would

When we talk about things that happened in the past but don't happen anymore we can do it in different ways.

- **Used to:**

We used to live in New York when I was a kid.

There didn't use to be a petrol station there. When was it built?

We can use '**used to**' to talk about past states ….

I used to go swimming every Thursday when I was at school.

I used to smoke but I gave up a few years ago.

… or we can use 'used to' to talk about repeated past actions

- **Would**

Every Saturday I would go on a long bike ride.

My teachers would always say "Sit down and shut up!"

We can use 'would' to talk about repeated past actions. Often either '**would**' or '**used to**' is possible. Both of these sentences are possible.

Every Saturday, I would go on a long bike ride.

Every Saturday I used to go on a long bike ride.

However, only '**used to**' is possible when we talk about past states.

We used to live in New York when I was a kid.

~~We would live in New York when I was a kid.~~

---

10. **A teacher is talking to a student. Put the verbs in brackets into the *past simple* or the *past continuous*.**

Teacher: James, why is your leg in a plaster cast? What 1)_____ (happen)?

James: Well, yesterday afternoon when I 2) _____(walk) home from school, I 3) _____ (slip) over on the ice and 4)_____(break) my ankle.

Teacher: How awful!

James: It 5) _____ (be) . And I 6) _____(not/have) any credit on my mobile to call my parents.

Teacher: So, how did you get to hospital?

James: Well, I 7) _____(lie) on the ground wondering what to do when, all of a sudden, I 8) _____ (see) my next door neighbour. He 9)_____ (take) his dog for a walk.

Teacher: That was lucky.

James: I know. Anyway, he 10) _____ (phone) my mum and she 11) _____(come) and 12) _____(take) me to hospital.

Teacher: Well, I'm very glad someone 13)_____ (find) you and I hope your leg mends soon.

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

A Night to Remember

It was a cold winter's night. The wind 1) ...was blowing... **(blow)** and thick snow 2) .... **(fall)** to the ground. None of us could sleep, so we all 3) .... **(stay)** up late. While we 4) .... **(sit)** in the living room, listening to my brother, Jed, play the guitar, Mum 5) .... **(come)** out of the kitchen with hot chocolate for everyone. We 6) .... **(have)** a great time when, suddenly, all the lights 7) .... **(go)** out! Mum 8) .... **(begin)** looking for some candles. Ted 9) .... **(try)** to help us when my litle sister, Emma, 10) .... **(fall)** off the couch. As I 11) .... **(try)** to reach her, I 12) .... **(trip)** over my brother's guitar. Luckily, Dad 13) .... **(find)** some matches and 14) .... **(light)** the fire. We could see again but we couldn't stop laughing!

12. Put the verbs in brackets into the *Past Simple* **or the** *Past Perfect.* **State which action happened first.**

1. When I_____(leave) the house, I_____- (realise) that I _____(forget) to take my keys with me.

First action: _____

2 After I_____ (finish) digging the garden, I _____ (decide) to go for a walk.

First action: _____

3 I _____ (lend) Alisha some money only after she _____ (promise) to give it back the next day.

First action: _____

4 Kate _____(study) for her Maths test before she _____ (go) out with her friends.

First action: _____

5 I _____ (buy) Beckie a plant yesterday because she _____(sing) so well in the concert the night before.

First action: _____

13. Open the brackets and use the correct form of the verb – *Past Perfect or Past Perfect Continuous.*

1. Julia wanted to sit down as she_____(stand) at work all day long.
2. She _____(learn) "Eugene Onegin" by the autumn.
3. The rain stopped but there were a lot of puddles because it _____ (rain) cats and dogs.
4. Olivia and Victor _____ (chat) via Skype for an hour when the connection broke.
5. They_____(decorate) the New Year tree before the children arrived.
6. Bob_____(eat up) all the muffins by lunchtime.
7. My sister_____ (do) the laundry since early morning.
8. I knew that our parents _____ (grow) melons in their greenhouse since they bought the house.
9. He _____(lose) much weight by the end of the year.
10. Brown understood the problems of his agency because he_____(work) for it since 2005.

14. Put the verbs in brackets into the correct past form.

Holiday Trouble

I remember the first time I 1) .went.. (go) abroad on holiday. I 2) .... (just/leave) school. I 3) .... (study) very hard for my final exams and I 4) .... (feel) that I needed to get away. A friend of mine 5) .... (want) to go away as well, so we 6) .... (decide) to look at some brochures at a travel agent's. We 7) .... (search) for about an hour when my friend 8) .... (find) the perfect holiday – two weeks in Cuba. We 9) .... (be) very excited about it. Finally, the day of our holiday 10) .... (arrive). We 11) .... (just/leave) the house when the phone 12) .... (ring). I 13) .... (run) back into the house but the phone 14) .... (stop) by the time I 15) .... (reach) it. When we 16) .... (get) to the airport, we 17) .... (check) in and 18) .... (go) to the cafeteria. While we were having our coffee, the airline 19) .... (make) an announcement. Our flight was delayed for eight hours. It was then that I 20) .... (realise) what the phone call was about.

15. Choose the correct answer.

1. By 2008, Katie_____six countries in Europe.

A had already been visiting   C already visited

B was already visiting   D had already visited

2 The children were cold. They _____in the snow all afternoon.

A had played   B had been playing

C were playing   D played

3 This time last week, I _____ an exam.

A sat   B had sat   C had been sitting   D was sitting

4 Lucy was gardening_____ Adam was painting the kitchen.

A when   B as soon as   C after   D while

5 Paul _____an expensive mountain bike last year.

A was buying   B had bought   C bought   D had been buying

6 He_____tennis every day during the summer holidays.

A is playing   B had played   C had been playing   D played

7 While Matthew was fixing the window, he _____ off the ladder.

A fell   B was falling   C had fallen   D had been falling

8 It was a chilly evening. A strong wind _____ and clouds were covering the sky.

A was blowing   B blew   C had blown   D had been blowing

9 They _____for three hours before they found the house.

A have walked   B had been walking   C walked   D are walking

10 By the time they arrived at the beach, it _____to rain.

A was starting   B started   C had started   D had been starting

16. For each of the following sentences, choose either "used to" or "would". In some cases, both variants are possible.

1. Do you remember how your Uncle David _____sit in that chair and smoke those disgusting cigars.

2. Your mother_____have a Yorkshire Terrier when she was a young girl, didn't she?

3. For years, they_____ go on holiday to the Rockies, but then it became very fashionable and, hence, expensive.

4. Years ago, I_____ write a diary every day but then I got bored with doing it and I stopped. Maybe it was my life that was boring!

5. At the start of their marriage, they _____ be very happy – but then it all went wrong!

6. You_____spell so well. Whatever happened?

7. When I was five, I _____be able to do incredible gymnastics. Now I can't even touch my toes.

8. Before getting my driving license, I_____ ride a bicycle everywhere.

✓ Mind the following question words used in English:
Who? Where? Why? What? When? Which? How?

17. Fill in the gaps with the correct *wh- (or how)* question.

1. _____are you going to the zoo? On Thursday.

2. _____are you going with to the park? I'm going with Tim.

3. _____are you buying at the store? I'm buying bread.

4. _____are the crayons? In the crayon bin.

5. _____ are you? I'm fine.

6. _____ are you crying? Because I'm sad.

7. _____ is that? It's a marker.

8. _____ are you going home? At 3 p.m.

9. _____ do you live? On Main Street.

10. _____ old are you? I'm 6 years old.

There is / There are

We use *there is* for singular and uncountable nouns and *there are* for plural.

There is a spider in the bath.
There are many people at the bus stop.
There is milk in the fridge.

---

18.   Fill   in   the   gaps   with   either "there   is" or "there   are".

1. _____ a nice girl in our class.

2. _____ no cakes left on the table.

3. _____ a big car in front of our garden.

4. _____ a lot of noisy children in the classroom.

5. _____ no books on your desk.

6. _____ a pencil on the floor.

7. _____ a knife in the kitchen.

8. _____ no eggs left.

9. _____ a new computer in Peter's room.

10. _____ a dog in the shop.

11. _____ a pump on your bike.

12. _____ some dog biscuits on the kitchen table.

13. _____ a clerk in the bank.

14. _____ no blue crayons in the cupboard.

19. Change these sentences so that you use "there + the correct tenses of be"

1) Two apples are on the table._____

2) A boy doesn't exist in the street. _____

3) Does an ATM exist near here? _____

4) A party will exist tomorrow. _____

5) A lot of illnesses existed in the 14th century. _____

6) Hardly any people were at the meeting. _____

7) A Starbucks is next to the bank. _____

8) Does a table exist in the garden? _____

9) A bath doesn't exist in my flat. _____

10) A lot of mountains exist in Switzerland._____

This/These/That/Those

- We use **this** (singular) and **these** (plural) as pronouns to talk about people or things near us:

This is a nice cup of tea.

Whose shoes are these?

- We use **that** (singular) and **those** (plural) as pronouns to talk about things that are not near us:

What's that?

Those are very expensive shoes.

This is our house, and that's Rebecca's house over there.

---

20. Insert *this, that, these* or *those* in the sentences below.

1. Do you like [   ] shoes I'm wearing? I bought them in a sale.

2. I like [   ] shirt. It looks really good on you.

3. I love [   ] earrings you're wearing. Were they a present?

4. I shouldn't have eaten all [   ] chocolates. I feel sick.

5. I think [   ] café's too noisy. Let's finish our drinks and go somewhere else.

6. I like [   ] city. I've been living here since I was a little girl.

7. What are you doing [   ] days? Are you still at college?

8. Whose is [   ] car over there? It's in my space.

21. Study the meaning of the following prefixes.

prefix	meaning	examples
anti-	against/opposed to	*anti-government, anti-racist, anti-war*
auto-	self	*autobiography, automobile*
de-	reverse or change	*de-classify, decontaminate, demotivate*
dis-	reverse or remove	*disagree, displeasure, disqualify*
down-	reduce or lower	*downgrade, downhearted*
extra-	beyond	*extraordinary, extraterrestrial*

hyper-	extreme	*hyperactive, hypertension*
il-, im-, in-, ir-	not	*illegal, impossible, insecure, irregular*
inter-	between	*interactive, international*
mega-	very big, important	*megabyte, mega-deal, megaton*
mid-	middle	*midday, midnight, mid-October*
mis-	incorrectly, badly	*misaligned, mislead, misspelt*
non-	not	*non-payment, non-smoking*
over-	too much	*overcook, overcharge, overrate*
out-	go beyond	*outdo, out-perform, outrun*
post-	after	*post-election, post-war*
pre-	before	*prehistoric, pre-war*
pro-	in favour of	*pro-communist, pro-democracy*
re-	again	*reconsider, redo, rewrite*
semi-	half	*semicircle, semi-retired*
sub-	under, below	*submarine, sub-Saharan*

super-	above, beyond	super-hero, supermodel
tele-	at a distance	television, telepathic
trans-	across	transatlantic, transfer
ultra-	extremely	ultra-compact, ultrasound
un-	remove, reverse, not	undo, unpack, unhappy
under-	less than, beneath	undercook, underestimate
up-	make or move higher	upgrade, uphill

22. Use the correct prefix with the words in brackets.

1. Children _____their clothes very quickly. (GROW)

2. He decided to_____ the offer I gave him. (CONSIDER)

3. My friend wanted to_____me but I was faster (RUN).

4. Last night on TV there was a _____ of the new shows planned this fall (VIEW).

5. We were _____, so we had to surrender. (NUMBERED)

6. The government_____the strength of the hurricane. (JUDGED)

7. The first_____ railroad was built in the United States in the 1860s (CONTINENTAL)

8. O'Hare Airport in Chicago is one of the busiest in the world, handling hundreds of domestic and _____flights every day. (NATIONAL)

9. His only hope of surviving was a heart_____. (PLANT)

10. The football team have been preparing for the _____. (FINALS)

11. _____animals is one of his special field of interests. (HISTORIC)

12. What she said made me_____ my strategy. (THINK)

Adjectives and Adverbs. Comparison

Adjective – a word used to modify or describe a noun or pronoun.
Adverb – a word that is used to modify an adjective, verb, or adverb.
    There are three forms of adjectives and adverbs used to show varying degrees of comparison: the positive, the comparative, and the superlative.
    The *positive* form is used when there is no direct comparison being made to anything specific, but is used to offer a broad or general comparison.
    The *comparative* form is used when two things are being compared with each other.
    The *superlative* form is used when more than two things are being compared with one another.
Regular forms for one and two syllable words.
positive – no change (big, strong, long, etc.)
comparative – words end in "er" (bigger, stronger, longer, etc.)
superlative – words end in "est" (biggest, strongest, longest, etc.)
Regular forms for three or more syllable words.
positive – no change (understandable, comfortable, etc.)
comparative – use "more" (more understandable, more comfortable, etc.)
superlative – use "most" (most understandable, most comfortable, etc.)
Adverbs that end in "ly" always use "more" or "most", such as "more quickly" or "most quickly".
Exceptions:
good – better – the best
bad – worse – the worst
far – farther – the farthest

---

23. Open the brackets. Use the correct form of comparison.

1. My house is (big) | bigger | than yours.

2. This flower is (beautiful)_____than that one.

3. This is the (interesting)_____ book I have ever read.

4. Non-smokers usually live (long) _____ than smokers.

5. Which is the (dangerous)_____ animal in the world?

6. A holiday by the sea is (good)_____than a holiday in the mountains.

7. It is strange but often a coke is (expensive) _____than a beer.

8. Who is the (rich)_____woman on earth?

9. The weather this summer is even (bad)_____than last summer.

10. He was the (clever)_____thief of all.

Adjectives. Word Order

Generally, the adjective order in English is:
- Quantity or number
- Quality or opinion
- Size
- Age
- Shape
- Colour
- Material
- Origin
- Purpose

For example:

I love that really <u>big old green antique</u> car that always parked at the end of the street.

---

24. Choose the correct variant of answer.

1. He was wearing a_____ shirt.

○ dirty old flannel

○ flannel old dirty

○ old dirty flannel

2. Pass me the_____ cups.

○ plastic big blue

○ big blue plastic

○ big plastic blue

3. All the girls fell in love with the_____teacher.

○ handsome new American

○ American new handsome

○ new handsome American

4. I used to drive _____ car.

○ a blue old German

○ an old German blue

○ an old blue German

5. He recently married a _____ woman.

○ young beautiful Greek

○ beautiful young Greek

○ beautiful Greek young

6. This is a _____ movie.

○ new Italian wonderful

○ wonderful Italian new

○ wonderful new Italian

7. She is a _____ supermodel.

○ beautiful slim Brazilian

○ Brazilian beautiful slim

○ slim Brazilian beautiful

8. It's in the _____ container.

○ large blue metal

○ blue large metal

○ blue metal large

9. He sat behind a_____ desk.

- ○ big wooden brown
- ○ big brown wooden
- ○ wooden big brown

10. She gave him a _____vase.

- ○ small Egyptian black
- ○ black Egyptian small
- ○ small black Egyptian

Modal Verbs

The modal verbs are: *can, could, may, might, must, ought to, will, would, shall, should, have to, need.* They take no -s in the third person singular except for *have to* and *need.* They come before the subject in questions and are followed by 'not' in negations. Except for *ought to* and *have to,* modal verbs are followed by an infinitive without *to. Sorry, I can't come. I have to meet Pam.*

Modal verbs are used to express: ability, possibility, probability, logical assumptions, permission, requests, offers, suggestions, advice, criticism, obligation, prohibition or necessity.

Ability

We express ability with:

- **can** (present / future): *Can you swim? No, I can't.*
- **could** (past): *She could dance for hours when she was young.*
- **was / were able to** (= managed to): *He was able to win the race.*

Possibility / Probability /Certainty

- **may, might** (perhaps, very possible): *He may be back before noon.*
- **could** (possible): *He could still be at home.*
- **must** (it is almost certain): *They look alike. They must be twins.*
- **can't** (it's not possible): *You have been sleeping all day. You can't be tired.*
- **can …be?** (Is it possible?) *Can he still be at work?*

Permission

- **can, could** (more formal), **may** (personal address): *You can do it when you want (according to the rules). You may do it when you want (I personally give my permission to do it).*

Advice

- *should / ought to* (general advice): *You should walk more.*
- *had better* (advice for a specific situation): *You'd better see your dentist.*

Requests, offers or suggestions

- *can* (request): *Can you help me tidy my room?*
- *could* (polite request, suggestion): *Could I have a little more cake please?*
- *would you like* (polite offer): *Would you like some more lemonade?*
- *shall I / we* (suggestion, offer): *Shall I post this letter for you?*
- *will* (offer, request): *Will you close the window, please?*

Obligation or necessity

- Must (strong obligation, personal feeling of necessity, order): *We must follow the school rules.*
- Have to (external necessity): *I have to do my homework every day.*
- Need (necessity): *I need to water flowers today.*

Absence of necessity

- Mustn't (prohibition): *You mustn't park here.*
- Can't (prohibition according to the rules): *You can't enter the club without a card.*
- Needn't/don't have to/don't need to (it is not necessary): *You needn't take an umbrella. It isn't raining.*
- Didn't have to (it was not necessary): *He didn't have to go to work yesterday because it was Sunday.*
- Needn't have done (did it, but it wasn't necessary)

25. Fill in *can / be able* in the correct form.

1 I _____to speak perfect English very soon.

2 "_____you hear me, Mum?"

3 They _____swim since they were five.

4 When he got to the front door, he_____ hear a dog barking inside the house.

5 I would love_____to fly an aeroplane.

26. Use the correct verb: may, might, could, must, can't.

Dear "Unhappy",
You 1) *can't* be serious about leaving home! There 2) .... be some problems with your family, but there 3) .... be another solution. You 4) .... try talking to a friend or a relative. You 5) .... have some aunts or cousins who can help. You 6) .... find that discussing the problem all together is better. Your parents 7) .... really be as angry as you think; they 8) .... be upset but they 9) .... realise why you're so unhappy. I suggest you try talking to them again – you 10) .... be surprised.

27. Choose the correct variant of answer.

1. We **may / could** try and fix it ourselves. What do you think?

2. I'm sorry. I didn't hear you. **Could / May** you please repeat that?

3. I **will / shall** do that for you if you like.

4. **Could you / Would you** mind waiting another quarter of an hour?

5. We haven't had a proper chat for ages. **Why don't you / Would you like** come round to my place for a dinner tonight?

6. **Shall I / What about** help you with your homework?

7. **Would you like / Will you like** another slice of pizza, Claire?

8. **Why don't we / How about going** to the Maldives this year?

9. **Would you / May you** give me your full name, please?

10. Ok, **shall / may** we say 8:00 p.m. them? How does that sound?

28. **Fill in** *can, could, would, shall* **or** *will.*

John : 1) ...*Would*.. you like some more coffee, darling?

Jane : No, I don't think so. 2) .... we get the bill?

John : OK. Waiter - excuse me, 3) .... you bring us the bill please?

Waiter : Here you are sir. 4) .... I take these plates away?

John : Thank you. 5) .... I have a pen to sign this cheque please? Jane,
6) .... you give me my glasses?

Waiter : 7) .... you like me to get a taxi for you sir?

John : Yes, please.

Waiter : And I 8) .... bring your coats for you in just a minute.

29. Fill in *should, ought to* **or** *had better*.

Jill : You 1) ... *should/ought to* ..... ask someone to paint the house this year.

Laura : Yes. It's beginning to look a bit dirty. I can't really afford it, though. Do you think I 2) ....
try to get a loan?

Laura : No, you 3) .... not. You might have a problem paying it back.

Jill : I 4) .... do something about the roof as well. It leaks when it rains hard.

Laura : Really? You 5) .... take care of it now or the ceiling will fall in!

Jill : Yes, you're right. I 6) .... ring someone today and ask them to look at it.

30.   Complete   the   gaps   with   a   form   of *have   to* or *must*.

1. The teacher said: "You _____ do all exercises on page 21 in *Look Ahead*."

2. I _____ help my little brother more. My father said so.

3. I _____ take these medicines. The doctor said so.

4. I _____ write lines as a punishment because I threw the shoe of my neighbour   through   the   window.

5. Sorry, I can't come. I_____ clean my room. I can't live in such a mess anymore.

6. He_____ clean the classroom because he had been throwing papers on the ground.

7. "You _____ help me", said the mysterious woman to the detective.

8. "The rules_____ be obeyed at all times!" shouted the headmaster.

9.   "I _____   go.   Otherwise   I'll   miss   my   train."

10. I _____ be home at one o'clock. Otherwise, my mother will kill me.

31. Fill in *mustn't, needn't* or *can't*.

John, I want you to look after your brother this evening. He 1) *can't* .. go out and he 2) .... forget to do all his homework. You 3) .... let him watch TV until he's finished it. He 4) .... watch the film either – it starts very late. He 5) .... have a bath; he had one in the morning. There's a cake in the cupboard but you 6) .... eat it all – leave some for your sister. You 7) .... do the washing-up: I'm going to do it tomorrow. You 8) .... make too much noise. We might be quite late home because we 9) .... leave the party tonight until most of the guests have left. And you 10) .... go to bed without having a wash and brushing your teeth. But you 11) .... wait up for us.

32. Identify the meaning of the modal verbs according to the box below.

> *(im)possibility offer advice necessity giving / refusing permission ability in the past absence of necessity obligation request polite request (im)probability prohibition*

1. This **must** be Jack's house. _____

2. It **can't** be 7 o'clock already! _____

3. **Shall** I open the door for you? _____

4. You **should** buy a new car. _____

5. You **can't** leave before 12 o'clock. _____

6. You**'d better** wash that immediately._____

7. You **may** come in now. _____

8. **Could** I ask you a question?_____

9. He **ought to** be more careful. _____

10. There **might** be some apple pie left._____

11. We'**ve got** to run to catch the bus._____

12. **Would you like** me to give you a lift? _____

13. **Can** you pass me the salt, please? _____

14. I **must** go to the dentist's. _____

15. You **can** leave your coat here._____

16. You **mustn't** tell anyone what happened. _____

17. **I'll** answer the phone for you. _____

18. He **could** play the piano when he was young. _____

19. She **needn't** wait for us. _____

20. **Do I have to** come with you? _____

33. Rewrite the sentences using the words given in bold type.

1. It isn't necessary to buy a ticket.

   NEED _____

2. I advise him to be more careful.

   OUGHT _____

3. I think that's John's car.

   MUST _____

4. I don't think he is her brother.

   CAN'T _____

5. He couldn't swim when he was five.

   ABLE _____

6. It's possible that he will win the race.

   MIGHT _____

7. You are not allowed to play in their garden.

   MUSNT'T _____

8. It wasn't necessary for them to repair the car.

   NEED _____

9. Shall I pour you another drink?

   WOULD _____

10. It's not possible for you to eat so much.

    CAN'T _____

11. Do you want me to open the window?

    SHALL _____

12. It's just possible she's still at work.

    COULD _____

13. Do you want me to help you with that?

    WOULD _____

14. I don't think she is a woman who spoke to me.

    CAN'T _____

15. We don't have to go shopping with Mum.

    NEEDN'T _____

16. Is it really possible that she's 50 years old?

    CAN _____

17. It would be a good idea to tell him the truth.

    BETTER _____

18. I advise you to study harder.

Reading

Apps for learning

Pre-Reading

34. Match the words with the definitions.

> *the CEO   enrolment   pace   unsustainable   a device   an app*
>
> *software   virtual*

1. the computer program that a person uses for a specific task – _____

2. a set of programs and instructions for a computer – _____

3. Chief Executive Officer, or the person who is in charge of a company – _____

4. registering for a course – _____

5. impossible to maintain – _____

6. an object, machine or piece of equipment – _____

7. existing only on a computer or the internet – _____

8. speed – _____

Reading

35. Read the following text.

Eurotalk is a London-based company that makes language-learning software. Recently, their Onebillion project has been in the news, especially since their maths learning app for children in Malawi was shown to improve learning. Dr Nicola Pitchford, a psychologist from the University of Nottingham, found that children using the app tripled their knowledge of maths in just eight weeks.

The name 'Onebillion' comes from the 'goal of reaching one billion children'. This is more or less the number of children who don't have the opportunity to learn basic skills, says Andrew Ashe, who started Eurotalk. Primary education has been free in Malawi since 1994, and the one million increase in student enrolment has put

pressure on teachers, classrooms and resources. Educating children in developing countries has many great benefits. For example, explains Ashe, 'there is very strong evidence that if you can get the basic skills right at primary level for girls, they have fewer children, healthier children, and more likely to be part of the economy. An average girl in Malawi will have 5.9 children and it's unsustainable at the moment.'

Virtual teacher

Jamie Stuart, Chief Technology Officer of Onebillion, explains that 'children are put in groups of 30 or even 60 and taken to a special classroom to spend 30 minutes every other day with the device.' One tablet device can be used by ten or twelve children each day. Each Oneclass is managed by an international volunteer and there is a virtual teacher guiding the student through the app. 'All of the children in Oneclass are learning at their own pace,' says Stuart, 'every child is going at their own speed.'

The apps are designed to be as culturally friendly as possible, and they promote a positive image of girls. The project works closely with the education ministry in Malawi to make sure there are no cultural misunderstandings. As Andrew Ashe points out, the success of the project depends on the project 'working with existing structures. One of the things we are most happy about is that they do see it as their project.'

The project is funded by people in wealthier countries who buy their own language version of the app. 'Every single penny that we earn from selling those apps goes towards developing our literacy material in Malawi,' says Stuart. The key to the success of the app is how it takes advantage of the enthusiasm of young children to learn. 'The children are so engaged and able to progress at their own pace,' says Ashe. 'They are like sponges, they absorb so much information at this age and we think this is why we are getting such a good learning result.'

(Source: britishcouncil.org/uk-now/science-uk/apps-learning)

36. Choose the correct option to complete the sentence.

1. The progress children have been making with the maths apps in Malawi ...

a. is difficult to measure.

b. could be very beneficial for the country in the future.

c. has positive and negative consequences.

2. The name 'Onebillion' comes from ...

a. the number of children who currently participate in the project.

b. the number of children who have participated in the project up to now.

c. the number of children the project has as an objective for participation.

3. According to Ashe, educating girls with basic skills in Malawi ...

a. means they will be healthier and have more children.

b. means they will have smaller numbers of healthier children.

c. means they are less likely to find paid work.

4. In the learning model called Oneclass, ...

a. the children work in their normal classroom.

b. the children work for 30 minutes every day.

c. the children go to a different classroom.

5. The education ministry in Malawi ...

a. helped to develop the software in the apps.

b. helps to make sure that the apps are suitable for local people.

c. had some problems understanding the project at first.

6. The money for the project in Malawi ...

a. comes from people in richer countries when they buy the app.

b. comes from people in Malawi when they buy the app.

c. comes from governments of richer countries.

Follow-Up

37. Write the correct form of the word in brackets to fill the gaps. Look at the example at the beginning of the text.

Children in Malawi are making great progress in _education_ (EDUCATE) using a mathematics app. This could have some very important advantages for a country like Malawi which suffers from high levels of 1)_____ (POOR).

The 2)_____ (DEVELOP) of a maths learning app for children in Malawi by a company called Eurotalk has been in the news recently. This app has produced a great 3)_____ (IMPROVE) in the learning of maths and some children in Malawi have tripled their knowledge of maths in only eight weeks.

In 1994, primary education was made free in Malawi and one million extra students registered for school. The 4)_____ (EDUCATION) needs of so many students put pressure on teachers, resources and buildings.

This was obviously a very 5)_____ (CHALLENGE) situation for the government of Malawi.

Andrew Ashe, who founded Eurotalk, speaks about the 6) _____(IMPORTANT) of educating children in developing countries and thinks that this has great advantages. The app is designed to be 7) _____ (SENSE) to the local culture and the education ministry in Malawi works closely with the project to 8) _____(SURE) that there are no cultural problems with the content of the app.

Electrophone: Broadcasting over Telephones

Pre-Listening

38. Match the following words with their Ukrainian equivalents.

> *broadcast   wire   devoted   discovery   installed   support*
> *receiver   take turns   loud speaker*

a. дрот

b. присвячений

c. трубка

d. встановлений

e. підтримка

f. по черзі

g. транслювати

h. відкриття

i. гучномовець

Listening

39. Listen to the recording and choose the correct answer.

1. Broadcasting first started in …

a. 1820

b. 1920

c. 1912

2. When first broadcast took place in Paris …

a. a lot of people visited the event

b. a few people visited the event

c. nobody visited the event

3. The first thing people heard broadcast was ….

a. radio program

b. churh service

c. music

4. Who had the broadcasting system installed at his home?

a. a ruler of France

b. a broadcasting company worker

c. a minister of France

5. The telephone newspaper had …

a. a long wire and two receivers

b. a short wire and a receiver

c. a short wire and two receivers

6. The service of electrophone was at first accessible for …

a. all people who had telephones

b. people who lived in London

c. wealthy people

7. The benefit of the electrophone first used in church was that …

a. it allowed people to hear sounds much louder

b. it allowed to hear sermons people who couldn't attend the service

c. it created more beautiful sound

8. The further application of the electrophone was …

a. loud speaker

b. earphones

c. MP3 players

Follow-Up

40. Think and write down other devices which have – *phone* as a root (e.g. *telephone, earphone* etc). What do they mean?

 Speaking

Photo Comparison

Warm-up

41. Look at the photos. Where are the people? Match each photo with a place below.

> laboratory   classroom   conference hall   dean's office
>
> workshop   library

42. Describe photo 1. What can you see? What is happening? Use the phrases below to help you.

> the photo shows   in the foreground / background   on the left / right
>
> in the top right corner   in the bottom left corner   judging by
>
> it / they etc. must be …   she / they etc. can't be …..

Speaking

43. Now compare photos 1 and 2. Describe a) the main similarities and b) the main differences. Use the phrases below to help you.

Similarities

The common theme in the photos is ...

You can see .... in both photos.

Both photos show ....

In both photos there are ...

Differences

The first photo shows ..., whereas the second photo shows ...

In the first photo ..., but in the second photo ...

One obvious difference is (that) ...

Unlike the first photo, the second photo shows ...

In contrast to the first photo, the second photo ....

44. What type of work would you like more after getting your degree – in a laboratory as a scientist or in a classroom as a teacher / lecturer? Why? Justify your opinion.

> ***Speaking strategy***
> When you are giving a short presentation, use set phrases to give opinions and justify them, and to structure your speech.

Key phrases

Structuring your speech

I'd like to start by saying / looking at ...

First of all, we need to decide / examine / look at / ask ourselves ...

I'll begin with ...

Now I'd like to move on to ...

This leads to my next point.

Now let's look at / move on to (the question of) ...

<u>*Ordering points or opinions*</u>

First, ... Second, ... Finally, ...

<u>*Justifying your opinion*</u>

There are a number of reasons why I believe this. First, ...

I'll tell you why I think that.

The reason I say that is ...

The main reason I feel this way is ...

<u>*Summing up your opinion*</u>

To sum up, ... In conclusion, ... All in all, ...

Just to summarize the main points ...

Follow-Up

45. Make a list of responsibilities of a university lecturer working in the field of physics or mathematics.

Writing

A scientist: to be or not to be?

Pre-Writing

46. Read the following text about the types of essays.

Basically, all essays have identical structure – Introduction, Paragraph 1, Paragraph 2 (Supporting arguments) and Conslusions. The sentences you put in each paragraph will depend on what type of question you get, or what essay it is. The most common types of essays are the following: Opinion essay, For and against essay and Discoursive essay. Writing an essay is an essential part of any international exam in

English, like FCE, IELTS etc., although in such tests writing an essay is given in form of task / question. Below the possible questions and typical structures are described.

➢ *Opinion essay.*

Typical Questions:

What is your opinion? Do you agree or disagree? To what extent do you agree or disagree? Direct question.

Structure:

Introduction

Paraphrasing the question

Thesis Statement (It is agreed…/It is disagreed…/This essay agrees/disagrees…)

Outline Sentence (This essay will discuss….)

Main Body Paragraph 1

Topic sentence

Explanation of the topic sentence

Examples

Main Body Paragraph 2

Topic sentence

Explanation of the topic sentence

Examples

Conclusion

Summary and opinion

➢ *For and against essay:*

Typical questions:

Discuss the advantages and disadvantages.

Discuss the advantages and disadvantages and give your own opinion.

Structure:

Introduction

Paraphrasing the question

Outlining the problem

Main Body Paragraph 1

Stating one advantage

Expanding / explaining advantage

Examples

Result

Main Body Paragraph 2

Stating one disadvantage

Expand / explaining disadvantage

Examples

Result

Conclusion

Summary

Opinion

> ➢ *Discoursive essay:*

<u>**Typical questions:**</u>

Discuss both points of view and give your opinion.

<u>**Structure:**</u>

Introduction

Paraphrasing question and / or stating both viewpoints.

Thesis Statement

Outlining the problem

Main Body Paragraph 1

Stating the first viewpoint

Discussing the first viewpoint

Reasoning why you agree or disagree with viewpoint

Examples to support your view

Main Body Paragraph 2

Stating the second viewpoint

Discussing the second viewpoint

Reasoning why you agree or disagree with viewpoint

Examples to support your view

Conclusion

Summary

Stating which view is better or more important

48. Read the essay, determine the type and analyze its structure.

Why I decided to be a scientist

The urge to know the truth about different elements concerning human life, animals, Earth and the entire universe courses through the veins of scientists. The research that has been conducted over the past few years has explored certain subjects that have impacted society in different ways.

There are certain groups of people that believe that science is the answer to find solace in the knowledge that progressively becomes available. There has been progress in healthcare systems and the accessibility of education through scientific research. However, on the other hand, some people have blamed science and labeled it as the cause of human suffering.

This, in some cases, is true as there are certain scientific practices that have caused unemployment, development of weapons of mass destruction and other poorly applied science practices. These cases have been the cause of prolonged arguments and debates about the justification of the goodness of science and the negativity of its badness.

However, science doesn't stand by to listen and be slowed down by any of those comments; instead, it continues to take steps towards making this world a better place. If I were a scientist, my foremost goal would be making the footprint of wrongly applied science very limited. For those that have been already dispersed and

continue wreaking havoc, I would work towards solutions on making them less dangerous or not at all.

As a result, I unapologetically say my goal is being a scientist, but not any scientist, rather a scientist with a difference. The field of science that has taken captive of me is pure science, due to its continual search for the truth and discoveries of mysteries. Pure science has uncovered important facts about the human race and its surroundings.

The reason why pure science was a logical decision is that I hate the ignorance of not being mindful about one's self. The reality is that most people existing in this modern world aren't informed about the realities of life. It is science that brought the truth out about these essential facts and that's just a small piece of what has been accomplished by science. Being a part of that would be a real privilege for me and having the first-hand experience would broaden my horizons and scientific understanding.

That understanding would enable me to apply industry best practices and show love for this planet and the residents that dwell in it. Through harnessing the powers of nature and using it to the benefit of humans and other living organisms, a lot more can be accomplished. The research that may seem too far out of our reach goes a long way and ends up affecting our everyday life.

The difference I would make would be secluding myself from powerful corporate and industrial companies that try to take over science for their selfish gain. These entities try to buy the developments of scientists and use for purposes that may not be good for the population at large. Deriving profit and more power, they desire to pursue more power and they use factors such as money and fame to entice good scientists to take the wrong path. Steering away from these temptations would be my first and foremost goal in this industry and I'll devote myself to science alone.

Coming to the governmental power play, during the Second World War, the Germans, Russians, English, Americans and the Japanese used science to reach their own ulterior objectives. I would vow for science before what my government would describe as a patriotic duty. Doing so with the belief that I am nature before I am a

citizen of a particular government. My sole purpose would be focusing on science despite my financial situation, prejudice, or other social injustice.

Extremist organizations are also continually recruiting and may be in need of scientists to be in their employ and develop dangerous weapons for them. No matter how much I may agree with their personal opinions deep inside me, I would not use science to aid them in accomplishing their mission.

The ultimate goal is outright independence from any power play, be it selfish company gain, from powerful governmental gain or from extremist organizations. The purposes outlined above may seem superficial or unreachable, but I believe I would have the necessary determination and devotion to the cause. Restoring dignity in science and shedding some good light on it would help regular citizens recognize how much it affects them.

The measures outlined above to restore the dignity of science will also serve as proof that there are good scientists that are loyal to chaste science practices. Science is the tip of the spear of everything we see, feel and hear in this modern world. The meaning of this is that it has enormous influential power over people, be it negative or positive.

Science has great power and it is innocent in its nature and unadulterated by any third force, but it is a pure, unique and non-human force. The possibilities are endless with science. There is always something to learn, redefine and better understand. With all that power, it still is neutral and calm, but it is only human that can determine whether it stays so.

Writing

49. Prepare a short essay (about 100 words) covering different problems of science. Choose one of the following types of essay according to the tasks given. Use the phrases from the *Useful language* box.

Science has done more harm that good. Do you agree?	Discuss the advantages and disadvantages of being a scientist.

Modern science in Ukraine: Problems and Perspectives

Useful language	
Introducing the topic	*Expressing opinions*
Many people believe / feel / claim that…	In my view / opinion …
People's opinions on … differ widely.	It seems to me that …
However, others maintain / think that…	I think / feel / maintain that …
We should acknowledge from the start that…..	*Contrasting*
	On the other hand, …
The key question is …	However, …
What needs to be decided is …	In contrast to …
Introducing additional points	Opposing to …
In addition, …	*Summing Up*
What is more, …	In conclusion, …
Furthermore, …	To sum up, …
Moreover, …	On balance, …
It is also worth bearing in mind that …	Even though … I would still maintain that…

Follow-Up

50. Discuss the following questions.

1. Does science always do good for the mankind?

2. What are your reasons of becoming a scientist?

3. Are you going to work in Ukraine as a scientist or abroad? Why?

4. What are the examples of science achievements commonly used today?

5. Do you believe that science can solve such global issues as climate change or nuclear weapon usage?

Work with Phrasal Verbs and Idioms

51. Translate the following phrasal verbs and idioms into Ukrainian.

dos and don'ts	keep the fingers crossed
make yourself understood	run out of smth
trial and error	go blank
learn smth by heart	miss smth out
rack your brains	make sense
on the tip of smb's tongue	in your element
go in one ear and out the other	drop out of (smth)

52. Match the phrasal verbs and idioms from Exercise 51 with their explanations.

a. speak in a way that others can understand;

b. try hard to remember smth;

c. a way of solving a problem by trying several possibilities and learning from your mistakes;

d. you are sure you know it, but you can't remember it at that moment;

e. things you should and shouldn't do;

f. not include smth, or fail to include smth; use all of smth and have no more left;

g. be unable to remember the answer to a question;

h. forget smth quickly;

i. hope for good luck or success;

j. learn smth by reading or hearing it repeatedly until you remember it exactly;

k. have a clear meaning; be logical and easy to understand.

53. Correct the mistake in each sentence. Write the correct word at the end.

1. If you see a mistake, you can just cross it off. _____

2. At school, we had to learn certain poems with heart._____

3. My pronunciation isn't good, I know, but I'm trying to make me understood. _____

4. Keep you fingers cross! _____

5. I was in such a panic my mind just went completely black. _____

6. I got stuck on one question, so I missed it away. _____

7. The teacher started the lesson with a long list of does and don'ts._____

54. Complete the following sentences with the phrasal verbs and idioms from Exercise 51.

1. Can you usually_____ yourself understood in English?

2. Do you think trial and _____is a good learning method?

3. I often find that I have words_____the tip of my_____.

4. I'm bad at languages. New words go in one _____ and out the_____ .

5. I often have to_____my brains to remember things I've learnt recently.

Unit 3.
MATHEMATICS AS THE LANGUAGE OF SCIENCE.
FIELDS OF MATHEMATICS

Warm-Up

1. Answer the following questions:

1. What is the origin of the word "mathematics"?

2. Were you good at maths at school?

3. Did you like maths at school?

4. Did you have a favourite or a hated maths teacher?

5. What is maths useful for nowadays if we have computers and calculators?

6. Are people who are really good at maths very interesting?

7. Are girls or boys better at maths?

8. How many different branches of mathematics do you know of?

9. What's most confusing to you: algebra, statistics, probability or chaos theory?

10. Are there times when two plus two equals five?

Vocabulary

2. Read the text.

One of the foremost reasons given for the study of mathematics is to use a common phrase, that ‑ mathematics is the language of science. This is not meant to imply that mathematics is useful only to those who specialized in science. No, it implies that even a layman must know something about the foundations, the scope and the basic role played by mathematics in our scientific age.

The language of mathematics consists mostly of signs and symbols, and, in a sense, is an unspoken language. There can be no more universal or more simple language, it is the same throughout the civilized world, though the people of each

country translate it into their own particular spoken language. For instance, the symbol 5 means the same to a person in England, Spain, Italy or any other country; but in each country it may be called by a different spoken word. Some of the best known symbols of mathematics are the numerals 1, 2, 3, 4, 5, 6, 7, 8, 9, 0 and the signs of addition (+), subtraction (-), multiplication (x), division (:), equality (=) and the letters of the alphabets: Greek, Latin, Gothic and Hebrew (rather rarely).

Mathematics can be subdivided into the study of structure, quantity, space, and change. There are also subdivisions dedicated to exploring links from mathematics to other fields: to logic, to set theory (foundations), to the empirical mathematics of the various sciences (applied mathematics), and more recently to the rigorous study of uncertainty.

The study of quantity begins with numbers, first the familiar natural numbers and integers ("whole numbers") and arithmetical operations on them, which are characterized in arithmetic. The deeper properties of integers are studied in number theory, from which come such popular results as Fermat's Last Theorem. As the number system is further developed, the integers are recognized as a subset of the rational numbers ("fractions"). These, in turn, are contained within the eal numbers, which are used to represent continuous quantities. Real numbers are generalized to complex numbers.

Discussion of the natural numbers leads to the transfinite numbers, which formalize the concept of "infinity". Another area of study is size, which leads to the cardinal numbers and then to another conception of infinity: the aleph numbers, which allow meaningful comparison of the size of infinitely large sets.

Many mathematical objects, such as sets of numbers and functions, exhibit internal structure. The structural properties of these objects are investigated in the study of groups, rings, fields and other abstract systems, which are themselves such objects. This is the field of abstract algebra. An important concept here is that of vectors, generalized to vector spaces, and studied in linear algebra. The study of vectors combines three of the fundamental areas of mathematics: quantity, structure,

and space. A number of ancient problems concerning Compass and straightedge constructions were finally solved using Galois theory.

The study of space originates with geometry – in particular, Euclidean geometry. Trigonometry is the branch of mathematics that deals with relationships between the sides and the angles of triangles and with the trigonometric functions; it combines space and numbers, and encompasses the well-known Pythagorean theorem. The modern study of space summarizes these ideas to include higherdimensional geometry, non-Euclidean geometries and topology. Quantity and space both play a role in analytic geometry, differential geometry, and algebraic geometry.

Within differential geometry are the concepts of fiber bundles and calculus on manifolds, in particular, vector and tensor calculus. Within algebraic geometry is the description of geometric objects as solution sets of polynomial equations, combining the concepts of quantity and space, and also the study of topological groups, which combine structure and space. Lie groups are used to study space, structure, and change. Topology in all its many ramifications may have been the greatest growth area in 20th century mathematics; it includes point-set topology, set-theoretic topology, algebraic topology and differential topology. In particular, instances of modern day topology are metrizability theory, axiomatic set theory, homotopy theory, and Morse theory. Topology also includes the now solved Poincaré conjecture and the controversial four color theorem, whose only proof, by computer, has never been verified by a human.

To understand and describe change is a common theme in the natural sciences, and calculus was developed as a powerful tool to investigate it. Functions arise here, as a central concept describing a changing quantity. The rigorous study of real numbers and functions of a real variable is known as real analysis, with complex analysis the equivalent field for the complex numbers.

Functional analysis focuses attention on (typically infinite-dimensional) spaces of functions. One of many applications of functional analysis is quantum mechanics. Many problems lead naturally to relationships between a quantity and its rate of

change, and these are studied as differential equations. Many phenomena in nature can be described by dynamical systems; chaos theory makes precise the ways in which many of these systems exhibit unpredictable yet still deterministic behavior.

3. Which of these statements are true? Correct the false ones.

1. Symbolic language is one of the main characteristics of modern mathematics for it determines its true aspect.

2. The language of mathematics consists of signs and symbols.

3. Mathematics can be subdivided into the study of quantity, structure, space, and change.

4. Understanding and describing number is a common theme in the natural sciences, and calculus was developed as a powerful tool to investigate it.

5. Trigonometry is the branch of mathematics that deals with relationships between the shapes and the angles of triangles and with the trigonometric functions; it combines space and numbers, and encompasses the well-known Pythagorean theorem.

6. The study of quantity starts with numbers, first the familiar natural numbers and integers and arithmetical operations on them, which are characterized in arithmetic.

7. Many mathematical objects, such as sets of numbers and functions, exhibit internal form.

4. Match the following words from the text to form word partnerships, translate them into Ukrainian.

internal change …………………………………………………………………..

unpredictable comparison ……………………………………………………………

fiber structure ……………………………………………………………………………

meaningful bundle …………………………………………………………………

rate of behavior …………………………………………………………………..

5. Find English equivalent of the following phrases:

- ціле число - …………………………………………………………….…

- точний доказ – …………………………………………………………

- нескінчена множина – ……………………………………………………..

- множина функцій – ……………………………………………………..

- включати в себе – ……………………………………………………..

- боки та кути трикутника – ……………………………………………..

- музика для душі – ....

- простір функцій – ....

6. Find word combinations with the following words from the text.

1. empirical – …………………………………………………………………..

2. applied – …………………………………………………………………..

3. polynomial – ………………………………………………………………….

4. continuous – ……………………………………………………………………

5. structural – …………………………………………………………………

6. natural – …………………………………………………………………………

7. equivalent – ……………………………………………………………………

8. quantum – ………………………………………………………………….

9. differential – ……………………………………………………………………..

10. general – …………………………………………………………………...

7. Choose one sentence from the Text and make up 5 types of questions to it.

Model: Many trends and traditions in this search are mixed.

Q1 (General): Are many trends and traditions in this search mixed?

Q2 (Alternative): Are many trends and traditions in this search mixed or combined?

Q3 (Tag): Many trends and traditions in this search are mixed, aren't they?

Q4 (Special): Where are many trends and traditions mixed?

Q5 (To the subject): What in this search is mixed?

8. Do the test:

1. The deeper properties of integers are studied in number theory, from which come such popular results as Fermat's … Theorem.
a) Third; b) Last; c) First; d) Second.

2. Many mathematical objects, such as sets of … , exhibit internal structure.
a) figures and numbers; b) shapes and functions;
c) numbers and functions; d) functions and space.

3. … both play a role in analytic geometry, differential geometry, and algebraic geometry.
a) space and shape ; b) quantity and figures; c) quantity and space; d) quantity and numbers.

4. Real numbers are generalized to ⋯ numbers.
a) complex; b) simple; c) "whole" ; d) - .

5. Functional analysis focuses attention on ⋯ of functions.
a) type; b) mode; c) structure; d) spaces.

6. The modern study of space generalizes these ideas to include higher-dimensional geometry, non-Euclidean geometries and ⋯ .
a) arithmetic; b) Euclidian geometries; c) topology; d) analysis.

7. Topology also includes the now solved Poincaré conjecture and the controversial four color theorem, whose only proof, by computer, has never been ⋯ .
a) checked by a computer; b) proven by a human;
c) verified by a human; d) analyzed by a human .

8. Within … geometry is the description of geometric objects as solution sets of polynomial equations.

a) algebraic; b) Euclidean; c) analytic ; d) differential .

9. Many phenomena in nature can be described by … systems.

a) similar; b) dynamical; c) static; d) different.

10. Another area of study is … , which leads to the cardinal numbers and then to another conception of infinity.

a) size; b) shape; c) form; d) space.

9. Translate from Ukrainian into English.

Математика – це наука про кількість та числа, про структури, порядки і відношення, що в них входить арифметика і алгебра, геометрія і тригонометрія і т.д. Математика на відміну від естетичних наук, вивчає не явища природи, а логічну побудову, тому експерименти в математиці є не випробовуванням природи, і перевіркою гіпотез в умових логіки. З початком математики математики. Рахунок став початком математики. Люди стикалися з математикою з давніх часів, наприклад, щоб визначити, хто багатший, або у кого більше худоби? Родоначальниками математики визнані греки (6-4 ст. до н.е.). Математика ділилася на арифметику і логістику. В середні віки (близько 400-1100) рівень математичного знання не піднімався вище арифметики, але важливим розділом математики в той період вважалася астрологія. В Західній Європі в 16 столітті були введені в обіг десяткові дроби і правила арифметичних дій з ними. На початку 19 століття математиків цікавила основна проблема алгебри – пошук загального рішення алгебраїчних рівнянь. Жоден математик сьогодні не може сподіватися, що буде знати більше того, що відбувається в дуже маленькому куточку науки.

10. Match the following terms with their explanation.

1. notation

2. arbitrary

3. equilateral

4. a solid

5. tetrahedron

6. octahedron

7. vertex (pl.vertices)

8. an obtuse angle

9. an isosceles triangle

10. multiple

11. fraction

12. an irrational number

13. a rational number

14. ratio

15. segment

16. equimultiple

17. geometric progression

18. product

19. integer

20. power

21. logarithm

a) not representing any specific value

b) having all sides of equal length

c) any series of signs or symbols used to represent quantities or elements in a specialized system

d) a solid figure having four plane faces

e) a solid figure having eight plane faces

f) a closed surface in three-dimensional space

g) the point of intersection of two sides of a plane figure or angle

h) (of a triangle) having two sides of equal length

j) (of an angle) lying between 90° and 180°

k) any real number that cannot be expressed as the ratio of two integers

l) the product of a given number or polynomial and any other one

m) a ratio of two expressions or numbers other than zero

n) a quotient of two numbers or quantities

o) any real number of the form a/b, where a and b are integers and b is not zero

p) one of the products arising from the multiplication of two or more quantities
by the same number or quality

q) a part of a line or curve between two

r) any rational number that can be expressed as the sum or difference of a finite
number of units

s) (also called: exponent, index) a number or variable placed as a superscript to the
right of another number or quantity indicating the number of times the number
or quantity is to be multiplied by itself

t) the result of the multiplication of two or more numbers, quantities etc.

u) a sequence of numbers, each of which differs from the succeeding one by a
constant ratio

v) the exponent indicating the power to which a fixed number, the base, must be
raised to obtain given number or variable

11. Write down the summary of the text using phrases from the Appendix I.

Grammar

Future Tenses

To express the meaning of future in English the following common future tenses and constructions are used: Future Simple, going to, Present Simple, Present Continuous, Future Continuous, Future Perfect.

Forms:

will-future	going to-future	Simple Present	Present Progressive	Future Progressive	Future Perfect
will + infinitive	to be (am, are, is) + *going to* + infinitive	infinitive 3rd person singular *(he, she, it)* infinitive + -s	to be (am, are, is) + infinitive + -ing	will + be + infinitive + -ing	will + have + past participle

Examples:

Positive Sentences

will-future	going to-future	Simple Present	Present Progressive	Future Progressive	Future Perfect
The sun will shine tomorrow.	We are *going to* fly to Leeds in summer.	The train leaves at 6.45.	I am going to a party tonight.	They will be playing football on Sunday afternoon.	She will have written the letter by tomorrow.

Negative Sentences

will-future	going to-future	Simple Present	Present Progressive	Future Progressive	Future Perfect
The sun will not shine tomorrow.	We are not *going to* fly to Leeds in summer.	The train does not leave at 6.45.	I am not going to a party tonight.	They will not be playing football on Sunday afternoon.	She will not have written the letter by tomorrow.

Questions

will-future	going to-future	Simple Present	Present Progressive	Future Progressive	Future Perfect
Will the sun shine tomorrow?	Are we *going to* fly to Leeds in summer?	Does the train leave at 6.45?	Am I going to a party tonight?	Will they be playing football on Sunday afternoon.	Will she have written the letter by tomorrow.

91

Use of Future Tenses

will-future	going to-future	Simple Present	Present Progressive	Future Progressive	Future Perfect
• future actions happen without the speaker's intention • prediction, assumption • spontaneous action	• planned action in the future • logical consequence (sth. is going to happen)	future action is fixed (e.g. timetable)	planned action in the near future	action will definitely happen (it usually happens)	sth. will already have happened before a certain time in the future

12. Fill in the correct future tense - will future, going to or Present Continuous.

1. They _____ (drive) to New York tomorrow morning.

2. I hope the weather _____ (be) nice.

3. I offered him this job. I think he _____ (take) it.

4. I promise I _____ (not tell) your secret to anyone.

5. Take your umbrella with you. It _____ (rain).

6. They _____ (play) cards this evening.

7. I _____ (go) to the cinema tomorrow.

8. They _____ (fly) to Seattle next summer holidays.

9. I _____ (invite) 50 people to the party, and I hope everyone _____ (come).

10. That exercise looks difficult. I _____ (help) you.

11. _____ he _____ (go) to the football match?

12. Are you sure they _____ (win) the match?

13. She _____ probably _____ (stay) till Thursday.

14. He _____ (not leave) tomorrow.

15. We think he _____ (come) home late in the night.

92

13. Put the verbs into the correct form (will, going to, Present Simple or Present Continuous).

2. I love London. I (probably / go)_____there next year.

2. Our train (leave) _____at 4:47.

3. What (wear / you)_____at the party tonight?

4. I haven't made up my mind yet. But I think I (find) _____ something nice in my mum's wardrobe.

5. This is my last day here. I (go) _____ back to England tomorrow.

6. Hurry up! The conference (begin)_____in 20 minutes.

7. My horoscope says that I (meet) _____ an old friend this week.

8. Look at these big black clouds! It (rain)_____.

9. Here is the weather forecast. Tomorrow (be)_____dry and sunny.

10. What does a blonde say when she sees a banana skin lying just a few metres in front of her? - Oh dear! I (slip) _____!

14. Fill in the gaps with the correct form of the verbs in brackets.

1. The train _____(to arrive) at 12:30.

2. We_____(to have) dinner at a seaside restaurant on Sunday.

3. It_____(to snow) in Brighton tomorrow evening.

4. On Friday at 8 o'clock I_____ (to meet) my friend.

5. Paul _____(to fly) to London on Monday morning.

6. Wait! I _____(to drive) you to the station.

7. The English lesson_____ (to start) at 8:45.

8. Are you still writing your essay? If you _____(to finish) by 4pm, we can go for a walk.

9. I_____(to see) my mother in April.

10. Look at the clouds – it _____(to rain) in a few minutes.

11. When they_____ (to get) married in March, they _____(to be) together for six years.

12. You're carrying too much. I_____ (to open) the door for you.

93

13. Do you think the teacher _____(to mark) our homework by Monday morning?

14. When I_____(to see) you tomorrow, I_____(show) you my new book.

15. After you_____ (to take) a nap, you_____ (to feel) a lot better.

16. I'm sorry but you need to stay in the office until you _____ (to finish) your work.

17. I_____(to buy) the cigarettes from the corner shop when it _____ (to open).

18. I_____ (to let) you know the second the builders_____ (to finish) decorating.

19. Before we _____(to start) our lesson, we _____(to have) a review.

20. We _____(to wait) in the shelter until the bus_____(to come).

21. I'm very sorry Dr. Jones_____ (not be) back in the clinic until 2pm.

22. This summer, I_____(to live) in Brighton for four years.

23. I don't think you_____ (to have) any problems when you land in Boston.

24. The baby should be due soon, next week she_____ (to be) pregnant for nine months.

25. By the time we get home, they_____ (to play) football for 30 minutes.

26. In three years I _____ (to live) in a different country.

27. When you_____ (to get) off the train, I _____(to wait) for you by the ticket machine.

28. _____ (to take) your children with you to France?

29. This time next week I _____ (ski) in Switzerland!

30. Now I_____ (to check) my answers.

Passive Voice

Active constructions are used more often in English than passive constructions. Generally, you need the passive voice in the following cases:

- When it is not known or not necessary to mention who performs the action, e.g. *Cotton is grown in Egypt.*

- When it is necessary to draw more attention to the receiver of the action. In this case, the object in the active construction becomes the subject in the passive construction and receives more attention. A phrase with the preposition "by" is used if it is necessary to show by whom the action is performed, e.g. *The book was written by T. Shevchenko.*

The examples of forming the Passive Voice:

Tense	Active	Passive
present simple	I **make** a cake.	A cake **is made** (by me).
present continuous	I **am making** a cake.	A cake **is being made** (by me).
past simple	I **made** a cake.	A cake **was made** (by me).
past continuous	I **was making** a cake.	A cake **was being made** (by me).
present perfect	I **have made** a cake.	A cake **has been made** (by me).
pres. perf. continuous	I **have been making** a cake.	A cake **has been being made** (by me).
past perfect	I **had made** a cake.	A cake **had been made** (by me).
future simple	I **will make** a cake.	A cake **will be made** (by me).
future perfect	I **will have made** a cake.	A cake **will have been made** (by me).

After modal verbs we use passive infinitive, for example:

*It can **be done** now.*

*The rule must **be learnt** by heart.*

15. Change these active sentences to passive. Choose if you need the agent or not.

1) The Government is planning a new road near my house.

_____

2) My grandfather built this house in 1943.

_____

3) Picasso was painting Guernica at that time.

_____

4) The cleaner has cleaned the office.

_____ _____

5) He had written three books before 1867.

_____

6) John will tell you later.

_____

7) By this time tomorrow we will have signed the deal.

_____

8) Somebody should do the work.

_____

9) The traffic might have delayed Jimmy.

_____

10) People speak Portuguese in Brazil.

_____

11) Everybody loves Mr Brown.

_____

12) They are building a new stadium near the station.

_____

13) The wolf ate the princess.

_____

14) At six o'clock someone was telling a story.

_____

15) Somebody has drunk all the milk!

_____

16) I had cleaned all the windows before the storm.

_____

17) A workman will repair the computer tomorrow.

_____

18) By next year the students will have studied the passive.

_____

19) James might cook dinner.

_____

20) Somebody must have taken my wallet.

_____

16. Change the following Passive phrases into the Active ones.

1. A novel is being read by Mary = Mary_____a novel.

2. A stone was being thrown by the kid = The kid _____ a stone.

3. A car has been bought by him = He _____a car.

4. The door had been knocked at by someone = Someone _____ the door.

5. Yam is eaten by people in my country = People_____yam in my country.

6. The jackpot will be won by her = She_____ the jackpot.

7. The mother tongue would be taught to him by her. = She _____ him the mother tongue.

8. The fish is eaten by the cat = The cat_____ the fish.

9. A book was offered to them by her = She_____them a book.

10. A letter was written to him by her = She_____him a letter.

Conditionals

There are four main kinds of conditionals in English:

- *The Zero Conditional:*

  (if + present simple, ... present simple)

  *If you **heat** water to 100 degrees, it **boils**.*

This conditional is used when the result will always happen. So, if water reaches 100 degrees, it always boils. It's a fact. I'm talking in general, not about one particular situation. The result of the 'if clause' is always the main clause.

- *The First Conditional:*

  (if + present simple, ... will + infinitive)

  *If it **rains** tomorrow, we**'ll go** to the cinema.*

It's used to talk about things which might happen in the future. Of course, we can't know what will happen in the future, but this describes possible things, which could easily come true.

- *The Second Conditional:*

  (if + past simple, ... would + infinitive)

  *If I **had** a lot of money, I **would travel** around the world.*

We can use it to talk about things in the future or present that are probably not going to be true. Maybe I'm imagining some dream for example.

- *The Third Conditional*

  (if + past perfect, ... would + have + past participle)

  *If I **had gone** to bed early, I **would have caught** the train.*

It talks about the past. Its used to describe a situation that didnt happen, and to imagine the result of this situation.

17. Make the Zero Conditional. Translate the sentences into Ukrainian.

1) If I _____(wake up) late, I_____(be) late for work.

2) If my husband_____(cook), he_____ (burn) the food.

3) If Julie _____(not/wear) a hat, she _____(get) sunstroke.

4) If children _____ (not/eat) well, they _____ (not/be) healthy.

5) If you _____ (mix) water and electricity, you _____(get) a shock.

6) If people _____ (eat) too many sweets, they _____ (get) fat.

7) If you _____(smoke), you_____ (get) yellow fingers.

8) If children_____ (play) outside, they_____(not/get) overweight.

9) If you _____ (heat) ice, it _____(melt).

10) If I _____(speak) to John, he _____ (get) annoyed.

18. Make the First Conditional. Translate the sentences into Ukrainian.

1) If I _____(go) out tonight, I _____ (go) to the cinema.

2) If you _____(get) back late, I _____ (be) angry.

3) If we _____(not/see) each other tomorrow, we _____ (see) each other next week.

4) If he_____(come), I_____ (be) surprised.

5) If we _____(wait) here, we_____(be) late.

6) If we _____(go) on holiday this summer, we _____ (go) to Spain.

7) If the weather _____ (not/improve), we _____ (not/have) a picnic.

8) If I _____(not/go) to bed early, I _____ (be) tired tomorrow.

9) If we _____ (eat) all this cake, we_____(feel) sick.

10) If you _____(not/want) to go out, I_____ (cook) dinner at home.

19. Make the Second Conditional. Translate the sentences into Ukrainian.

1) If I _____ (be) you, I _____ (get) a new job.

2) If he_____ (be) younger, he _____ (travel) more.

3) If we _____ (not/be) friends, I _____(be) angry with you.

4) If I _____(have) enough money, I _____ (buy) a big house.

5) If she _____ (not/be) always so late, she _____(be) promoted.

6) If we _____(win) the lottery, we_____(travel) the world.

7) If you_____(have) a better job, we_____(be) able to buy a new car.

8) If I _____ (speak) perfect English, I_____ (have) a good job.

9) If we _____ (live) in Mexico, I _____ (speak) Spanish.

10) If she_____ (pass) the exam, she _____(be) able to enter university.

20. Make the Third Conditional. Translate the sentences into Ukrainian.

1) If you _____(not/be) late, we _____ (not/miss) the bus.

2) If she_____ (study), she _____(pass) the exam.

3) If we _____(arrive) earlier, we_____(see) John.

4) If they _____ (go) to bed early, they_____ (not/wake) up late.

5) If he _____ (become) a musician, he _____ (record) a CD.

6) If she _____ (go) to art school, she _____ (become) a painter.

7) If I _____ (be) born in a different country, I _____ (learn) to speak a different language.

8) If she _____ (go) to university, she _____ (study) French.

9) If we _____ (not/go) to the party, we _____ (not/meet) them.

10) If he _____ (not/take) the job, he _____ (go) travelling.

21. Make the first, second or third conditional.

1) *(Third conditional)* If the students _____ (not/be) late for the exam, they _____ (pass) .

2) *(Third conditional)* If the weather _____ (not/be) so cold, we _____ (go) to the beach.

3) *(Second conditional)* If she _____ (have) her laptop with her, she _____ (email) me.

4) *(First conditional)* If she _____ (not/go) to the meeting, I _____ (not/go) either.

5) *(Third conditional)* If the baby _____ (sleep) better last night, I _____ (not/be) so tired.

6) *(First conditional)* If the teacher _____ (give) us lots of homework this weekend, I _____ (not/be) happy.

7) *(Second conditional)* If Lucy _____ (have) enough time, she _____ (travel) more.

8) *(First conditional)* If the children _____ (not/eat) soon, they _____ (be) grumpy.

9) *(First conditional)* If I _____ (not/go) to bed soon, I _____(be) tired in the morning.

10) *(Second conditional)* If I _____ (want) a new car, I _____ (buy) one.

22. Finish the sentences with a clause in the correct conditional:

1. If it is sunny tomorrow _____

2. If you sit in the sun too long _____

3. If I were you_____

4. If I were the Prime Minister_____

5. If she had studied harder_____

6. If I won the lottery_____

7. If I hadn't gone to bed so late_____

8. If I hadn't come to London _____

9. If you mix water and electricity _____

10. If she hadn't stayed at home _____

23. Supply the correct verb forms in these conditional sentences. Decide, which type of conditionals are these sentences.

1. If you (to heat) _____iron, it (to start)_____ to get red hot and then white hot.

2. If Molly and Paul (be)_____ misinformed about the train times they (not be) _____late.

3. If Ioannis (stay) _____ longer at the party, he (have)_____a good time.

4. If the government (lose) _____the next election, the Prime Minister (resign) _____ from politics.

5. If we (not go)_____to your friend's party, I never (meet) _____Alan.

6. If train fares (be) _____cheaper, more people (use)_____them.

7. If Molly (get)_____job that she's applied for, she will be delighted.

8. It (be) _____a disaster if the explosion had happened in the middle of the day.

9. If the talks (be broken) _____down again, there (be)_____ a war between the two countries.

10. If Ali (know) _____anything about mechanics at that time, I'm sure she (help) _____us.

11. He (have) _____a bad accident last Friday if he _____ (not / drive) more carefully.

24. Translate the sentences into English.

1. Якщо б у компанії погодилися, ми могли б досягти швидкого прогресу.

_____

2. Компанія поверне гроші, якщо ви передумаєте.

_____

3. Виставка, можливо, закрилася б, якби вони не знайшли нових спонсорів.

_____

4. Я б відмовився співпрацювати, якщо б я був у вашому положенні.

_____

5. Якщо ви вип'єте занадто багато кави, ви не зможете заснути.

_____

6. Якби Джек привіз карту, ми б не заблукали.

_____

7. Якщо ви зіткнетеся з Павлом, скажіть йому, що я хочу його бачити.

_____

Reported Speech

Reported Statements

When do we use reported speech? Sometimes someone says a sentence, for example "I'm going to the cinema tonight". Later, maybe we want to tell someone else what the first person said. We use a 'reporting verb' like 'say' or 'tell'. If this verb is in the present tense, it's easy. We just put 'she says' and then the sentence, e.g.

Direct speech: I like ice cream.

*Reported speech: She **says** (that) she **likes** ice cream.*

We don't need to change the tense, though probably we do need to change the 'person' from 'I' to 'she', for example. We also may need to change words like 'my' and 'your'.

!!! But, if the reporting verb is in the **past tense**, then usually we change the tenses in the reported speech:

Direct speech: I like ice cream.

*Reported speech: She **said** (that) she **liked** ice cream.*

Tense	Direct Speech	Reported Speech
present simple	I like ice cream	She said (that) she liked ice cream.
present continuous	I am living in London	She said (that) she was living in London.
past simple	I bought a car	She said (that) she had bought a car OR She said (that) she bought a car.
past continuous	I was walking along the street	She said (that) she had been walking along the street.
present perfect	I haven't seen Julie	She said (that) she hadn't seen Julie.
past perfect*	I had taken English lessons before	She said (that) she had taken English lessons before.
will	I'll see you later	She said (that) she would see me later.
would*	I would help, but.."	She said (that) she would help but...
can	I can speak perfect English	She said (that) she could speak perfect English.
could*	I could swim when I was four	She said (that) she could swim when she was four.
shall	I shall come later	She said (that) she would come later.
should*	I should call my mother	She said (that) she should call her mother
might*	I might be late	She said (that) she might be late

| must | I must study at the weekend | She said (that) she must study at the weekend OR She said she had to study at the weekend |

*doesn't change

Reported Questions

In fact, it's not so different from reported statements. The tense changes are the same, and we keep the question word. The very important thing though is that, once we tell the question to someone else, it isn't a question any more. So we need to change the grammar to a normal positive sentence, e.g.

Direct speech: Where do you live?

Reported speech: She asked me where I lived.

There are two types of questions in English – General (Yes/No question) and Special (wh- question). To report general questions we use the word if or either and the direct word order. The tenses are changed the same way as for statements. To report special questions, we also use the direct word order. Note: NO auxiliary verbs are used in reported questions, e. g.

Special questions

Direct Question	*Reported Question*
Where is the Post Office, please?	She asked me where the Post Office was.
What are you doing?	She asked me what I was doing.
Who was that fantastic man?	She asked me who that fantastic man had been.

General Questions:

Direct Question	*Reported Question*
Do you love me?	He asked me if I loved him.
Have you ever been to Mexico?	She asked me if I had ever been to Mexico.
Are you living here?	She asked me if I was living here.

Reported Requests

All requests mean the same thing, so we don't need to report every word when we tell another person about it. We simply use 'ask smb + to + infinitive':

Direct speech: Can you close the window?

Reported speech: She asked me to close the window.

Here are a few more examples:

Direct Request	Reported Request
Please help me.	She asked me to help her.
Please don't smoke.	She asked me not to smoke.
Could you bring my book tonight?	She asked me to bring her book that night.
Could you pass the milk, please?	She asked me to pass the milk.
Would you mind coming early tomorrow?	She asked me to come early the next day.
Please don't be late.	She asked us not to be late.

Reported Orders

We report orders in the same way as a request. We just use 'tell' instead of 'ask', e.g.

Direct Order	Reported Order
Go to bed!	He told the child to go to bed.
Don't worry!	He told her not to worry.
Be on time!	He told me to be on time.
Don't smoke!	He told us not to smoke.

Time Expressions with Reported Speech

When we report something, we need to change the time expressions as well as the tenses. Here's a table of some possible conversions:

now	then / at that time
today	yesterday / that day / Tuesday / the 27th of June
yesterday	the day before yesterday / the day before / Wednesday / the 5th of December
last night	the night before, Thursday night
last week	the week before / the previous week
tomorrow	today / the next day / the following day / Friday

25. Make the direct speech into reported speech. Use 'he told me' at the beginning of your answer. It's the same day, so you don't need to change the time expressions.

1) "We're working." _____

2) "She's coming to the party." _____

3) "I'll go to the cinema later." _____

4) "She has visited Paris three times." _____

5) "Jane left the party early." _____

6) "He didn't like chocolate as a child." _____

7) "He works in a bank." _____

8) "Julie doesn't like going out much." _____

9) "I don't have a computer." _____

10) "I haven't seen Julie for ages." _____

26. Make reported questions. Use "she asked me" at the beginning of each answer. It's the same day, so you don't need to change the time expressions.

1) "Where is he?" _____

2) "What are you doing?" _____

3) "Why did you go out last night?" _____

107

4) "Who was that beautiful woman?" _____

5) "How often do you go to the cinema?" _____

6) "Do you live in London?" _____

7) "Did he arrive on time?" _____

8) "Have you been to Paris?" _____

9) "Can you help me?" _____

10) "Is this road to the station?" _____

11) "Will you come later?" _____

12) "Have you studied reported speech before?" _____

27. Make reported requests or orders. Start each sentence with 'she asked me'or 'she told me'. It's the same day, so you don't need to change the time expressions.

1) "Please help me carry this." _____

2) "Please come early." _____

3) "Please buy some milk." _____

4) "Could you please open the window?" _____

5) "Could you bring the book tonight?" _____

6) "Can you help me with my homework, please?" _____

7) "Would you bring me a cup of coffee, please?" _____

8) "Would you mind passing the salt?" _____

9) "Would you mind lending me a pencil?" _____

10) "I was wondering if you could possibly tell me the time?" _____

28. Make reported speech. Start all your answers with 'she', and use the past simple of 'ask', 'say' or 'tell'. It's the same day, so you don't need to change the time expressions.

1) "Don't do it!" _____

2) "I'm leaving tomorrow." _____

3) "Please get me a cup of tea." _____

4) "She got married last year." _____

5) "Be quick!" _____ _

6) "Could you explain number four, please?" _____

7) "Where do you live?" _____

8) "We went to the cinema and then to a Chinese restaurant." _____

9) "I'll come and help you at twelve." _____ _

10) "What are you doing tomorrow?" _____

11) "Don't go!" _____

12) "Do you work in London?" _____ _

13) "Could you tell me where the post office is?" _____

14) "Come here!" _____ _

15) "I've never been to Wales." _____

16) "Have you ever seen The Lord of the Rings?" _____

17) "I don't like mushrooms." _____ _

18) "Don't be silly!" _____

19) "Would you mind waiting a moment please?" _____

20) "How often do you play sport?" _____

29. Translate the sentences into English. Mind the rules of reporting.

1. Він сказав, що повернеться. 2. Вона відповіла, що пароплав щойно прибув. 3. Він повідомив, що отримує листи щонеділі. 4. Вона наполягала, що хоче провести відпустку в Іспанії. 5. Він відказав, що вже спав, коли вони повернулися. 6. Я чула, що вони повернулися вчора. 7. Він сказав, що обідав, коли задзвонив телефон. 8. Він зізнався, що збирається обговорити це питання. 9. Вона нагадала, що прочитає книжку до кінця тижня. 10. Він пообіцяв, що все буде добре. 11. Вона поцікавилася, чи можна відкрити вікно. 12. Він подумав, чи не вегетаріанка вона. 13. Вона запитала, чи далеко до ринку. 14. Він поцікавився, чи читала вона оповідання в оригіналі. 15. Він розмірковував, чи не занадто часто вони ходять до театру. 16. Він поцікавився, чи любить вона драму. 17. Вона поцікавилася, чи пише він вірші. Він допитувався у неї, чому

вона сидить там вже годину. 18. Хіба він питав, чим ми займалися досі? 19. Він поцікавився, хто ще не бачив фільм. 20. Вона не розуміла, чому він не приніс доповідь? 21. Він поцікавився, коли я купив приймач. 22. Вона допитувалася, з ким він їздив на курорт. 23. Вона поцікавилася, скільки чоловік приїхало. Вона благала його прийти увечері. 24. Він наказав не ходити туди. 25. Він запропонував показати документи. 26. Вона ублагала прочитати її статтю. 27. Вона просила не ходити до театру без неї. 28. Вона розпорядилася варити каву. 29. Вона заборонила запалювати світло. 30. Вона рекомендувала залишити книгу там.

Reading

Branches of mathematical analysis

Pre-Reading Tasks

30. Answer the questions.

1. Do you know the adjective of the noun "algebra"?

2. Can you name a new division of algebra?

3. What is your favourite field in modern maths?

4. Why do you like studying maths?

5. What basic problems do the following fields of algebra – linear algebra, Lie group, Boolean algebra, homological algebra, vector algebra, matrix algebra – deal with?

Reading

31. Read the text.

Real analysis (traditionally, the theory of functions of a real variable) is a branch of mathematical analysis dealing with the real numbers and realvalued functions of a real variable. In particular, it deals with the analytic properties of real

functions and sequences, including convergence and limits of sequences of real numbers, the calculus of the real numbers, and continuity, smoothness and related properties of real-valued functions. Complex analysis, traditionally known as the theory of functions of a complex variable, is the branch of mathematical analysis that investigates functions of complex numbers. It is useful in many branches of mathematics, including algebraic geometry, number theory, applied mathematics; as well as in physics, including hydrodynamics, thermodynamics, mechanical engineering, electrical engineering, and particularly, quantum field theory. Complex analysis is particularly concerned with the analytic functions of complex variables (or, more generally, meromorphic functions). Because the separate real and imaginary parts of any analytic function must satisfy Laplace's equation, complex analysis is widely applicable to two-dimensional problems in physics.

Functional analysis. Functional analysis is a branch of mathematical analysis, the core of which is formed by the study of vector spaces endowed with some kind of limit-related structure (e.g. inner product, norm, topology, etc.) and the linear operators acting upon these spaces and respecting these structures in a suitable sense. The historical roots of functional analysis lie in the study of spaces of functions and the formulation of properties of transformations of functions such as the Fourier transform as transformations defining continuous, unitary etc. operators between function spaces. This point of view turned out to be particularly useful for the study of differential and integral equations. A differential equation is a mathematical equation for an unknown function of one or several variables that relates the values of the function itself and its derivatives of various orders. Differential equations play a prominent role in engineering, physics, economics, biology, and other disciplines. Differential equations arise in many areas of science and technology, specifically whenever a deterministic relation involving some continuously varying quantities (modeled by functions) and their rates of change in space and/or time (expressed as derivatives) is known or postulated. This is illustrated in classical mechanics, where the motion of a body is described by its position and velocity as the time value varies. Newton's laws allow one (given the position, velocity, acceleration and various forces

acting on the body) to express these variables dynamically as a differential equation for the unknown position of the body as a function of time. In some cases, this differential equation (called an equation of motion) may be solved explicitly. 16 Measure theory. A measure on a set is a systematic way to assign a number to each suitable subset of that set, intuitively interpreted as its size. In this sense, a measure is a generalization of the concepts of length, area, and volume. A particularly important example is the Lebesgue measure on a Euclidean space, which assigns the conventional length, area, and volume of Euclidean geometry to suitable subsets of the -dimensional Euclidean space. For instance, the Lebesgue measure of the interval in the real numbers is its length in the everyday sense of the word – specifically, 1. Technically, a measure is a function that assigns a non-negative real number or $+\infty$ to (certain) subsets of a set. It must assign 0 to the empty set and be (countably) additive: the measure of a 'large' subset that can be decomposed into a finite (or countable) number of 'smaller' disjoint subsets, is the sum of the measures of the "smaller" subsets. In general, if one wants to associate a consistent size to each subset of a given set while satisfying the other axioms of a measure, one only finds trivial examples like the counting measure. This problem was resolved by defining measure only on a sub-collection of all subsets; the so-called measurable subsets, which are required to form a -algebra. This means that countable unions, countable intersections and complements of measurable subsets are measurable. Nonmeasurable sets in a Euclidean space, on which the Lebesgue measure cannot be defined consistently, are necessarily complicated in the sense of being badly mixed up with their complement. Indeed, their existence is a non-trivial consequence of the axiom of choice. *Numerical analysis.* Numerical analysis is the study of algorithms that use numerical approximation (as opposed to general symbolic manipulations) for the problems of mathematical analysis (as distinguished from discrete mathematics). Modern numerical analysis does not seek exact answers, because exact answers are often impossible to obtain in practice. Instead, much of numerical analysis is concerned with obtaining approximate solutions while maintaining reasonable bounds on errors. Numerical analysis naturally finds applications in all fields of engineering and the

physical sciences, but in the 21st century, the life sciences and even the arts have adopted elements of scientific computations. Ordinary differential equations appear in celestial mechanics (planets, stars and galaxies); numerical linear algebra is important for data analysis; stochastic differential equations and Markov chains are essential in simulating living cells for medicine and biology.

32. Answer the questions:

1. What mathematical notions does the Real analysis deal with?

2. What types of functions does the Complex analysis concerned with?

3. Describe the historical roots of functional analysis.

4. What kind of disciplines do the differential equations play a prominent role in?

5. Referring to the measure theory how can the measure of a 'large' subset be decomposed into?

6. What fields does the Numerical analysis find its applications in?

7. Enumerate the basic forms of Mathematical Analyses and expand on their principles.

33. Ask the special questions.

1. Some properties are established by way of reasoning (how). 2. Geometry is concerned with the properties and relationships of figures in space (what ... with). 3. Some figures such as cubes and spheres have three dimensions (how many). 4. Many discoveries were made in the nineteenth century (when). 5. The truth of nonmathematical propositions in real life is much less certain (where). 6. The given proposition and its converse can be stated as follows (in what way). 7. Pure mathematics deals with the development of knowledge for its own purpose and need (what ... with). 8. Carl Gauss proved that every algebraic equation had at least one 21 root (who). 9. There are three words having the same meaning (how many). 10. The given definition corresponds to the idea of uniqueness (what).

34. Translate the definitions into Ukrainian and find the suitable term from the opposite column.

1. A number (symbol i) whose square equals a real negative number. These numbers were invented to allow equations to be solved when they have no real roots. For example, 1 has two real square roots, +1 and -1. The equation $x^2 = 1$ thus has two real roots, x = 1 and x = -1. The number -1 has no real square roots, so the equation $x^2 = -1$ has no real roots. However, the 'imaginary' number, denoted by i, allows the equation $x^2 = -1$ to have two imaginary roots, x = i and x = -i. By convention i always precedes any coefficient other than 1 or -1.	a) applied mathematics b) differential calculus and integral calculus c) dot product or scalar product d) number theory e) divergent, convergent f) infinitesimal g) imaginary number
2. In mathematics, the limit of a sequence is the value that the terms of a sequence "tend to". If such a limit exists, the sequence is called_ . A sequence which does not converge is said to be _＿_.	
3. The branch of mathematics that deals with the properties and relationships of numbers, especially the positive integers is called_____.	
4. A scalar function of two vectors, equal to the product of their magnitudes and the cosine of the angle between them, also called_____.	
5. The branch of mathematics that deals with the finding and properties of derivatives and integrals of functions, by methods originally based on the summation of infinitesimal differences. The two main types are_____.	

6. The abstract science of number, quantity, and space, either as abstract concepts (pure mathematics), or as applied to other disciplines such as physics and engineering is called _ . 7. Extremely small. However small a number other than zero may be, it is always possible to find another even closer to zero. The derivative of a continuous function considers the limit to which the ratio between changes in a function and changes in its argument tends as both changes become infinitesimally small.	

Follow-Up

35. Prepare a scheme demonstrating various branches of mathematics.

 Listening

Teaching mathematics in schools of Britain and China

Pre-Listening

39. In small groups, rank these with your partners. Put the ones that will best help people find a job at the top. Change partners often and share your rankings.

- maths
- English
- computer coding

- history
- engineering
- art

• physics   • woodwork

Listening

40. Listen to the recording. Fill in the gaps with the words or phrases you hear.

The UK wants Chinese teachers (1)_____ the level of maths in its schools. Chinese students have (2) _____ test results. There (3)_____ in maths levels between the UK and China. A newspaper said: "The children of cleaners in Shanghai (4)_____ UK doctors and lawyers in global maths tests." The UK (5) _____ best maths teachers (6)_____ ability of one million British students.

The UK (7) _____ countries in maths. Poor numeracy costs the UK economy $30 billion a year. Britain's education minister went on (8) _____ to China. She said: "We have some brilliant maths teachers…(9) _____ Shanghai… strengthened (10) _____ learn from them." She added: "They (11) _____ to maths and I want us to match that." Maths (12) _____ higher salaries and better jobs.

41. State whether the following sentences are true (T) or false (F).

a. Shanghai students are the world's best a maths.   T / F

b. Britain is just behind China in international test score tables.   T / F

c. Chinese children do better at maths than British doctors and lawyers.   T / F

d. The UK wants to employ 600 maths teachers from China.   T / F

e. Poor competence in maths costs the UK economy up to $30bn a year.   T / F

f. Britain's education minister said Chinese maths teachers were the best.   T / F

g. The minister said Chinese students have a never-say-die attitude.   T / F

h. Good maths qualifications greatly help employment opportunities.   T / F

Follow-Up

42. Role play the following situations.

Role A – Maths You think maths is the best qualification to have when job-hunting. Tell the others three reasons why. Tell them about potential problems with their qualifications. Also, tell the others which is the least useful of these (and why): English, computer coding or engineering.
Role B – English You think English is the best qualification to have when job-hunting. Tell the others three reasons why. Tell them about potential problems with their qualifications. Also, tell the others which is the least useful of these (and why): maths, computer coding or engineering.
Role C – Computer coding You think computer coding is the best qualification to have when job-hunting. Tell the others three reasons why. Tell them about potential problems with their qualifications. Also, tell the others which is the least useful of these (and why): English, maths or engineering.
Role D – Engineering You think engineering is the best qualification to have when job-hunting. Tell the others three reasons why. Tell them about potential problems with their qualifications. Also, tell the others which is the least useful of these (and why): English, computer coding or maths.

Answering IELTS Questions

Pre-Speaking

43. Do you know what IELTS stand for? What sorts of tasks does it involve? Have you ever tried passing this exam? Find as much as you can about this exam and share your findings with your groupmates.

44. Analyze the following answers to the questions at IELTS session. What makes the answers sound natural? Check your answers below.

1. Do you like maths? (Is maths your favourite subject?)

(Answer 1)

It's such a shame to say never. I'm not into numbers, I'm the dumbest when learning mathematics. I remember when I was a high school student I always got a D+ or D- mark in major exams and no matter how hard I tried, I just couldn't improve my grades most especially in Trigonometry and Statistics.

(Answer 2)

Definitely! I don't want to blow my own trumpet but to be honest with you, I got very good grades in mathematics from primary school to secondary school. And that's the main reason why I'm currently majoring statistics in my university, I want to be a statistician someday. I believe I inherited my dad's mathematical and analytical skills and I'm so grateful for that.

2. When did you start learning mathematics?

If my memory serves me well, I learned that subject when I was in my first grade of primary school. I learned the basic arithmetic, but only addition and subtraction. Like counting how many apples or candies and subtracting the apples if I ate one or two, something like that. That was a piece of cake!

3. Do you use a calculator?

(Answer 1)

Yes I do! I often use my phone's calculator when I go shopping at the grocery store. I always make sure to keep track of my expenses as I don't want to go beyond my budget. My phone's calculator is a big help for me to not overspend.

(Answer 2)

No I don't since I'm not a student anymore. If I need to calculate something I just do it on my mind or if the numbers are just too huge for me to handle, I just do a manual calculation using a pen and a piece of paper.

4. Do you think mathematics is important?

Yes, it is very essential in our everyday lives since everything in this world is interconnected with math. From reading the time and dates to counting money and in budgeting, not to mention understanding the prices of goods and how much we need to pay. If we're all ignorant of basic math, we surely can never survive.

Check your answers:
1) **ANSWER 1:** The speaker started his answer with a very good expression expressing his negative answer. That expression was a good start instead of just saying 'no'. And he used some good topic vocabulary words related to math study.
   ANSWER 2: The speaker gave a straightforward positive answer then he proceeded to his explanation.Then he related his main reason to what he wanted to have as a profession. Also he had used some topic vocabulary words or expressions. His answer was direct with good expressions and very natural.
2) The speaker opened his introduction with a very good expression. Use that expression when you're trying to remember something that happened in the past. Using that makes you sound very natural. Notice how he answered it well – he talked about areas in math and added some very good examples of the situation. Brief answer and well-composed answer.
3) **ANSWER 1:** The speaker provided an affirmative short direct answer to the question. In order to make his answer longer he talked about his routine of shopping and on how he used a calculator during that time. This kind of example made his answer more detailed.
   ANSWER 2: The speaker developed a negative straightforward answer. And in order for him to extend his answer, he simply talked about his technique in calculating numbers without relying on calculator. It's a realistic answer and organized.
4) Here the speaker started his answer by giving a paraphrased introduction then immediately provided his answer. He provided a very good explanation to his answer by mentioning instances on how important math in every person's life. He ended his answer by using a conditional tense, that would surely make his Grammar mark better.

Speaking

45. Answer the questions from exerices 44 using the lexical resource below. Try to sound natural and precise.

LEXICAL RESOURCE

Essential [adj.] – very important

Interconnected [adj.] – all parts connected to one another

Not to mention [phrase] – used to introduce an additional fact

Ignorant [adj.] – uneducated; lack of knowledge

It's such a shame [expression] – it means it's very unfortunate

Be into (I'm not into) [expression] – to be interested in

Dumbest [adj. in superlative form] – stupid; lack of intelligence

D mark [noun] – it's a grading system that means less unsatisfactory performance [A is the highest grade]

Blow one's trumpet [expression] – to crow, brag, boast

Statistician [noun] – an expert in doing analysis of statistics

Inherit [verb] – derive [behavior/characteristics] genetically from one's parents or ancestors

Grateful [adj.] – thankful; blessed

If my memory serves me well/right/correctly [expression] – used for saying that you think you have remembered something correctly

Basic arithmetic [noun] – the basic calculation such as addition, subtraction, multiplication, and division

A piece of cake [idiom] – very easy

Keep track [phrase] – to make sure that you know what is happening

Beyond (my) budget [expression] – another way to say over the budget; out of budget

Manual calculation [noun] – to calculate without using a calculator

46. Prepare a list of five questions concerning the study of mathematics. Ask them and answer together with your partner.

Writing

Writing in Mathematics

Pre-Writing

47. Writing is very special for mathematics. You need not only know how to read the symbols, but also how to present and connect your ideas. Look at the example below. The first part (1) is an example of codified mathematical problem, while the second part (2) demonstrates the way it should be rendered in writing.

1)

$$L(C, P) \subset A_n$$
$$C \subset L \Rightarrow C \subset A_n$$
$$\text{Spse } p \in P, \ p \notin A_n \Rightarrow p_i < p_j \text{ for } i < j$$
$$c + p \in L \subset A_n$$
$$\therefore c_i + p_i \geq c_j + p_j \text{ but } c_i \geq c_j \geq 0, p_j \geq p_i \ \therefore \ (c_i - c_j) \geq (p_j - p_i)$$
$$\text{but } \exists \text{ a constant } k \ni c + kp \notin A_n$$
$$\text{let } k = (c_i - c_j) + 1 \qquad c + kp \in L \subset A_n$$
$$\therefore c_i + kp_i \geq c_j + kp_j \Rightarrow (c_i - c_j) \geq k(p_j - p_i)$$
$$\Rightarrow k - 1 \geq k \cdot m \qquad k, m \geq 1 \qquad \text{Contradiction}$$
$$\therefore p \in A_n$$
$$\therefore L(C, P) \subset A_n \Rightarrow C, P \subset A_n \text{ and the}$$
lemma is true.

2)

Let N denote the set of nonnegative integers, and let

$$N^n = \{ (b_1, \ldots, b_n) \mid b_i \in N \text{ for } 1 \le i \le n \}$$

be the set of n-dimensional vectors with nonnegative integer components. We shall be especially interested in the subset of "nonincreasing" vectors,

$$A_n = \{(a_1, \ldots, a_n) \in N^n \mid a_1 \ge \cdots \ge a_n\}. \tag{1}$$

If C and P are subsets of N^n, let

$$L(C, P) = \{c + p_1 + \cdots + p_m \mid c \in C, m \ge 0, \text{ and } p_j \in P \text{ for } 1 \le j \le m\} \tag{2}$$

be the smallest subset of N^n that contains C and is closed under the addition of elements of P. Since A_n is closed under addition, $L(C, P)$ will be a subset of A_n whenever C and P are both contained in A_n. We can also prove the converse of this statement.

48. Translate the following explanations of the Lemma in Ukrainian.

Lemma 1. If $L(C, P) \subseteq A_n$ and $C \ne \emptyset$, then $C \subseteq A_n$ and $P \subseteq A_n$.

Proof. (Now it's your turn to write it up beautifully.)

Proof. Assume that $L(C, P) \subseteq A_n$. Since C is always contained in $L(C, P)$, we must have $C \subseteq A_n$; therefore only the condition $P \subseteq A_n$ needs to be verified.

If P is not contained in A_n, there must be a vector $(b_1, \ldots, b_n) \in P$ such that $b_i < b_j$ for some $i < j$. We want to show that this leads to a contradiction.

Since the set C is nonempty, it contains some element $(c_1, \ldots, c_n)$. We know that the components of this vector satisfy $c_1 \ge \cdots \ge c_n$, because $C \subseteq A_n$.

Now $(c_1, \ldots, c_n) + k(b_1, \ldots, b_n)$ is an element of $L(C, P)$ for all $k \ge 0$, and by hypothesis it must therefore be an element of A_n. But if we take $k = c_i - c_j + 1$, we have $k \ge 1$ and

$$c_i + kb_i \ge c_j + kb_j,$$

hence

$$c_i - c_j \ge k(b_i - b_j). \tag{3}$$

This is impossible, since $c_i - c_j = k - 1$ is less than k, yet $b_j - b_i \ge 1$. It follows that $(b_1, \ldots, b_n)$ must be an element of A_n. ∎

Note that the hypothesis $C \ne \emptyset$ is necessary in Lemma 1, for if C is empty the set $L(C, P)$ is also empty regardless of P.

49. Write the following formulae in the proper "writing" manner. Solve them. Use the tips given below. Use Appendix 2 if necessary.

1. Use English words. Although there will usually be equations or mathematical statements in your proofs, use English sentences to connect them and display their logical relationships. If you look in your textbook, you'll see that each proof consists mostly of English words. In general, you should not use logic symbols such as $\forall$, $\implies$, $\exists$, $\wedge$, etc, unless you are writing about a problem in symbolic logic.

2. Show the logical connections among your sentences. Use phrases like "Therefore" or "because" or "if. . . then. . . " or "if and only if" to connect your sentences.

3. Do not start a sentence with a mathematical expression. All sentences should begin with English words, not mathematical symbols or expressions. You should revise and rewrite the sentence if this is not the case.

4. Math should not break at the end of a sentence. If a mathematical expression wraps at the end of a line, then you should rewrite the proof or possibly put longer or more important expressions in a displayed environment.

Good Phrases to Use in Math Papers:

• *Therefore (thus, so, hence, accordingly, it follows that, we see that, then)*

• *We assume that (assuming, where, M stands for)*

• *show (demonstrate, prove, explain why, find)*

• *if (whenever, provided that, when)*

• *notice that (note that, notice, recall)*

• *since (because)*

1. $4x - 7(2\text{-}x) = 3x + 2$

2. $L = \{\, a^k b^k \mid k \geq 0 \}$

Follow-Up

50. Create your own equation and write down its solution. Present it to the class.

Work with Phrasal Verbs and Idioms

51. Translate the phrasal verbs into Ukrainian.

think ahead (to sth) _____ _____

think   for   yourself   _

talk   it   /   sth   over   _

think   it   /   think   over   /   think   through   _

on   the   spur   of   the   moment   _

make   up   your   mind

think   straight   _

think twice _____ _____

think   back   _

take   it   in   _

have got a good head for sth _____

slip your mind _____ _____

know   sth   like   the   back   of   your   head   _

get   the   hang   of   sth   _

out of practice _____ _____

give sth a try _____

52. Match the following definitions with the appropriate phrasal verbs or idioms from Exercise 51.

1. form your opinions rather than simply believing what other people say;

2. think about things that happened in the past;

3. think about a future event and plan for it;

4. think carefully about the possible results of sth.;

5. know sth very well (INF);

6. make an attempt to do sth;

7. less good at doing sth than you used to be, because you haven't done it for some time;

8. learn or begin to understand how to do sth;

124

9. fully understand and remember what you hear, see, or read;

10. be naturally good at doing sth.

**53. One word is missing after *think* in each sentence. Write it at the end.**

1. I couldn't think; I was nervous and everyone was looking at me. _____

2. We must think and decide where we're going for our holidays this year._____

3. He needs to think himself rather than go along with everyone else. _____

4. When I think to my school days, I realize how unhappy I was. _____

5. If you have a burglar alarm, it makes burglars think about breaking in. _____

6. Could you give me a few days to think it? _____

54. Complete the sentences.

1. I've got a chance to work abroad, but I'd like to think it_____ first.

2. Do you ever think_____to the time you spent in Kenya?

3. We offered Maria the job but she wants to talk it_____ with her family.

4. I was under so much stress that I just wasn't thinking_____; I was very confused!

5. I can't make up my _____what to wear to the party tomorrow.

6. Don't listen to what other people say – think for _____.

7. I just accepted the offer on the_____ of the moment. I wish I hadn't now.

55. Complete the questions. Answer them.

1. Are you good_____maths?

2. Have you got a good_____for figures?

3. Do you find it easy to take_____a lot of factual information?

4. Which town do you know like the _____of your hea d?

5. Are you any_____at cooking? If not, are you prepared to_____it a try?

6. Do other people's birthdays ever slip your_____?

7. Do you think it's easy for a beginner to get the_____of skiing?
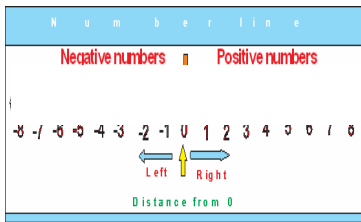
Unit 4. Integer

Warm-Up

1. What do you know about integers?

2. Can you read the following scheme?
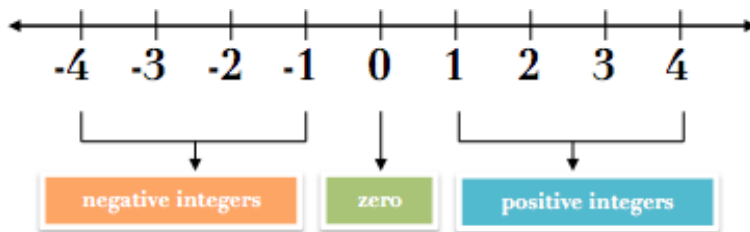
3. What is the difference between positive and negative integers?

4. Which derivatives from the word "integer" do you know?

5. What notion is opposed to the notion "integer"?

Vocabulary

2. Read the text.

An **integer** (from the Latin *integer* meaning "whole") is a number that can be written without a fractional component. For example, 21, 4, 0, and −2048 are integers, while 9.75, 5½, and √2 are not.

The set of integers consists of zero (0), the natural numbers (1, 2, 3, ...), also called *whole numbers* or *counting numbers*, and their additive inverses (the **negative integers** −1, −2, −3, ...). This is often denoted by a boldface Z ("**Z**") or blackboard bold standing for the German word *Zahlen* ([ˈtsaːlən], "numbers").

ℤ is a subset of the sets of rational and real numbers and, like the natural numbers, is countably infinite.

The integers form the smallest group and the smallest ring containing the natural numbers. In algebraic number theory, the integers are sometimes called **rational integers** to distinguish them from the more general algebraic integers. In fact, the (rational) integers are the algebraic integers that are also rational numbers.

Algebraic properties

Integers can be thought of as discrete, equally spaced points on an infinitely long number line. In the above, non-negative integers are shown in purple and negative integers in red.

Like the natural numbers, $\mathbf{Z}$ is closed under the operations of addition and multiplication, that is, the sum and product of any two integers is an integer. However, with the inclusion of the negative natural numbers, and, importantly, 0, $\mathbf{Z}$ (unlike the natural numbers) is also closed under subtraction. The integers form a unital ring which is the most basic one, in the following sense: for any unital ring, there is a unique ring homomorphism from the integers into this ring. This universal property, namely to be an initial object in the category of rings, characterizes the ring $\mathbf{Z}$.

Properties of addition and multiplication on integers

	Addition	Multiplication
Closure:	a + b is an integer	$a \times b$ is an integer
Associativity:	$a + (b + c) = (a + b) + c$	$a \times (b \times c) = (a \times b) \times c$
Commutativity:	$a + b = b + a$	$a \times b = b \times a$
Existence of an identity element:	$a + 0 = a$	$a \times 1 = a$
Existence of inverse elements:	$a + (-a) = 0$	An inverse element usually does not exist at all.
Distributivity:	$a \times (b + c) = (a \times b) + (a \times c)$ and $(a + b) \times c = (a \times c) + (b \times c)$	
No zero divisors:		If $a \times b = 0$, then $a = 0$ or $b = 0$ (or both)

$\mathbf{Z}$ is not closed under division, since the quotient of two integers (e.g., 1 divided by 2), need not be an integer. Although the natural numbers are closed under exponentiation, the integers are not (since the result can be a fraction when the exponent is negative).The following lists some of the basic properties of addition and multiplication for any integers a, b and c.

In the language of abstract algebra, the first five properties listed above for addition say that **Z** under addition is an abelian group. As a group under addition, **Z** is a cyclic group, since every non-zero integer can be written as a finite sum $1 + 1 + \cdots + 1$ or $(-1) + (-1) + \cdots + (-1)$. In fact, **Z** under addition is the *only* infinite cyclic group, in the sense that any infinite cyclic group is isomorphic to **Z**.

The first four properties listed above for multiplication say that **Z** under multiplication is a commutative monoid. However not every integer has a multiplicative inverse; e.g. there is no integer x such that $2x = 1$, because the left hand side is even, while the right hand side is odd. This means that **Z** under multiplication is not a group.

All the rules from the above property table, except for the last, taken together say that **Z** together with addition and multiplication is a commutative ring with unity. It is the prototype of all objects of such algebraic structure. Only those equalities of expressions are true in **Z** for all values of variables, which are true in any unital commutative ring. Note that certain non-zero integers map to zero in certain rings.

At last, the property (*) says that the commutative ring **Z** is an integral domain. In fact, **Z** provides the motivation for defining such a structure.

The lack of multiplicative inverses, which is equivalent to the fact that **Z** is not closed under division, means that **Z** is *not* a field. The smallest field with the usual operations containing the integers is the field of rational numbers. The process of constructing the rationals from the integers can be mimicked to form the field of fractions of any integral domain. And back, starting from an algebraic number field (an extension of rational numbers), its ring of integers can be extracted, which includes **Z** as its subring.

Although ordinary division is not defined on **Z**, the division "with remainder" is defined on them. It is called Euclidean division and possesses the following important property: that is, given two integers a and b with $b \neq 0$, there exist unique integers q and r such that $a = q \times b + r$ and $0 \leq r < |b|$, where $|b|$ denotes the absolute value of b. The integer q is called the *quotient* and r is called the *remainder* of the division of a by b. The Euclidean algorithm for computing greatest common

divisors works by a sequence of Euclidean divisions.Again, in the language of abstract algebra, the above says that **Z** is a Euclidean domain. This implies that **Z** is a principal ideal domain and any positive integer can be written as the products of primes in an essentially unique way. This is the fundamental theorem of arithmetic.

Order-theoretic properties

Z is a totally ordered set without upper or lower bound. The ordering of **Z** is given by: ... $-3 < -2 < -1 < 0 < 1 < 2 < 3 < ...$

An integer is *positive* if it is greater than zero and *negative* if it is less than zero. Zero is defined as neither negative nor positive.

The ordering of integers is compatible with the algebraic operations in the following way: if $a < b$ and $c < d$, then $a + c < b + d$

if $a < b$ and $0 < c$, then $ac < bc$.

It follows that **Z** together with the above ordering is an ordered ring.

The integers are the only nontrivial totally ordered abelian group whose positive elements are well-ordered. This is equivalent to the statement that any Noetherian valuation ring is either a field or a discrete valuation ring.

Construction

Red points represent ordered pairs of natural numbers. Linked red points are equivalence classes representing the blue integers at the end of the line.

In elementary school teaching, integers are often intuitively defined as the disjoint union of the (positive) natural numbers, the singleton set whose only element is zero, and the negations of natural numbers. However, this style of definition leads to many different cases (each arithmetic operation needs to be defined on each combination of types of integer) and makes it difficult to prove that these operations obey the laws of arithmetic. Therefore, in modern set-theoretic mathematics a more abstract construction, which allows one to define the arithmetical operations without any case distinction, is often used instead. The integers can thus be formally constructed as the equivalence classes of ordered pairs of natural numbers (*a*,*b*).

The intuition is that (*a*,*b*) stands for the result of subtracting *b* from *a*.To confirm our expectation that $1 - 2$ and $4 - 5$ denote the same number, we define an

equivalence relation ~ on these pairs with the following rule: $(a, b) \sim (c, d)$ precisely when a+d = b+c.

Addition and multiplication of integers can be defined in terms of the equivalent operations on the natural numbers; denoting by [(a,b)] the equivalence class having (a,b) as a member, one has:

$$[(a, b)] + [(c, d)] := [(a + c, b + d)].$$
$$[(a, b)] \cdot [(c, d)] := [(ac + bd, ad + bc)].$$

The negation (or additive inverse) of an integer is obtained by reversing the order of the pair: $-[(a, b)] := [(b, a)].$

Hence subtraction can be defined as the addition of the additive inverse:

$$[(a, b)] - [(c, d)] := [(a + d, b + c)].$$

The standard ordering on the integers is given by:

$[(a, b)] < [(c, d)]$ iff $a + d < b + c.$

It is easily verified that these definitions are independent of the choice of representatives of the equivalence classes.

Every equivalence class has a unique member that is of the form (n,0) or (0,n) (or both at once). The natural number n is identified with the class [(n,0)] (in other words the natural numbers are embedded into the integers by map sending n to [(n,0)]), and the class [(0,n)] is denoted −n (this covers all remaining classes, and gives the class [(0,0)] a second time since −0 = 0. Thus, [(a,b)] is denoted by

$$\begin{cases} a - b, & \text{if } a \geq b \\ -(b - a), & \text{if } a < b. \end{cases}$$

If the natural numbers are identified with the corresponding integers (using the embedding mentioned above), this convention creates no ambiguity.

This notation recovers the familiar representation of the integers as {... −3,−2,−1, 0, 1, 2, 3, ...}. Some examples are:

$$
\begin{aligned}
0 &= [(0,0)] &= [(1,1)] &= \cdots &= [(k,k)] \\
1 &= [(1,0)] &= [(2,1)] &= \cdots &= [(k+1,k)] \\
-1 &= [(0,1)] &= [(1,2)] &= \cdots &= [(k,k+1)] \\
2 &= [(2,0)] &= [(3,1)] &= \cdots &= [(k+2,k)] \\
-2 &= [(0,2)] &= [(1,3)] &= \cdots &= [(k,k+2)].
\end{aligned}
$$

Cardinality. The cardinality of the set of integers is equal to (aleph-null). This is readily demonstrated by the construction of a bijection, that is, a function that is injective and surjective from **Z** to **N**. If **N** = {0, 1, 2, ...} then consider the function:

$$
f(x) = \begin{cases} 2|x|, & \text{if } x < 0 \\ 0, & \text{if } x = 0 \\ 2x - 1, & \text{if } x > 0. \end{cases}
$$

{... (-4,8) (-3,6) (-2,4) (-1,2) (0,0) (1,1) (2,3) (3,5) ...}

If **N** = {1, 2, 3, ...} then consider the function:

$$
g(x) = \begin{cases} 2|x|, & \text{if } x < 0 \\ 2x + 1, & \text{if } x \geq 0. \end{cases}
$$

{... (-4,8) (-3,6) (-2,4) (-1,2) (0,1) (1,3) (2,5) (3,7) ...} If the domain is restricted to **Z** then each and every member of **Z** has one and only one corresponding member of **N** and by the definition of cardinal equality the two sets have equal cardinality.

Comments:

fractional component – дрібна складова

set of integers – множина цілих чисел

natural numbers – натуральні числа

additive inverse – аддитивна інверсія, інверсія відносно додавання

boldface – напівжирний шрифт

blackboard bold – спосіб написання напівжирним шрифтом

countably infinite – злічувально безкінцевий

algebraic number theory – алгебраїчна теорія чисел

algebraic integers – ціле алгебраїчне число

number line – цифрова вісь

unital ring – унітальне кільце (кольцо́ (асоціативне кільце) – в загальній алгебрі - алгебраїчна структура, в якій визначені операція оборотного складання і операція множення, за властивостями схожі на відповідні операції над числами. Найпростішими прикладами кілець є числа (цілі, речові, комплексні), функції, визначені на заданій множині.

ring homomorphism – гомоморфізм кілець

universal property – універсальна властивість

initial object – ініціальний об'єкт (в теорії категорій початковий об'єкт категорії C - це її об'єкт I, такий що для будь-якого об'єкта X в C існує єдиний морфізм I → X.)

exponentiation [ˌɛkspənɛnʃiˈeɪʃ(ə)n] – зведення в ступінь

abstract algebra – абстрактна алгебра

abelian group – абелева група; комутативна група

cyclic group – циклічна група

isomorphic – ізоморфний, що має ідентичну форму; в математиці кажуть, що між двома структурами існує ізоморфізм, якщо для кожного компонента однієї структури є відповідний компонент в іншій структурі, і навпаки;

commutative monoid – комутативний [абелев] моноїд

commutative ring – комутативне кільце

equality of expressions – рівність виразів

integral domain – область цілісності

field of fractions – поле відносин

number field – числове поле; поле чисел

subring – подкільце (підмножина кільця)

absolute value – абсолютне значення, абсолютна величина, модуль (числа)

remainder – 1) залишок (від ділення); 2) різниця; 3) залишковий член (ряду)

greatest common divisors – найбільший спільний дільник

principal ideal domain – область головних ідеалів

fundamental theorem of arithmetic – основна теорема арифметики

totally ordered set – цілком упорядкована множина

ordered ring – упорядковане кільце

Noetherian valuation ring – кільце нормування Нетер;

discrete valuation ring – кільце дискретного нормування

disjoint union – незв'язне об'єднання

singleton set – одноелементні безліч

equivalence classes – класи еквівалентності

ordered pair of natural numbers – впорядкована пара натуральних чисел

equivalence relation – відношення еквівалентності

to be embedded into – бути вкладеним в

embedding (or imbedding) – вкладення в математиці - це спеціального виду відображення одного примірника деякої математичної структури під другий примірник такого ж типу. А саме, вкладення деякого об'єкту X в Y задається ін'єкційних відображенням, яке зберігає деяку структуру. Що означає «збереження структури», залежить від типу математичної структури, об'єктами якої є X і Y. У термінах теорії категорій відображення, «зберігає структуру», називають морфізма.

familiar representation – звичне представлення

primitive data type – вихіідний тип даних

computer languages (programming languages) – мови програмування

cardinality – кардинальне число, потужність безлічі

aleph-null – алеф-нуль

bijection – біекція, взаємно-однозначне відображення

injective – ін'єктивний а) реалізує вкладення, який реалізує ін'єктивні відображення; б) збільшує число аргументів (про функції)

surjective – сюр'єктивний

3. Fill in the blanks with the necessary words.

1. To (виміряти) an angle, compare its side to the corner of this page. 2. The corner represents (прямий кут), whose measurement is 90°. 3. If the angle is smaller than the corner, the angle is (гострий кут). 4. If the opening is larger than the corner of the page, the angle is (тупй). Its measure is more than 90°. 5. Locate the point of

your (транспортир) which represents the (вершина) and align the vertex with the point. 6. Rotate the protractor keeping the vertex aligned until one (бік) of the angle is on the 0° – 180° line of the protractor. 7. The angle measure that is (визначається) by the side of the angle that is not on the 0° – 180° line of the protractor. 8. You may have to (продлити) one side of the angle so that it crosses the scale. 9. Use the proper (позначення), m is the symbol for "measure of".

4. Find the corresponding Ukrainian sentence.

1. From what you already know you may deduce that drawing two rays originating from the same end point forms an angle.

a) З того, що ви вже знаєте, ви можете зробити висновок, що, малюючи два променя, що виходять з однієї кінцевої точки, ви отримуєте кут.

b) З того, що вам відомо, ви можете зробити висновок, що зображення двох променів, що беруть початок в одній і тій же кінцевій точці, утворює кут.

c) З того, що ви вже дізналися, ви, можливо, зробили висновок, що малюнок двох променів, що беруть початок в одній кінцевій точці, утворює кут.

2. The approach to the problem being considered remained traditional.

a) Розглядався підхід до традиційної проблеми, що залишився.

b) Підхід до проблеми, що залишилась, розглядався традиційно.

c) Підхід до даної проблеми залишався традиційним.

3. Physical facts expressed in terms of mathematics do not seem unusual nowadays.

a) Виражені математичні факти здавалися незвичайними в фізичних термінах в даний час.

b) Фізичні факти, виражені в математичних термінах, які не здаються незвичними сьогодні.

c) Те, що фізичні факти в даний час виражаються математичними термінами, не здається сьогодні незвичайним.

4. Having made a number of experiments Faraday discovered electromagnetic induction.

a) Проводячи ряд експериментів, Фарадей відкрив електромагнітну індукцію.

b) Провівши ряд експериментів, Фарадей відкрив електромагнітну індукцію.

c) Зробивши ряд експериментів, Фарадей відкрив електромагнітну індукцію.

5. Answer the questions below.

1. What have you seen if you multiply a whole number by 1?

2. Have you changed the fraction when you multiply 12 by 22 ?

3. What division have you used to change 68 to lower terms?

6. Translate the sentences from English into Ukrainian.

1. An angle is the union of two rays which have a common endpoint but which do not lie on the same line. ……………………………………………………………………

2. Since an angle is a union of two sets of points, it is itself a set of points. When we say "the angle ABC" we are talking about a set of points - the points lying on the two rays. …………………………………………………………………………………….

3. Two angles occur so often in geometry that they are given special names. An angle of 90° is called a right angle and an angle of 180° is called a straight angle.

…………………………………………………………………………………………

7. Translate the sentences into English.

1. Раціональне число – це число, яке може бути представлено у вигляді відношення a / b, де a i b - цілі числа i b - не дорівнює нулю.

2. Цілі числа – це розширення безлічі натуральних чисел , що $\mathbb{N}$ отримується

додаванням до $\mathbb{N}$ нуля негативних чисел виду -n. Безліч цілих чисел позначається $\mathbb{Z}$.

3. У математиці Синглетоном називається безліч з єдиним елементом. Наприклад, безліч {0} є Синглетон.

Grammar

Infinitive and Gerund

We use <u>gerunds (verb + ing):</u>

- After **certain verbs**, e.g. I **enjoy singing.**

- After prepositions, e.g. I drank a cup of coffee **before leaving.**

- As the subject or object of a sentence, e.g. **Swimming** is good exercise.

We use <u>'to' + infinitive:</u>

- After **certain verbs**, e.g. We **decided to leave.**

- After many adjectives, e.g. It's **difficult to get** up early.

- After verbs to show the purpose of an action, e.g. I **came** to London **to learn** English.

We use the <u>bare infinitive (the infinitive without 'to'):</u>

- After modal verbs, e.g. I can **meet** you at six o'clock.

- After 'let', 'make' and (sometimes) 'help', e.g. The teacher let us **leave** early.

- After some verbs of perception (see, watch, hear, notice, feel, sense), e.g. I watched her **walk** away.

- After expressions with 'why', e.g. Why **go** out the night before an exam?

We need to memorize the verbs after which we use Gerund or Infinitive. Here is the list of verbs, followed by Gerund or Infinitive.

Verbs+Gerund (-ing):

like, love, hate, don't mind, can'stand, enjoy, finish, miss, practise, admit, deny, suggest, recommend, consider, imagine, fancy, postpone, avoid.

Verbs+To-Infinitive:

would like, want, need, hope, expect, plan, decide, arrange, learn, seem, tend, offer, pretend, manage, agree, appear, can't wait, can't afford, prepare.

There are also some verbs that can be followed by Gerund or Infinitive, but changing their meaning:

Verbs followed by a gerund or infinitive with a change in meaning:

136

forget	I forgot to meet him. *(I didn't meet him because I forgot to do it.)*	
	I forgot meeting him. *(I don't have the memory of meeting him before.)*	
go on	He went on to learn English and French. *(He ended one period of time before this.)*	
	He went on learning English and French. *(He continued learning the languages.)*	
quit	She quit to work here. *(She quit another job in order to work here.)*	
	She quit working here. *(She quit her job here. She doesn't work here anymore.)*	
regret	I regret promising to help you. *(I'm sorry that I made the promise.)*	
	I regret to tell you that we can't hire you. *(I'm telling you now, and I'm sorry.)*	
remember	She remembered to visit her grandmother. *(She didn't forget to visit.)*	
	She remembered visiting her grandmother. *(She had memories of this time.)*	
stop	I stopped to call you. *(I interrupted another action in order to call you.)*	
	I stopped calling you. *(I stopped this activity. Maybe we had a fight.)*	

try	I tried to open the window. *(I attempted this action but didn't succeed.)*
	I tried opening the window. *(This was one option I sampled. Maybe the room was hot.)*

8. Read these sentences and state the form and the function of the Infinitive. Translate them into Ukrainian.

1. To solve the equation was not difficult for her. 2. The speaker at the conference didn't like to be interrupted. 3. The article is difficult to translate. 4. They must have attended his lecture before. 5. He is always the first to come to the University. 6. The method to be applied is rather complicated. 7. He worked hard in order not to be behind the other students. 8. The topic may have been considered at the previous lesson. 9. Our aim is to extend the definition. 10. It isn't easy to speak any foreign language. 11. He must be improving his knowledge of mathematics. 12. The scientist might have been working on this problem for many years.

9. Open the parentheses and give the correct form of the infinitive.

1. I am glad_____(read) this book now. 2. I hope_____(award) a scholarship for the coming semester. 3. He is happy_____(work) at this company for more than five years. 4. He does not like _____(interrupt) by anybody. 5. Ann was surprised _____(pass) the exams. 6. The question is too unexpected _____(answer) at once. 7. I want _____(solve) these equations. 8. This theorem was the first _____(prove). 9. She might _____(forget) to translate the text yesterday. 10. The question must _____(settle) an hour ago. 11. The article is _____ (write) in time. 12._____(Understand) the situation one must (know) the details.

10. Complete the sentences by using infinitives. Supply a preposition after the infinitive if necessary. Use the Model.

*Model: I'm planning **to fly** to the USA next year.*

1. The student promised not … late for the lecture. 2. I need … my homework tonight. 3. I want … computer games after my classes. 4. He intends … a programmer when he graduates from the university. 5. I hope … all of my courses this term. So far my grades have been pretty good. 6. I try … class on time every day. 7. I learned (how) … when I entered the university. 8. I like … a lot of e-mails from my friends. 9. I hate … in front of a large group. 10. My roommate offered … me with my English.

11. Write the correct form (gerund or infinitive) of the verbs given in parentheses. Sometimes more than one answer is possible.

1. He regrets_____(not study) harder when he was at school. 2. The teacher was very strict and nobody dared_____(talk) during his lessons. 3. She suggested _____(go) to the University by taxi. 4. _____(learn) English involves _____(speak) as much as you can. 5._____(Solve) this equation multiply each term in it by the quantity that precedes it. 6. On_____(obtain) the data the scientists went on working. 7. The procedure _____ (follow) depends entirely on the student. 8. This equation must_____(solve) at the previous lesson. 9. Euclid was the first _____(bring) all the known facts about geometry into one whole system. 10. We don't mind_____ (give) further assistance. 11. The method_____ (apply) is rather complicated. 12._____ (prove) this theorem means _____(find) a solution for the whole problem. 13. Students are _____-(study) the laws of mathematics and mechanics.

12. Fill in the gaps in the following sentences with the verbs from the box. You may have to change the form of the word.

try	get	look	repeat	rent	help	be	shut	follow	do
look	apologize	go	lie	speak	talk	work	have	smile	come

1. I want ＿＿＿＿＿to him. 2. He is afraid＿＿＿＿＿it himself. 3. She is ashamed of＿＿＿＿＿ the hat on. 4. He is proud of ＿＿＿＿＿ a bookworm. 5. He hopes ＿＿＿＿＿home soon. 6. He is tired of ＿＿＿＿＿ it again and again. 7. Where are you going ＿＿＿＿＿dinner? 8. He is accustomed to ＿＿＿＿＿her advice. 9. He decided＿＿＿＿＿there. 10. He is sorry about＿＿＿＿＿at them like this. 11. He agreed ＿＿＿＿＿together. 12. They like＿＿＿＿＿English. 13. He stopped ＿＿＿＿＿to her. 14. He crossed the room＿＿＿＿＿at the picture. 15. She complained about the door ＿＿＿＿＿with a bang. 16. She succeeded in ＿＿＿＿＿ there in time. 17. He objected to＿＿＿＿＿anybody during the test. 18. She hates ＿＿＿＿＿. 19. She was excited about＿＿＿＿＿a flat in the fashionable district. 20. He made her ＿＿＿＿＿.

13. Open the brackets and use the correct form of the verb (Gerund or Infinitive).

1. Did you remember＿＿＿＿＿＿＿＿ (post) the letters?

2. The doctor told him to stop ＿＿＿＿＿＿＿ (smoke).

3. That film made me＿＿＿＿＿ (cry).

4. I think you should avoid ＿＿＿＿＿＿ (eat) junk food.

5. The teacher encouraged him＿＿＿＿＿＿(rewrite) the essay.

6. She loves ＿＿＿＿＿＿＿ (watch) soap operas.

7. Students are not allowed ＿＿＿＿＿＿ (stay) in class during the break.

8. My friends advised me ＿＿＿＿＿＿＿ (take) on that job.

9. In the end we agreed＿＿＿＿＿＿＿ (share) the expenses.

10. I forgot ＿＿＿＿＿＿＿ (call) Sarah.

<h1 align="center">-ed and -ing Adjectives</h1>

Adjectives that end in *-ed* (e.g. *bored*, *interested*) and adjectives that end in *-ing* (e.g. *boring*, *interesting*) are often confused.

<h2 align="center">-ed <i>Adjectives</i></h2>

Adjectives that end in *-ed* generally describe emotions – they tell us how people feel.

I was so bored in that lesson, I almost fell asleep. He was surprised to see Helen after all those years. She was really tired and went to bed early.

<h2 align="center"><i>-ing</i> Adjectives</h2>

Adjectives that end in *-ing* generally describe the thing that causes the emotion – a boring lesson makes you feel bored.

Have you seen that film? It's really frightening. I could listen to her for hours. She's so interesting. I can't sleep! That noise is really annoying!

14. Choose the correct adjective.

1. My nephew was (amusing / amused) by the clown.

2. It's so (frustrating / frustrated)! No matter how much I study I can't seem to remember this vocabulary. 3. This lesson is so (boring / bored)!

4. I'm feeling (depressed / depressing), so I'm going to go home, eat some chocolate, and go to bed early with a good book.

5. I thought her new idea was absolutely (fascinated / fascinating).

6. This maths problem is so (confusing / confused). Can you help me?

7. The teacher was really (amusing / amused) so the lesson passed quickly.

8. The journey was (exhausting / exhausted)! Twelve hours by bus.

9. The plane began to move in a rather (alarming / alarmed) way.

10. He was (frightening / frightened) when he saw the spider.

11. I was really (embarrassing / embarrassed) when I fell over in the street.

12. That film was so (depressing / depressed)! There was no happy ending for any of the characters.

13. I'm sorry, I can't come tonight. I'm completely (exhausting / exhausted).

14. We are going in a helicopter? How (exciting / excited)!

15. Don't show my baby photos to people, Mum! It's so (embarrassing / embarrassed)!

16. It's okay, it's only me. Don't be (alarming / alarmed).

17. My sister is so (exciting / excited) because she is going on holiday tomorrow.

18. I hate long flights, I'm always really (boring / bored).

19. She looked very (confusing / confused) when I told her we had to change the plan.

20. John was (fascinated / fascinating) by Mandarin when he first started learning languages. He decided to study more and now he can speak it fluently.

Reading

Pre-Reading

15. Match the words with the definitions.

the trachea	*a kidney*	*the spleen*	*insulin*	*bionic*	*the pancreas*
	conventional		*prosthetics*		

1. a gland in your body, behind the stomach; it helps with digestion and produces insulin _____

2. artificial body parts _____

3. one of a pair of organs in your body; it helps you to urinate_____

142

4. an organ of the body; it produces and removes blood cells_____

5. a tube in your body which carries air; it helps you to breathe_____

6. an adjective used to talk about parts of the body; it means 'made stronger by using electronics'_____

7. traditional or usual _____

8. a hormone which controls the amount of glucose (sugar) in your blood _____

16. Read the following text.

Bionic robot-men

The very latest prosthetics

In the James Bond movie *Skyfall*, there is a frightening moment when the bad guy of the film removes his prosthetic mouth to show his damaged face. We are scared, but amazed at the possibility. Could it be possible to replace parts of our body and even improve on the original? The UK's Channel 4 has shown a documentary called 'How to Build a Bionic Man', featuring psychologist Bertolt Meyer who himself has a bionic hand. 'Rex', the Bionic Man, brings together scientists working on the latest research to test the limits of prosthetic technology.

Built by leading UK roboticists Richard Walker and Matthew Godden from Shadow Robot, Rex is currently on display at London's Science Museum. The two-metre tall artificial man has 28 of the latest artificial limbs and organs and cost almost $1 million to make. He has a 3D-printed skull, a synthetic blood system and artificial pancreas, kidney, spleen and trachea.

Showing technology to the world

Walker describes how their work began about two years ago when the production company contacted him. His team proposed to obtain the very latest prosthetics and build a human from it. As Walker says, 'see if it stands up and walks!' Their objective was to show people the latest artificial body parts, all of which can be used in the real world. Rex was born after two and a half months of late nights and lots of pizza.

Then there are the more conventional prosthetics like the artificial hand, which uses signals from nerves in the human body for picking up and holding things. Walker explains, 'to get the hand to pick something up, we had to simulate the human nerve signals that it would look for in the human body.'

Replacing failed organs

Walker is very surprised by how well technology is being used to build organs to function effectively when the original organ fails. So the artificial pancreas provides insulin and when insulin levels fall, insulin is released. When the insulin level rises again, the mechanical pancreas can absorb it, just like the real pancreas.

If the Bionic Man can be built again in five years' time, Walker predicts that we will be even more surprised by what prosthetic technology can do for our bodies.

Follow-Up

17. Choose the correct phrase to complete the sentences.

1. In the film 'Skyfall', the bad guy ...

    a. uses an artificial mouth to try to frighten people.

    b. uses an artificial mouth because his face was injured.

    c. feels both scared and amazed at the same time.

2. Rex, the Bionic Man, ...

    a. was built with technology which was a little limited.

    b. will go on show at a museum in London soon.

    c. has a number of artificial organs in his body.

3. Work began on Rex after ...

    a. a production company made contact with a robot expert.

    b. a robot expert managed to make a robot stand up and walk.

    c. a long discussion between two men eating pizza.

4. A conventional artificial hand ...

    a. makes a signal when it wants to pick something up.

    b. uses information from the human body to move.

    c. is not able to pick up or hold things.

5. The artificial pancreas ...

    a. works in the same way as a real pancreas.

    b. works in a very different way to a real pancreas.

    c. cannot release insulin like a real pancreas.

6. Walker predicts that ...

    a. another Bionic Man will be built five years from now.

    b. it will be a surprise if another Bionic Man is built.

    c. if another Bionic Man is built in the future, it will be even more surprising.

18. Fill the gaps with the correct phrase from the box.

how well technology	*two years ago*	*it cost nearly*
two and a half	*make it better*	*in the near future*
two important	*a prosthetic mouth*	

    The bad guy in the latest James Bond film has 1)_____ because his face was damaged. Is it possible to replace a part of our bodies and 2) _____ than the original?

    Rex was built by 3)_____ robot scientists from the UK. The artificial man has 28 artificial limbs and organs and 4)_____ $1 million to make. Work on Rex began more or less 5)_____ when a production company contacted one of the scientists. It took

6)_____ months of hard work to finally finish building Rex.

One of the scientists is very surprised at 7)_____ is being used to make artificial organs to replace organs which no longer work well.

Richard Walker predicts that 8)_____ we will be very surprised by what prosthetic technology can do for our bodies.

Follow-Up

19. Find out what new bionomic robot-men are. Make a short presentation and share it with your groupmates.

Listening
British Icon: Stephen Hawking

Pre-Listening

20. Answer the questions:

1. Which of the following did Stephen Hawking work with?

   a. radiation   b. theory of equations   c. singularities   d. geometry

2. Where was Stephen Hawking born?

   a. Oxford   b. London   c. New York

3. How many children did Stephen Hawking have?

   a. 1   b. 2   c. 3

4. Hawking was ill …

   a. since his birth   b. for most part og his life   c. for a short period of life

5. When was Stephen Hawking born?

   a. 1946   b. 1942   c. 1950

Listening

21. Listen to the recording about the unusual life of Stephen Hawking.

22. Choose the correct option.

1. Stephen Hawkins studied at both Oxford and Cambridge.

○ True

○ False

2. Doctors expected him to live for only two more years after he was diagnosed with ALS.

○ True

○ False

3. Stephen Hawkins said that he didn't enjoy life living with ALS.

○ True

○ False

4. His goal was to understand the universe.

○ True

○ False

5. Many people got to know him better when he published a book.

○ True

○ False

6. His book sold 10 million copies and it was translated into 14 different languages.

○ True

○ False

7. Stephen was unable to speak so he had a computer programme with a British accent to speak for him.
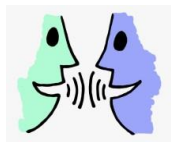
○ True

○ False

8. Stephen was given a free flight into space from Virgin Atlantic.

○ True

○ False

Follow-Up

23. Fid out as much as possible information about the life of Stephen Hawking and present it to the class.

 Speaking

Discussion: Agreeing and Disagreeing

Pre-Speaking

24. In speaking exams you may be asked to discuss a topic and give your opinion. Watching other students doing this sort of task will help you learn how to do it too. So, watch the video first and then read the tips below to make sure you get top marks in your next speaking exam!

https://learnenglishteens.britishcouncil.org/exams/speaking-exams/discussion

25. Study the following tips for discussions.

Do:

Think about your opinion before the discussion starts.

Say what you really think about the topic and explain why you think that.

Listen to what your partner says and say if you agree or disagree.

Make sure you know the language for agreeing and disagreeing.

Be polite if you disagree.

Ask your partner what he/she thinks.

Use every second you are given to do the task.

Finish the discussion by summarising what you have spoken about.

Don't:

Only give your own opinion but also respond to your partner.

Worry if you don't agree with your partner. That's fine!

Talk about things that are not relevant to the topic.

Let the discussion stop. Keep it going!

26. Study the following phrases expressing agreement and disagreement. Group them into three categories: *agreement, partial agreement, disagreement.*

Agreement	Partial agreement	Disagreement

That's right!

I don't agree!

Absolutely!

I see your point, but ...

I totally disagree!

Absolutely not!

You're right. That's a good point.

Exactly!

I'm not sure about that.

Me too!

That's partly true, but ...

Yes, I agree!

I totally agree!

I couldn't agree more!

That's not right!

I agree up to a point, but ...

I see exactly what you mean!

I'm not so sure about that.

27. Discuss with your partner the following topics. Follow the tips and use the phrases given above. Share your opinions with the groupmates.

- The internet is the best way to do your shopping.

- Young people under 15 shouldn't use mobile phones.

- All young people should stay at school until they are 18.

- There shouldn't be any advertising on TV during children's programmes.

- Famous celebrities shouldn't complain if the paparazzi take photos of them every day.

- It is the children's responsibility to look after their parents when they get old.

- Dogs should be banned from cities.

Follow-Up

28. Watch the following video and write down other phrases used for expressing agreement and disagreement.

https://www.youtube.com/watch?v=jLFz5rzzEJE&ab_channel=BritishCouncil%7CLearnEnglishTeens

 Writing

Why Teaching Is Still The Best Job In The World

Pre-Writing

29. Read the following text about the types of essays.

Basically, all essays have identical structure – Introduction, Paragraph 1, Paragraph 2 (Supporting arguments) and Conslusions. The sentences you put in each paragraph will depend on what type of question you get, or what essay it is. The most common types of essays are the following: Opinion essay, For and against essay and Discoursive essay. Writing an essay is an essential part of any international exam in English, like FCE, IELTS etc., although in such tests writing an essay is given in

form of task / question. Below the possible questions and typical structures are **described.**

✓ *Opinion essay:*

<u>Typical Questions:</u>

What is your opinion? Do you agree or disagree? To what extent do you agree or disagree?

<u>Structure:</u>

Introduction

Paraphrasing the question

Thesis Statement (It is agreed…/It is disagreed…/This essay agrees/disagrees…)

Outline Sentence (This essay will discuss….)

Main Body Paragraph 1

Topic sentence

Explanation of the topic sentence

Examples

Main Body Paragraph 2

Topic sentence

Explanation of the topic sentence 126

Examples

Conclusion

Summary and opinion

✓ *For and against essay:*

<u>Typical questions:</u>

Discuss the advantages and disadvantages.

Discuss the advantages and disadvantages and give your own opinion.

<u>Structure:</u>

Introduction

Paraphrasing the question

Outlining the problem

Main Body Paragraph 1

Stating one advantage

Expanding / explaining advantage

Examples

Result

Main Body Paragraph 2

Stating one disadvantage

Expand / explaining disadvantage

Examples

Result

Conclusion

Summary

Opinion

✓ ***Discoursive essay:***

<u>Typical questions:</u>

Discuss both points of view and give your opinion.

<u>Structure:</u>

Introduction

Paraphrasing question and / or stating both viewpoints.

Thesis Statement

Outlining the problem

Main Body Paragraph 1

Stating the first viewpoint

Discussing the first viewpoint

Reasoning why you agree or disagree with viewpoint

Examples to support your view

Main Body Paragraph 2

Stating the second viewpoint

Discussing the second viewpoint

Reasoning why you agree or disagree with viewpoint

Examples to support your view

Conclusion

Summary

Stating which view is better or more important.

30. Read the essay, determine the type and analyze its structure.

Sometimes, good teachers quit. Teaching is an increasingly demanding job with divergent influences, dynamic sources of innovation, and aging dogma that makes it all a struggle. It can be emotionally draining, and at times, impossible.

But in lieu of that–and in an age where start-ups are glorified, entertainment is endlessly emphasized, and tech is kind, teaching continues to be the best job in the world. Or at least I think so anyway. Here are some reasons why.

The potential to transform lives – ask any teacher who has helped a student in any number of ways, from academic to welfare and emotional learning, and they will tell you that life is not only good, but amazing.

It gives you the chance to be continuously creative – of course there are increasing levels of accountability in teaching, but teachers are allowed to be creative in every lesson. Even in observations, in fact most of all in observations, lessons are encouraged to be creative and interesting to engage the students. Teachers have so many opportunities to try new ideas, and indulge in iterative process to ensure the optimum learning environment is created.

It offers you a chance to continuously get better – teachers are not only encouraged to seek continuous professional development, but can ask for observation on a regular basis, to provide opportunities to grow and learn from masters or more experienced practitioners. In so few professions is there such support, and considering that as a minimum, contracts are for a year, teachers have so much time to demonstrate improvement. A growth mindset is part of the foundation of teaching.

It is a grounding, humbling profession – the amount of work teachers do compared to remuneration is shockingly disproportionate, in 2 senses: firstly, in terms of how many paid vs non paid hours of work they receive, and secondly, in relation to other similarly creative and important (and not so important) vocations in our

society. But that is not why teachers teach. So few teachers go into the vocation for the salary – it's a calling before anything else.

There is always satisfaction somewhere – teaching is a calling, and no one enters it without his or her inner voice telling him or her that. Of course there are always some imposters, but the massive majority have their hearts in the right place. How cool is that for the students?

Having said that, teaching can be and is incredibly demanding, and often we can lose sight of that calling, bogged down in aspects of the profession that don't seem to be connected to it. But on closer inspection, most of the extra demands are actually central to the job itself: explaining to parents where you are coming from; being observed; collaborating with others; marking.

Take this last aspect, crucial to understanding whether students are learning what you believe you are teaching. Yes, it is very time consuming, but perhaps one of the most important and fundamental weapons in a teacher's arsenal; any good school will understand this and the other cited demands, and create an environment where they become part of directed time.

It is when these aspects are not acknowledged in directed time that the conditions for burnout are rife.

It's a chance to truly to lead the world in the 21st century – introducing students to new technologies and ways of presenting, curating, and collaborating with others with what they know is truly exciting and truly invigorating. Modern teachers are actually pioneering pedagogy, and can and will be able to hold their heads up high in the future when we look back and see how learning in this day and age took a radical but enormously beneficial turn for the better.

Engaging students in greater collaboration, and instilling initiative in curation and the promotion of information leads to truly independent learning, and setting up such learning environments is an opportunity that all teachers now have before them. There are few more gratifying feelings that being needed.

Of course, so much of the technological addition to teaching has all been achieved mostly through our own initiative, having to source and implement the

enterprising learning strategies. But this only provides another string to our bow, and in the context of how important 21st century skills are, another example of why teaching is such an amazing thing to do. Sometimes teaching is exhausting, but friends, always come back to the core of what we are doing.

We are change makers, and that is something to be proud of. Long live teaching, still the best job in the world!

Writing

31. In groups of three or four prepare a short essay (about 100 words) covering the problem of teaching in modern world. Choose one of the following types of essay according to the tasks given. Use the phrases from the Useful language box.

- ✓ Teaching is a prestigious job in the modern world. Do you agree?
- ✓ Advantages and disadvantages of the teacher's job.
- ✓ Teaching maths in secondary school: problems and prospects.

Useful language

Introducing the topic	*Expressing opinions*
Many people believe / feel / claim that…	In my view / opinion …
	It seems to me that …
People's opinions on … differ widely.	I think / feel / maintain that …
However, others maintain / think that…	*Contrasting*
	On the other hand, …
We should acknowledge from the start that…..	However, …
	In contrast to …
The key question is …	Opposing to …
What needs to be decided is …	*Summing Up*
Introducing additional points	In conclusion, …
In addition, …	To sum up, …

What is more, …	On balance, …
Furthermore, …	Even though … I would still maintain that…
Moreover, …	
It is also worth bearing in mind that …	

Follow-Up

32. Discuss the following questions.

1. Is teaching a prestigious job in Ukraine? What do you know about other countries?

2. Are you going to be a maths teacher in secondary school?

3. Do you think that the teacher's job is well-paid in the world?

4. In your opinion, can robots replace teachers one day? Why? / Why not?

5. What are the challenges of the teacher's job, in your view?

Work with Phrasal Verbs and Idioms

33. Translate the following phrasal verbs and idioms into Ukrainian.

To sit one's hands folded -

To do smth at one sitting - _____

To learn smth at one's mother's knee -_

Intellectual / mental food -_____

To be very quick / slow on the uptake - _

To follow in one's steps -

To work by fits and starts - _

To be head over ears in work _____ _____

To wrack one's brains about smth -_____

To stuff one's memory with smth - _____

From cover to cover - _____

To show promise - _____

A walking dictionary - _____

To bear the fruits of smth - _____

To turn a deaf ear to smth - _____

To pass with flying colours - _____

To know one's stuff - _____

To take great pains to do smth - _____

Not to make tail or head of smth - _____

34. Find and underline idioms in the text.

When Mary was young she was showing promise as a teacher. She learned to read write and count at her mother's knee. The girl was vey quick on the uptake. Mary's mother was a doctor and wanted her daughter to follow in her footsteps. But Mary went he own way. Now she is an experienced teacher and is always head over ears in work. Mary teaches English. Some of her students are bright and clever but some of them are slow on the uptake. Some students read books from cover to cover, but several boys rarely open their textbooks. Mary recommends them to read more but they turn a deaf ear to what she says and her words are in at one ear and out at the other. Mary claims that it's never late to learn and emphasizes that little knowledge is a dangerous thing.

35. Match the prasal verbs and idioms from Exercise 33 with their definitions below.

a. There's always room for improvement, getting knowledge of some subjectsm or skills.

b. To pass a test with ease.

c. To be likely to become very good.

d. To ignore what someone says.

e. To have a result of something.

f. From beginning to end.

g. To learn smth as a very young child.

h. To have much work to do.

i. To understand things quickly.

j. To do the same thing as somebody did earlier.

k. What has been said is forgotten immediately.

l. To be experienced in or knowledgeable about a subject.

m. To have difficulty understanding simple or obvious things.

36. Use appropriate idioms instead of underlined words and expressions.

1. When it comes to school, however, instead of following the proverb "we gain knowledge of the subject or skills in an activity, by experience", we create courses of instruction that tell students about the theory of the task without concentrating on the doing of the task. It's not easy to see how to apply apprenticeship to mass education. So in its place, we lecture.

2. No wonder Tom failed at exams as he never starts preparing in advance and tries to memorize the whole amount of the material at one blow.

3. Six weeks has passed since Martin had seen him and vainly tried to think of the cause of offence.

4. Later he bitterly regretted that had treated his University course as the process of loading his brains with useless details.

5. She took great pains keeping repeating well-known historical facts so that it would have an effect on her students, but it seemed that all efforts were useless and they would always be ignorant of the history of Great Britain.

SUMMARIZING A NEWSPAPER ARTICLE

1. Read the information about how to write summary of the article given below.

How to write a summary

Writing a summary is a great way to process the information you read, whether it's an article or a book. It usually includes some steps.

1. Find main idea.

In a summary, you want to identify the main idea of the article and put this information in your own words. Plan to read the article several times. In the first reading you want to get the general notion of the essay. Write that down after you finish reading. That will be the thesis of your summary. Include the author's first and last name and the title of the article.

To figure out the central idea, you should ask yourself why this essay was written and published. Clues to help determine this are:

- ✓ The title.
- ✓ The place it was published (which can help you determine the intended audience).
- ✓ The date of publication.
- ✓ The type of essay.
- ✓ The tone of the piece.
- ✓ Notions which seem to be repeated throughout.

2. Reread the piece, taking notes on the major points of it. Once you know for sure what the author's main point is, reread the piece, looking for the ways they support that point. You can find supporting material by looking for details that refer to the title, surprises in the argument or plot, repetition, or a lot of attention to detail. Write down each time something like this occurs.

3. Write the summary in your own words.

- ✓ Start with the source's information. You should start every summary with the author and the article's title. This lets your reader know that you're

summarizing what someone else has written. For example, you can start with something like "George Shaw's 'Pygmalion' is a play that addresses issues of class and culture in early twentieth-century England."

✓ Work from memory to write the main point of each section. Without looking at your notes, write a first draft that includes the main point of each section in your own words. A summary shouldn't just repeat what the original author said, so using your own words is very important. To put something in your own words, write it down as if you were explaining or describing it to a friend. In that case, you wouldn't just read what the author wrote. If you absolutely must use the original author's words, put them in quotation marks. This tells your reader those words aren't yours. Not doing this is academic plagiarism, and it can get you in a lot of trouble.

✓ Present the material using the author's point of view. As you write, make sure you're only summarizing the original piece of writing. You shouldn't be inserting your own opinions of the piece or of the events the piece covers. Instead, summarize what the original author said and retain their tone and point of view. For this purpose you will need to use author tags (the list is given below).

Author Tags Verb List

says	explain	comments
persuades	suggests	understands
argues	reminds	helps us understand
elucidates	presents	intimates
concludes	presents the idea	creates the impression
criticizes	defines	highlights
concedes	shows	states
thinks	admits	lists
notes	analyzes	disagrees
observes	points out	emphasizes

discusses	identifies	implies
insists	responds	shows
proves	rejects	suggests

Adverbs to Use with Author Tags

conclusively	expressively	realistically
tightly	angrily	radically
clearly	dutifuly	evenly
occasionally	quickly	ironically
honestly	eagerly	elegantly
sharply	rarely	loosely
exactly	happily	hastily
perfectly	sternly	unexpectedly
sometimes	never	justly
devotedly	finally	warily
wearily	completely	fully
doggedly	iconically	sarcastically
seriously	carefully	politely

4. Revising your draft into a coherent summary. Reread the draft you wrote from memory against your notes. Take your notes out and compare them to your from-memory draft. If there's anything major you forgot to include, put it in your second draft.

2. Write summaries of the following articles.

Comparing Teaching Methods of Mathematics at University Level

by Michael Gr. Voskoglou

The constructivist views about learning and the socio-cultural approach have recently become very popular in school education (primary and secondary) for teaching and learning mathematics.

The idea that knowledge is a human construction supported by experience, first stated by Vico in the 18th century and further extended by Kant, greatly affected the epistemology of Piaget, who is considered to be the forerunner of the theory of constructivism for the process of learning. This theory appeared formally by von Glasersfeld who developed his ideas in the Piaget foundation of the United States in 1975 [1]. According to the constructivist view, knowledge is not passively received from the environment but actively constructed by synthesizing past knowledge and experience with new information. The "coming to know" is a process of adaptation based on and constantly modified by the individual's experience of the world.

On the other hand, the socio-cultural approach is based on Vygotsky's theory, claiming that knowledge is a product of culture and social interaction. Learning takes place when individuals engage socially to talk about and act on shared problems or interests. The Communities of Practice are groups of people (experts or practitioners in a particular field) who share a concern for something they do and learn how to do it better as they interact regularly, therefore having the opportunity to develop themselves personally and professionally [2, 3]. The combination of the ideas of constructivism with the socio-cultural theories is known as social constructivism [4].

Mathematics teaching is intended to promote the learning of mathematics. However, while theory provides us with lenses for analyzing learning, the position of mathematics teaching remains theoretically anomalous and underdeveloped. We might see that one of the problems lies in the relationships between learning, teaching and the practice of teaching. Theories help us to analyze, or explain, but they do not provide recipes for action; rarely do they provide direct guidance for practice.

According to Jaworski [3], one way to draw on theories of learning to explain or characterize teaching is to see teaching as a social practice, in which teachers are practitioners. For example, like the novice tailor being drawn into the practice of tailoring by perfecting processes and skills, by learning the rules of trade, etc., we might see the novice teacher being similarly drawn into the practice of teaching.

The principles of constructivism and of the socio-cultural theories for learning began to be applied for the teaching of school mathematics during the 1980s, when

the failure of the introduction of the "new mathematics" had already become more than evident to everybody. However, in the mathematics departments of universities and in many other departments of the positive sciences, the majority of instructors still preferred the traditional way of delivering explicit mathematics instruction (EMI) to students. EMI is a systematic approach where students are guided through the learning process with clear statements about the purpose for learning the new skill, clear explanations and demonstrations of the instructional target, and supported practice with feedback until independent mastery has been achieved. It contains elements particularly well suited for supporting crucial working memory processing needed for learning [5]. However, it has been argued that EMI sometimes only increases the students' procedural knowledge and not their deep knowledge on the subject [6]. Thus, it may not promote conceptual understanding and critical analysis. Many teachers using EMI also proceed in the classroom to a series of challenging questions resulting in active mathematical discourse with students as a means to investigate mathematical thinking [7]. It is of worth noting that this is a practice compatible with the principles of social constructivism. For reasons of brevity, the combination of EMI with the challenging questions will be referred to in the rest of the paper as the "explicit" method, whereas the approach based purely on the principles of the social constructivism will be referred as the "constructive" method for teaching mathematics.

During the recent decades, social constructivism has been largely connected with mathematics learning, and attempts to build a confrontation between the above two ways of teaching mathematics that have already appeared in the literature, although many of them are related to elementary rather than university mathematics (e.g., see [8–10]). In a recent article, Lahdenpera, Postareff, and Ramo reviewed the corresponding research that has already been reported at the undergraduate university mathematics level, and they noted that, in certain cases, the findings are rather intertwined [11].

In the same work [11], the authors performed a quantitative study on the same group of students undertaking two different mathematics courses of the first semester

of studies at the University of Helsinki. The results of the study have shown that the more student-centered (and, therefore, closer to the principles of social constructivism) course design succeeded in supporting more favorable approaches to learning, higher self-efficacy levels, and more positive student experiences of the teaching–learning environment.

The paper at hand attempts a comparison of the "explicit" and the "constructive" teaching method of mathematics at university level. For this, a classroom experiment was performed at the Graduate Technological Educational Institute (T. E. I.) of Western Greece. The outcomes of the experiment, expressed in linguistic terms (grades), were assessed and compared with the help of the Grade Point Average (GPA) index to evaluate the student quality performance and by using Grey Numbers (GNs) to evaluate their mean performance.

Preferences of Teaching Methods and Techniques in Mathematics with Reasons
by Menderes Ünal

Educational systems consist of many elements, including students, teachers, curriculum, administrators, specialists, technology, physical and financial resources. However, teachers are the essential element, since quality of the education mostly depends on the quality and competence of teachers [37, 2]. Teachers have many roles, from planning classroom activities, to instructing, disciplining, motivating and guiding students. Teachers are also expected to both use teaching techniques effectively and to have modern management skills in classroom environments [15] in order to establish learning that can be defined as permanent changes in behavior. Those factors which most impact students' learning and performance are not only teachers' attitudes, choice of methodology, and the content of curriculum, but also students' socioeconomic background, behavior, and personal characteristics [32, 38, 22, 33, 14, 28, 27, 12]. Effective teaching, therefore, must place equal emphasis on teacher, student, environment, curriculum and other factors [42]. Teaching mathematics is related to more than one variable as well as to other disciplines. The

primary goal of efficient mathematical teaching is to transfer mathematical knowledge in a way that allows students to adapt to new situations and knowledge [29]. In history, mathematics has been used to supply fundamental needs of societies; as mathematical knowledge progressed, so did technology, with many new scientific branches emerging [11]. Mathematics curriculums have aimed to provide students with the fundamental mathematical skills needed for further education, including understand mathematical concepts; developing their own mathematical thinking and problem-solving processes; using these skills both in real life and in the classroom; systematically improving their skills, and behaving responsibly [25]. The chief aim of mathematics education extends beyond motivating students to learn the basic mathematics that they will need in school; rather, it is to convince them (in the hope that they will continue to learn beyond the classroom) to adapt to the mathematical challenges that their future lives will present [36]. Mathematics, as an academic course and as a mode of thought, begins in students' primary education and continues throughout their lifetime learning; moreover, there is a strong relationship between mathematical success and academic success in other courses. Changes and adaptations in other disciplines deeply affect the teaching-learning process in mathematics [3]. Teachers' preferences and opinions regarding pedagogical techniques in mathematics courses are important, because they may reveal their ability to address the needs of students at different learning levels. The study began with a self-evaluation of the teachers' strengths and weaknesses regarding their teaching preferences. As teachers develop their teaching skills, they may help students integrate their mathematical knowledge with other activities, and find out what works best for their personalities and curriculum [33].

The following principles may provide guidance for effective classroom practices in supporting mathematics teaching. First, it is recommended that teachers build on children's natural interest in mathematics, and on their intuitive and informal mathematical knowledge. They should encourage inquiry and exploration to foster problem-solving and mathematical reasoning [52]. Second, teachers are expected to use both formal academic lessons and everyday activities as natural vehicles for

developing children's mathematical knowledge. Providing a mathematically rich environment and incorporating the language of mathematics throughout the school day could be effective. Third, teachers are also advised to use literature to introduce mathematical concepts, and then reinforce them with hands-on activities. Finally, it is recommended that teachers establish partnerships with parents and other caregivers in order to support children's mathematical development [34, 47]. Mathematics was chosen as an object of study because it can be described as a common tool and language used to define mental schemas throughout the world. Individuals who lack basic mathematical skills may face difficulties in school and social life; overcoming such difficulties requires the establishment of an effective learning environment. Reaching this goal depends on the employment of effective pedagogical methods; it is therefore essential to investigate different teaching methods—problem solving, inquiry based teaching, discovery, games, lecturing, and case studies, among others—and to draw attention to effective teaching and learning processes.

Research Method This descriptive study aimed to identify various teaching techniques used in mathematics classes, and to understand why teachers prefer them. Descriptive models describe past or present situations as it was or as it is characteristically. These methods could be described as survey methods in which situations, events, objects, circumstances, institutions, groups and various areas have been tried to describe in their contexts as well [18, 16]. Data were collected for this study using case studies, a qualitative research method. According to Yıldırım and Simsek [44], case studies enable researchers to prioritize questions of "what" and "why," by examining individual cases in detail. Qualitative research can therefore be described as "...research in which qualitative data-collecting techniques such as observation, interview and document analysis are used, and a qualitative process carried out to reveal perceptions and cases in their natural environment as exact and integrated." Yin [45] defines the case study as a relative research model, used when case borders are uncertain and there are enough data sources in real life borders. The study's central subjects are teachers, represented here by a focus group composed of Mathematics teachers at schools of Kırsehir Directorate of National Education.

Interviews were conducted with 40 teachers, who were selected for the study by a random sampling method. The study group was constituted of 14 (35%) females and 26 (35%) male teachers. Data Collection Data were collected using semi-structured interview, one of the qualitative data-collecting techniques. Interviews are one of the most frequently used data collection tools in qualitative research. An interview is an interaction process based on asking and answering questions designed to provide insight on a predetermined and specific topic. Patton [31] also explains the interview's purpose as stepping in a person's inner world and understanding his perspective. In the interview form of this research, common teaching techniques (Demonstrate and Practice, Question-Answer, Problem Solving, Lecturing, Games, Discovery, Describing, Cooperative, Case Study and Scenario) which were proposed by recent studies [6, 48, 49, 50, 54] were listed and teachers were asked to indicate how often they used each technique in their courses. They were also asked to explain the reasons why they preferred or eschewed those teaching techniques. In quantitative research, validity depends on the evaluator's objectivity [20]. To increase this study's reliability, followings were employed: a) The researcher clearly defined his position, as simply the interpreter and not a participant. b) Data resources were defined clearly, as participants' were quoted in the comments to ensure accurate representation of their opinions. c) Social environment and process was clarified, as data were collected through asking participants to explain their preferences by complete prompt "I prefer this technique/ method because ..." and teachers were asked to rate a five Likert type question showing how often they use each technique. d)Conceptual framework was expressed directly. Volunteer Mathematics teachers from the schools in Kırşehir were given about a week to generate their reasons. e) As a result of inductive analysis procedure, 11 major conceptual themes were identified. f) In establishing the inter-rater reliability rate, a specialist at the faculty was asked to sort the reasons into the 11 categories, and the level of agreement between the colleague and the researcher was 92 %. The colleague placed 28 reasons (hands-on activities, practical activities, inevitable in mathematics, etc). under categories different from

167

that of the researcher (i.e., Reliability =Agreement /Agreement + Disagreement X 100 = 323 / 323 + 28 X 100 = 92%) [21, 26].

Project Work

Work with video

Why be a maths teacher?

1. Watch the following video:

https://www.youtube.com/watch?v=Sp_HeHPRnws&ab_channel=EddieWoo

2. Answer the following questions:

1. What is the most common reason of choosing this profession that most maths teachers give?

2. What are the three factors of long-term motivation in chossing a career?

3. What does the author like about teaching maths?

4. What does the speaker think about the feeling of satisfaction? Why does it appear?

5. How did the speaker help a girl to master maths?

3. Translate the following words and word-combinations from the video into Ukrainian:

flexibility - ………………………………………………………………………….

projectile motion - ……………………………………………………………………….

rates of change - ……………………………………………………………………………

pick up a new skill - ………………………………………………………………………

make a contribution - …………………………………………………………………..

the mantle of maths education - …………………………………………………………..

Project

4. Prepare a presentation proving that maths teaching profession is really awesome. Include into your presentation the following:

- ✓ strong arguments;
- ✓ video- and audio-fragments;
- ✓ photos, pictures;
- ✓ diagrams, graphs, schemes;
- ✓ your own story.

Vocabulary and grammar

1. Translate the following words and phrases into English.

загальноосвітня школа_____

дисертація кандидата (доктора) наук_____

увійти до складу команди (спортивної) _____

викладачі кафедри, факультету_____

дрібна складова _____

самостійна робота (студента) _____

середня школа_____

кільце дискретного нормування _____

аддитивна інверсія, інверсія відносно додавання _____

загальноосвітня школа _____

ціле алгебраїчне число _____

зведення в ступінь _____

декан _____

першокурсник_____

залікова книжка _____

Total:_____/___15___

2. Put the correct special questions to the sentences below.

1. An arc is usually named by its endpoints. (how)

2. A chord is a line segment connecting any two points on the circle. (what)

3. They attended the lectures on geometry twice a week. (how often)

4. Most mathematical proofs can be given in many different ways. (how)

5. In geometry we separate all geometric figures into two groups: plane figures and space figures or solids. (how many)

6. Later you ought to do some measurements to check your calculations. (when) 7. We are already familiar with the basic concepts of geometry through our high school studies of maths. (what)

8. The points of geometry have no size and no dimensions. (what)

9. Numbers became abstract when we began to reason about their nature and enumerate their properties through arithmetical and logical operations. (when)

10. A straight line extends indefinitely only in one direction. (where)

Total: /_10__

3. Form the plurals from the following nouns:

pen_____   policeman _____
fork _____   midwife_____
smile _____   tooth _____
piano _____   bath _____
mother-in-law _____   sketch _____

Total:____/__5__

Reading

3. Read the text.

FERMAT'S LAST THEOREM

Pierre de Fermat was born in Toulouse in 1601 and died in 1665. Today we think of Fermat as a number theorist, infact as perhaps the most famous number theorist who ever lived. The history of Pythagorean triples goes back to 1600 B.C, but it was not until the seventeenth century A.D that mathematicians seriously attacked, in general terms, the problem of finding positive integer solutions to the equation $x_n + y_n = z_n$. Many mathematicians conjectured that there are no positive integer solutions to this equation if n isgreater than 2. Fermat's now famous conjecture was inscribed in the marginof his copy of the Latin translation of Diophantus's Arithmetica. The note read: "To divide a cube intotwo cubes, a fourth power or in general any power whatever into two powers of the same denomination above the second is impossible and I have assuredly found an admirable proof of this, but the margin is too narrow to contain it".

Despite Fermat's confident proclamation the conjecture, referred to as "Fermat's last theorem" remains unproven. Fermat gave elsewhere a proof for the case n = 4. it was not until the next century that L.Euler supplied a proof for the case n = 3, and still

another century passed before A.Legendre and L.Dirichlet arrived at independent proofs of the case n = 5. Not long after, in 1838, G.Lame established the theorem for n = 7. In 1843, the German mathematician E.Kummer submitted a proof of Fermat's theorem to Dirichlet. Dirichlet found an error in the argument and Kummer returned to the problem. After developing the algebraic "theory of ideals", Kummer produced a proof for "most small n". Subsequent progress in the problem utilized Kummer's ideals and many more special cases were proved. It is now known that Fermat's conjecture is true for all n < 4.003 and many special values of n, but no general proof has been found.

Fermat's conjecture generated such interest among mathematicians that in 1908 the German mathematician P.Wolfskehl bequeathed DM 100.000 to the Academy of Science at Gottingen as a prize for the first complete proof of the theorem. This prize induced thousands of amateurs to prepare solutions, with the result that Fermat's theorem is reputed to be the maths problem for which the greatest number of incorrect proofs was published. However, these faulty arguments did not tarnish the reputation of the genius – P.Fermat. Richard Lawrence Taylor (born 19 May 1962) is a British mathematician working in the field of number theory. A former research student of Andrew Wiles, he returned to Princeton to help his advisor complete the proof of Fermat's Last Theorem. Taylor received a $3 million 2014 Breakthrough Prize in Mathematics "For numerous breakthrough results in the theory of automorphic forms, including the Taniyama-Weil conjecture, the local Langlands conjecture for general linear groups, and the Sato-Tate conjecture." He also received the 2007 Shaw Prize in Mathematical Sciences for his work on the Langlands program with Robert Langlands.

4. Answer the following questions.

1. How old was Pierre Fermat when he died?_____

2. Which problem did mathematicians face in the 17 century A.D? _____

3. What did many mathematicians conjecture at that time? _____

4. Who first gave a proof to Fermat's theorem? _____

5. What proof did he give? _____

6. Did any mathematicians prove Fermat's theorem after him? Who were they? _____

5. Are the statements True (T) or False (F)? Correct the false sentences.

1. The German mathematician E.Kummer was the first to find an error in the argument ....T / F

2. With the algebraic "theory of ideals" in hand, Kummer produced a proof for "most small n" and many special cases .... T / F

3. A general proof has been found for all value of n...T / F

4. The German mathematician P.Wolfskehl won DM 100.000 in 1908 for the first complete proof of the theorem.. T / F

Total:_____/___10___

Listening

6. Listen to five different people talking about their jobs and match the speaker with the correct job.

1. Speaker A works as a (an) ………………….

2. Speaker B works as a (an) ………………….

3. Speaker C works as a (an) ………………….

4. Speaker D works as a (an) ………………….

5. Speaker E works as a (an) ………………….

7. Choose the correct answer.

1. Does speaker A enjoy his job?

Yes.

Sometimes.

No.

2.When does speaker A work?

Weekdays.

Weekends and holidays.

Summer holidays.

3.What does speaker B say tourists love doing?

Visiting universities.

Taking a boat trip.

Swimming in the river.

4.Does speaker C like his job?

Yes.

Sometimes.

No.

5.What does speaker D say is difficult about being a pilot?

Travelling to many countries.

Learning many languages.

Flying planes in bad weather.

Total:_____/___10___

Total:_____/___50___

Vocabulary List

absolute value – абсолютне значення, абсолютна величина, модуль (числа)

abstract algebra – абстрактна алгебра

abelian group – абелева група; комутативна група

additive inverse – аддитивна інверсія, інверсія відносно додавання

addition – додавання

a lot more – багато іншого; a lot of – багато

a lot of books, a lot of time, *syn.* many, much, a great deal of, plenty of

aleph-null – алеф-нуль

algebraic number theory – алгебраїчна теорія чисел

algebraic integers – ціле алгебраїчне число

all the members – всі члени

apply for admission – подавати заявку на вступ

applied to – ті, що застосовуються до

applicability – можливість застосування, прикладний характер

applied science – прикладна наука

arbitrary – випадковий

Assistant Dean – заступник декана

Associate Professor – доцент

at first – спочатку; first of all – перш за все

Bachelor - бакалавр

based on principles of – засновані на принципах

be fond of – любити, подобатись; *syn.* to like

became familiar with... – дізналась

be embedded into – бути вкладеним в

bijection – біекція, взаємно-однозначне відображення

boldface – напівжирний шрифт

blackboard bold – спосіб написання напівжирним шрифтом

calculus - 1) обчислення 2) математичний аналіз (навчальна дисципліна, розділ вищої математики)

cardinality – кардинальне число, потужність безлічі

can be subdivided – можна розділити

college admission tests – вступні тести

commutative monoid – комутативний [абелев] моноїд

commutative ring – комутативне кільце

comprehensive school – загальноосвітня школа

construction of the real numbers- конструктивні способи визначення дійсного числа

converge - 1) сходитися; прагнути до (загального) межі 2) зводити (в-одну точку)

could be recognized – можна визнати

computer languages (programming languages) – мови програмування

countably infinite – злічувально безкінцевий

cyclic group – циклічна група

Dean - декан

defend PhD thesis – захищати дисертацію кандидата (доктора) наук

Department – факультет, кафедра

derivative – похідна, похідна функція

differs from – відрізняється від

differentiation - диференціювання, відшукання похідної

discrete valuation ring – кільце дискретного нормування

disjoint union – незв'язне об'єднання

Doctoral candidate, PhD – кандидат (доктор) наук

embedding (or imbedding) – вкладення в математиці - це спеціального виду відображення одного примірника деякої математичної структури під другий примірник такого ж типу.

equality of expressions – рівність виразів

equivalence relation – відношення еквівалентності

equilateral - рівнобічний

equimultiple - рівнократний

examination board – екзаменаційна комісія

exponentiation [ˌɛkspənɛnʃɪˈeɪʃ(ə)n] – зведення в ступінь

exponential function – експоненціальна функція, показова функція

equivalence classes – класи еквівалентності

Faculty – викладачі кафедри, факультету

familiar representation – звичне представлення

field of fractions – поле відносин

first-year student - першокурсник

fraction – дріб

fractional component – дрібна складова

freshman – a first-year student; a **sophomore** – a second-year student; **undergraduate** – student of senior courses

fundamental theorem of arithmetic – основна теорема арифметики

geometric progression – геометрична прогресія

grade - оцінка

graduate – випускатися (з університету, коледжу, курсів і т. ін.)

grammar school - граматична школа (більш академічної спрямованості)

greatest common divisors – найбільший спільний дільник

head of department – завідувач кафедри

infinite series - нескінченний ряд

infinite series expansions – розкладання нескінченних рядів

infinitesimal [ɪnfɪnɪˈtesɪm(ə)l] - нескінченно мала величина

infinitesimal calculus - аналіз нескінченно малих величин

initial object – ініціальний об'єкт (в теорії категорій початковий об'єкт категорії C - це її об'єкт I, такий що для будь-якого об'єкта X в C існує єдиний морфізм I → X.)

injective – ін'єктивний а) реалізує вкладення, який реалізує ін'єктивні відображення; б) збільшує число аргументів (про функції)

integer – ціле число

integral domain – область цілісності

integration – інтегрування, обрахування інтеграла

interrelationship between theory and practice – взаємозв'язок теорії і практики

irrational number – ірраціональне число

isomorphic – ізоморфний, що має ідентичну форму; в математиці кажуть, що між двома структурами існує ізоморфізм, якщо для кожного компонента однієї структури є відповідний компонент в іншій структурі, і навпаки;

isosceles triangle - рівнобедрений трикутник

it'll take time – знадобиться час

join some students' scientific society – стати членом студентського наукового гуртка

join the army – піти до армії

join a team – увійти до складу команди (спортивної)

Laboratory assistant - лаборант

lattice-complete – частково впорядкована множина, в якому будь-яке непорожнє підмножина А має точну верхню і нижню межу, звані зазвичай об'єднанням і перетином елементів підмножини А.

least upper bound – точна (найменша) верхня межа (кордон), або супремум

lecturer – лектор, викладач

like – подібно як; to be like – бути схожим

He is like his father – Він схожий з батьком

He likes skating – Він любить кататися на ковзанах

He is a student like me – Він, як і я, студент

limit - 1) межа; межа 2) pl. інтервал значень

logarithm – логаритм

mainstream science – основний напрямок науки

mathematical object – математичний об'єкт

measure – міра, показник, критерій

method of exhaustion – метод посілдовних елімінацій

multiple - множинний

multiplication – множення

natural numbers – натуральні числа

Noetherian valuation ring – кільце нормування Нетер;

notation - розмітка

non-empty subset – непорожнє підмножина

no wonder – не дивно

number line – цифрова вісь

number field – числове поле; поле чисел

obtuse angle – тупий кут

octahedron – восьмигранник

ordered field – впорядковане поле

ordered ring – упорядковане кільце

ordered pair of natural numbers – впорядкована пара натуральних чисел

overlapping branches – галузі, що перехрещуються (накладаються)

pass with flying colours – скласти (іспит) дуже легко

PhD thesis – дисертація кандидата (доктора) наук

post-graduate student – аспірант

post-graduate course - аспірантура

power series - розкладання нескінченних рядів

primary school – початкова школа

primitive data type – вихідний тип даних

principal ideal domain – область головних ідеалів

product – похідний

pure science – власне наука

ratio – співвідношення

rational number – раціональне число

record card - табель

regular polygon – правильний прямокутник

remainder – 1) залишок (від ділення); 2) різниця; 3) залишковий член (ряду)

resulted in – призвело до

ring homomorphism – гомоморфізм кілець

Rolle's theorem – Теорема Ролля (теорема про нулі похідної): якщо матеріальна функція, безперервна на відрізку [a; b] і диференційована на інтервалі (a; b), приймає на кінцях цього інтервалу однакові значення, то на цьому інтервалі знайдеться хоча б одна точка, в якій похідна функції дорівнює нулю.

student of the day-time department – студент денного відділення ; *syn.* a full-time student vs. part-time department / distant student, Open university student –

secondary modern school – загальна середня школа

self-guided work – самостійна робота (студента)

score – набрані балли

segment – відрізок

set of integers – множина цілих чисел

singleton set – одноелементні безліч

sine [saɪn], cosine ['kəusaɪn], tangent ['tænʤ(ə)nt], arctangent – синус, косинус, тангенс, арктангенс

solid – тіло

Specialized Academic Council – Спеціалізована вчена раді із захисту дисертацій

students' night parties – студентські вечори

subdivision – підрозділ

subring – подкільце (підмножина кільця)

surjective – сюр'єктивний

Taylor series – ряди Тейлора, розкладання функції в нескінченну суму статечних функцій.

take somebody's way – піти чиїмось шляхом

tetrahedron - чотиригранник

topological space – топологічний простір; **metrical space** – метричний простір

total order (linear order, total order, simple order, non-strict ordering) - лінійно впорядкована множина або ланцюг

totally ordered set – цілком упорядкована множина

the elaboration of scientific theories – розробка наукових теорій

transcript – виписка з табеля, додаток до диплому

Tutor - куратор

undergraduate course – курс бакалавріату

unital ring – унітальне кільце (кольцо́ (асоціативне кільце) – в загальній алгебрі - алгебраїчна структура, в якій визначені операція оборотного складання і операція множення, за властивостями схожі на відповідні операції над числами. Найпростішими прикладами кілець є числа (цілі, речові, комплексні), функції, визначені на заданій множині.

universal property – універсальна властивість

upper bound – верхня межа, верхня межа

vice-rector – проректор

vertex (pl.vertices) – вершина

Zeno's paradox of the dichotomy – парадокс дихотомії Зенона або Апорія «Дихотомія» (послідовне розподіл цілого на дві частини).

Useful phrases for discussion

1. Asking about or for an opinion

Could you tell me ....? What do you think about/of .... ?

What's your opinion about ...? Do you think/feel .... ?

How do you feel about ....? May I ask you..... ?

2. Asking for an explanation

Could you explain to me ....? Could someone please tell me.... ?

Just tell me the reason why ....? I don't really understand .... ?

I just don't see why/what/how .... Are you saying that .... ?

What do you mean by that? I beg your pardon?

I didn't quite get that. Excuse me, did you say that..... ?

3. Giving your opinion

In my opinion/view .... If you ask me ....

As far as I can see/*I'm concerned* ....It seems to me that ....

I have the/a feeling that .... I think/feel/reckon/believe ....

Well, I'd say .... If you want my opinion ....

You can take it from me that .... First of all/*To start with* I'd like to point out ...

What we have to decide is .... There can be no doubt that ....

It's a fact that .... Nobody will deny that ....

The way/*As* I see it Everyone knows ....

Let me put it this/another way .... Let's get this clear (first) ....

Sorry to interrupt you, but .... The point I'm trying to make is ....

Personally (speaking) I think .... I'm absolutely convinced that ....

My view/*point of view* is that ..... The way I look at/*see* it is this

What I actually meant was ....

4. Giving an explanation

Look, it's like this: What I mean is ....

The reason for this is .... The main problem is ....

Just let me explain .... Well, the reason is ....

Well, the thing is .... Above all we must keep in mind that ....

5. Agreeing with an opinion

I (quite) agree. I agree completely/entirely.

I couldn't agree (with you) more. I entirely/completely agree with you on that.

That's true/right. That's just it.

Quite/Exactly/Precisely/Right/Certainly/Definitely. You're quite/so right.

I think so, too. I don't think so either.

That's just my feeling/opinion. That's just how I see it/*feel about it, too.*

That's a very good/important point. You've got a good point there.

Yes, of course/*definitely/absolutely* Marvelous.

That's exactly what I mean/say. Yes, that's obvious.

That's exactly how I see it. That's what I think

How very true. So do I/So am I

Yes, indeed. I'm all in favor of what you've been saying.

6. Qualified agreement

Yes, perhaps, but .... Yes, possibly, although ....

Yes, but on the other hand .... Yes, up to a point.

I agree up to a certain point, but ..... Yes, in a way.

Maybe, I suppose so. Well, it depends.

I don't think it's as simple as that .. I see what you mean, but I think that's not the whole story

You may be right there. Yes, but there's also another aspect to consider

7. Polite disagreement

I disagree (with you), I'm afraid. No, I really can't agree, I'm afraid.

I don't quite agree there. I'm not so certain/*at all sure* if that's true/correct

I'm not (quite) so sure (really). I'm sorry I can't agree.

Do you really think so/*believe that*? I'm not convinced that ....

Well, that's one way of looking at it, (but) Well, I have my doubts about that

You can't really mean that. You don't really mean that, do you?

I wouldn't say so. I don't think so.

I don't think you're right/*that's right.* Surely you don't mean that?

I don't want to argue with you, but .....I can't go all the way with you on that point.

Are you seriously suggesting that....? I have my problems with what you're saying

8. *Strong disagreement*

I doubt that very much I think you got that wrong

You're pulling my leg! On the contrary!

That doesn't convince me at all. You're contradicting yourself.

I've never heard of such a thing. You're wrong, you know.

You can't be serious! It's not like that at all!

That's not correct You're contradicting yourself

You don't understand. I'm afraid, I don't think you quite understand.

I don't think so, really! That's not fair!

That's out of the question I can't believe that I'm afraid

I can't accept your view, that .....Do you really think that's a good idea?

I'm afraid, I can't agree with you there Well, you would, wouldn't you?

That's (simply) not true! I don't think, you can say ....

Surely you're not serious, are you? I doubt it/that very much

You can't be serious! Oh, come on, think about what you've just said!

I doubt if ....I've got my doubts about that.

I don't agree with you at all. I disagree entirely/completely.

Oh, come on, you must be joking/kidding! That's out of the question

That's not how I see it It's not as simple as that!

That's no excuse I believe you're mistaken

That doesn't make sense to me Let's be sensible about this

You're hopeless/wrong You won't listen to reason

I think you got that wrong I'm not impressed

For heaven's sake! Well that's one way of looking at it, but

9. Making a complaint

I can't quite understand how/why I've come to complain about ...

I'm disappointed with I'm fed up with ....

It really is terrible/ridiculous that I'm sorry I have to say this, but ....

Forgive me for mentioning it, but......That's what I want to know.

Do you realize that ....? Are you aware that .... ?

I'm disappointed to hear that. What are you going to do about it?

Something ought to be done about it. Look, I really must protest about ....

Can't something be done to/about ....

10. Reacting to a complaint

I'm (awfully) sorry to hear that Î really must apologize for this.

Well, there's nothing we can do about that, I'm afraid

This isn't my/our fault, you know.

What do you expect us/me to do? I'll find out what has happened

I'm sorry you should take it that way. I'll see what I can do.

What Are Statistics?

Statistics is a form of mathematical analysis that uses quantified models, representations and synopses for a given set of experimental data or real-life studies. Statistics studies methodologies to gather, review, analyze and draw conclusions from data. Some statistical measures include the following:

Understanding Statistics

Statistics is a term used to summarize a process that an analyst uses to characterize a data set. If the data set depends on a sample of a larger population, then the analyst can develop interpretations about the population primarily based on the statistical outcomes from the sample. Statistical analysis involves the process of gathering and evaluating data and then summarizing the data into a mathematical form.

Statistics is used in various disciplines such as psychology, business, physical and social sciences, humanities, government, and manufacturing. Statistical data is gathered using a sample procedure or other method. Two types of statistical methods are used in analyzing data: descriptive statistics and inferential statistics. Descriptive statistics are used to synopsize data from a sample exercising the mean or standard deviation. Inferential statistics are used when data is viewed as a subclass of a specific population.

Types of Statistics

Statistics is a general, broad term, so it's natural that under that umbrella there exist a number of different models.

Mean

A mean is the mathematical average of a group of two or more numerals. The mean for a specified set of numbers can be computed in multiple ways, including the arithmetic mean, which shows how well a specific commodity performs over time, and the geometric mean, which shows the performance results of an investor's portfolio invested in that same commodity over the same period.

Regression Analysis

Regression analysis determines the extent to which specific factors such as interest rates, the price of a product or service, or particular industries or sectors influence the price fluctuations of an asset. This is depicted in the form of a straight line called linear regression.

Skewness

Skewness describes the degree a set of data varies from the standard distribution in a set of statistical data. Most data sets, including commodity returns and stock prices, have either positive skew, a curve skewed toward the left of the data average, or negative skew, a curve skewed toward the right of the data average.

Kurtosis

Kurtosis measures whether the data are light-tailed (less outlier-prone) or heavy-tailed (more outlier-prone) than the normal distribution. Data sets with high kurtosis have heavy tails, or outliers, which implies greater investment risk in the form of occasional wild returns. Data sets with low kurtosis have light tails, or lack of outliers, which implies lesser investment risk.

Variance

Variance is a measurement of the span of numbers in a data set. The variance measures the distance each number in the set is from the mean. Variance can help determine the risk an investor might accept when buying an investment.

Ronald Fisher developed the analysis of variance method.[1] It is used to decide the effect solitary variables have on a variable that is dependent. It may be used to compare the performance of different stocks over time.

Paradoxical Mathematics

Mathematics is a paradoxical, elusive subject, with the habit of appearing clear and straightforward, then zooming away and leaving us stranded in a blank haze.

Why?

It is easy to forget that mathematics is primarily a tool for human thought. Mathematical thought is far better defined and far more logical than everyday

thought, and people can be fooled into thinking of mathematics as logical, formal, symbolic reasoning. But this is far from reality. Logic, formalization, and symbols can be very powerful tools for humans to use, but we are actually very poor at purely formal reasoning; computers are far better at formal computation and formal reasoning, but humans are far better mathematicians.

The most important thing about mathematics is how it resides in the human brain. Mathematics is not something we sense directly: it lives in our imagination and we sense it only indirectly. The choices of how it flows in our brains are not standard and automatic, and can be very sensitive to cues and context. Our minds depend on many interconnected special-purpose but powerful modules. We allocate everyday tasks to these various modules instinctively and subconsciously.

The term `geometry', for instance, refers to a pattern of processing within our brains related to our spatial and visual senses, more than it refers to a separate content area of mathematics. One illustration of this is the concept of correlation between two measurements on a set, which is formally nearly identical with the concept of cosine of the angle between two vectors. The content is almost the same (for correlation, you first project to a hyperplane before measuring the cosine of the angle), but the human psychology is very different. Each mode of thinking has its own power, and ideally, people harness both modes of thought to work together. However, in formalized expositions, this psychological > difference vanishes.

In the same way, any idea in mathematics can be thought about in many different ways, with competing advantages. When mathematics is explained, formalized and written down, there is a strong tendency to favor symbolic modes of thought at the expense of everything else, because symbols are easier to write and more standardized than other modes of reasoning. But when mathematics loses its connection to our minds, it dissolves into a haze.

I've loved to read all my life. I went to New College of Sarasota, Florida, a small college that was just starting up with a strong emphasis on independent study, so I ended up learning a good deal of mathematics by reading mathematics books. At that time, I prided myself in reading quickly. I was really amazed by my first

encounters with serious mathematics textbooks. I was very interested and impressed by the quality of the reasoning, but it was quite hard to stay alert and focused. After a few experiences of reading a few pages only to discover that I really had no idea what I'd just read, I learned to drink lots of coffee, slow way down, and accept that I needed to read these books at 1/10th or 1/50th standard reading speed, pay attention to every single word and backtrack to look up all the obscure numbers of equations and theorems in order to follow the arguments. Even so, when something was ``left to the reader'', I generally left it as well. At the time, I could appreciate that the mathematics was an impressive intellectual edifice, and I could follow the steps of proofs. I assumed that such an elaborate buildup must be leading to a fantastic denouement, which I eagerly awaited -- and waited, and waited.

It was only much later, after much of the mathematics I had studied had come alive for me that I came to appreciate how ineffective and denatured the standard $((\text{definition theorem proof})^n \text{remark})^m$ style is for communicating mathematics. When I reread some of these early texts, I was stunned by how well their formalism and indirection hid the motivation, the intuition and the multiple ways to think about their subjects: they were unwelcoming to the full human mind.

John Hubbard approaches mathematics with his whole mind.

If you page through the current book, you will see many intriguing figures. That is a first sign: figures are one of the most important ways to keep our thought processes going in our whole brains, rather than settling down into the linguistic, symbol-handling areas. Of course, the figures in your imagination are even more important. Geometric ideas can be conveyed with words and with symbols, sometimes more effectively than with pictures, but a lack of figures is a good indication of a lack of geometry.

Another important part of human thinking is the emotional aspect. In mathematics, what is intriguing, puzzling, interesting, surprising, boring, tedious, exciting is crucial; they are not incidental, they shape how we think. Personally, my thinking was shaped by boredom: I develop intense urges to come up with `easy' methods in order to avoid tedious computations that are opaque to me. Hubbard, a

principal participant in the mathematics he is discussing, has done an excellent job in conveying the drama."

Embracing Diversity in the Classroom

... by Jennamarie Moody

When I close my eyes, I picture myself in a school located in an urban setting, teaching a classroom of diverse yet alike students. These students are in the second grade, meaning that they are impressionable yet vulnerable to their environment whether this means at home, at school, or in their greater community.

Some of these students don't speak English as their first language, and some come from low-income households that can limit their educational experiences outside of the classroom. And yet, no matter what differences these students bring to the table, their uniqueness flows throughout the classroom in such a positive energy that embraces, respects, and promotes learning. This is the goal I am working towards; the goal of inspiring our youth to become self-advocates for their learning.

Opportunities for equal educational experiences may not exist, however the beauty lies in the growth of love young students can develop as they are challenged in the classroom to question their surroundings. I plan to make a difference in the lives of the children I meet along the way, and to create a safe learning environment.

Although the tests for certification and studies can be difficult, my passion for education and dedication to shaping the lives of my students is what keeps me going. The end goal is to nurture the development of my students to become active and engaged participants in society, and that is what I intend to do completely.

The Future of Children's Education

by Lesley Martinez-Silva

I aspire to make a difference in others' lives through education. I'm studying to be an elementary school teacher because I believe that children can achieve so much more if they learn early of their potential.

Education has always been my priority. My parents always stressed the importance of obtaining an education, having missed that opportunity themselves. My parents taught me as a child that schooling was vital to success in life. Truly, that lesson has been the most important in my path to college. I don't think I would've made it this far had I not taken my education seriously.

I want to teach others about the importance of education so they too can prosper. Everything I'm learning at university is important for my future career and, if I don't study it, I'm failing my future students. Every child deserves the best education available and I should strive to be the best educator possible to provide that for them. When balancing academics, work, and my social life, it can get challenging to keep going. But, with the future of children's education in my hands, I always get back on track.

I Dream for My Students

by Nicole Gongora

The dream of success motivates me to study. Not my success, my future students' success. I push myself through the rough spots for them.

I was a lost child in high school; I didn't know how to apply to college, let alone afford it. No child should have to experience that. As a future educator, I am committed to helping my students succeed, achieve more, and continue onto higher education. Every child should be given the opportunity to showcase their strengths and follow their dreams.

College was never a dream for me; it was a far off, unattainable fantasy. I met some inspiring teachers in high school who encouraged me to change my life and who helped me to thrive. Without them, I wouldn't be where I am today.

I plan to work at a low-income school similar to the one I attended. These types of schools are the ones who lack resources. I will serve as a resource to my students and I hope to be an inspiration to them. In turn, I hope they become kind, respectful adults. I want them to see the virtue in helping others and I hope they will serve

others in their future careers. I want to be the teacher they remember. I want to be the teacher that helped them succeed.

I'll feel successful as a teacher if my students are successful in attaining their goals. If one student decides to achieve more then I will have lived out my dream.

"Mo"tivated

by Mo Cabiles

The world we live in is hard, unsteady and ruthless. We see this everyday in the harshness of homelessness, to social media screaming for justice. What motivates me to continue on is that I have felt the bitter cold bite of homelessness. I know what it's like to not have enough to eat and to be scared of what will happen next.

I am fortunate to no longer be in those situations but that, by no means, is an indicator that it will all now come easy. As an adult learner and your "non-traditional" student, there are other obstacles I must overcome. From transportation to childcare or education application mastery to APA formatting, the many roadblocks I tackle both large and small are what I consider to be my victories.

I've seen what having a higher education can do for someone and I want that for myself and that of my daughters. I strive to be a good example for them, to show them that, regardless of social standing and unforeseeable circumstances, if they work hard and put their best effort forward, they can achieve their dreams.

My dream is to obtain my Masters in Education with an emphasis in counseling, I want to be an academic advisor or guidance counselor. I've seen so many youths attempt community college and fail because they fell through the cracks. These students need to realize their potential and I want to help them achieve that and to be their cheerleader.

Doubt and Dreams

by Katheryn England

As a high school senior, many people assume I'm prepared for college and know what I want to study after graduation. These assumptions cause me to

experience moments of self-doubt. Then I re-evaluate what I want for myself, and what it is that keeps me working towards my dreams. Through the goals I've set for myself, I can maintain focus, move past my self-doubt and succeed. By focusing on my goals, I can make a difference in the world directly around me.

A goal I have in my life is to be an elementary teacher, also known as an <u>early childhood teacher in Australia</u>. As a teacher, I can share the knowledge I've gained to leave behind a better future for our world. Last year, I had the opportunity to work alongside a previous elementary teacher and mentor of mine. I'd visit her classroom daily, and taught lessons alongside her or independently. Uniquely, they were the opening act in my high school's original winter play. They read firsthand from our scripts and learned what happens behind the scenes. Showing a new part of the world to the youth of my community has motivated me to pursue my dreams.

Remembering this experience and the positive influence I had on those students helps me overcome self-doubt and stay focused on my goals. Thanks to the goals I've set for my life, I not only can find purpose for my efforts, but find the will to be confident in whatever choices I make.

One Person

by Megan Burns

My ultimate goal is to change the lives of people. Studying to be a teacher is hard. All of the classes that are required, all of the practicums, and all of the time spent just to become a teacher is stressful, but the thought of being able to help just one person changes everything.

It takes one person to be a light in someone's life. It take one person to be a helping hand. It takes one person to change an unmotivated, broken life, and make it brand new. Teachers are those people. We motivate students to do their best, we guide students to success when no one else will, and we are always available to listen. One teacher can change the lives of thousands of students. That is my motivation.

I know that after college, I will be a teacher, a guider, a counselor, and a friend to so many students. No matter how many bad days I have or how many times I want to quit, I just think of what is to come in the future. I can be that change this world needs, even if its in a small high school classroom. It just takes one person.

The Road Not Taken

by Jenyfer Pegg

My entire life has been filled with discouragement. I grew up in a household where I was constantly told "No". I was told my ideas were stupid and would not work. In my junior year of high school, my teachers and counselors started talking about college and sending in applications to different places. At that point, I knew I was not going. I came from a poor family and I knew we could never have money for something like college.

But I went on college visits, I listened to people speak about their college, and I was set. I had a lot of things pushing me, except the one thing I really wanted, my family. No one in my family has gone to college, and when I told my mother, she was shocked. She told me she just wanted me out of the house.

When I came to school, I realized I wanted to teach high school. I want to make an actual difference in someone else's life. My family has taken the same road for years, and I'm not going down that road. I won't live paycheck to paycheck like my mom, I will be a person that others will look up to.

I'm going to do something worthwhile, and I will work harder than anyone else if it gets me there. I've seen what my life will be like without school and motivation and there is absolutely no way I'm going down that road. I've got bigger plans.

Manipulatives: The Missing Link in High School Math

Marilyn Curtain- Phillips, M. Ed.

The thrill of achievement comes from overcoming adversity in the accomplishment of

an important goal ~ Unknown

Algebra, Geometry and Trigonometry can be challenging and complex subjects for many high school students in the United States. These subjects are usually taught using textbooks, workbooks and examinations. While these resources are essential in developing learning skills in math, it doesn't encourage problem-solving skills and retention. It is not surprising to learn many students view math as boring, difficult and irrelevant, rather than fun and interesting. The scope of what it means to be successful in mathematics expands beyond procedural knowledge and skill-acquisition to include sense-making and conceptual understanding (Buckley 2004). An integrated approach is needed to motivate students to learn math in a more relaxed environment, thus eliminating persistent math anxiety, the lack of math application skills and poor standardized test performance. The Third International Mathematics and Science Study (TIMSS) tested the students of 41 nations. Children in the United States were among the leaders in the fourth grade assessments, but by high school graduation, they were almost last. High school math should be taught in a way in which students can grasp and understand skills. Manipulatives are visual objects that help illustrate mathematical relationships and applications. These resources are used primarily in elementary schools and somewhat in middle schools. Manipulatives are valuable resources for accelerating and deepening students understanding of math, yet its use is almost non-existent in high school. Marilyn Burns, Creator of Math Solutions has "used manipulative materials at all levels for 30 years." In every decade since 1940, the National Council of Teachers of Mathematics (NCTM) has encouraged the use of manipulatives at all grade levels (Bellonio), yet many high school teachers are reluctant to use this type of resource.

Almost all mathematics-teaching activities take place at the abstract level (Sharma, 1997). According to Sharma, students have a tendency to forget when taught only at the abstract stage. Thus students become frustrated because mastery was never fully attained. Students will begin to have difficulty in learning mathematics. The results in failure will cause many students to develop a fear of mathematics (Sharma, 1997). Students' attitudes towards any curriculum area can be

related to their achievement in ways that reinforce higher or lower performance (timss.org). Full 88% of Bill and Melinda Gates Foundations' survey respondents said they had passing grades in high school. Asked to name the reasons they had left school, more respondents named boredom than struggles with coursework. Over 1 million students drop out of school each year. That includes nearly half of all African Americans, Hispanics, and Native Americans who fail to graduate from public high school with their class. Leaving many of them with a host of poor outcomes to follow, from low lifetime earnings to high incarceration rates to a high likelihood that their children will drop out of high school thus eliminating the cycle (Thornburg, 2006).

Sharma (1997) feels there are six levels of mastery of mathematical concepts: intuitive, concrete, representation (pictorial), abstract, applications and communication. According to Sharma, ideally, each mathematics concept should be introduced beginning at the communication level. Manipulatives will teach concrete understanding to the abstract math process, especially when the student may not understand the concept behind the skill. When students develop a concrete understanding of math skills, then they are more likely to perform that math skill and understand math concepts at the abstract level. Manipulatives can make math concepts come alive. According to Spikell (1993), most learners whether adults or children, will master mathematical concepts and skills more readily, if they are presented first in concrete, pictorial and symbols. By using manipulatives, pictures and symbols to model or represent abstract ideas, the stage is set for learners to understand the abstractions they represent (Spikell, 1993). Students will be able to practice and demonstrate mastery using concrete objects. Manipulatives appeal to the learning style of kinesthetic learners because they actually touch the objects. Pictures appeal visually for visual/spatial learners. "Visualization is the natural way one begins to think. Before words, images emerge" (Sharma, 1987). "Almost every mathematics idea, except simple arithmetic facts, consists of three components: linguistic, conceptual and skill/procedural" (Sharma, 1987). Therefore manipulatives

offer benefits to a variety of learning styles. They also provide a change from the textbook for mathematical/logical learners.

Games with manipulatives are also valuable with helping students to apply what they learned to the real world, as well as provide a means to improve their math skills interactively. Using board games and card games along with cooperative learning are ways that students can become involved in a positive mathematical environment. Games are highly motivational to students and can be used effectively to practice specific skills. "Using games in the classroom and at home will maximize students' problem-solving competence, ability to communicate and reason mathematically, perception of the value of mathematics, and self-confidence in their ability to apply mathematical knowledge to new situations." Cooperative groups provide students a chance to exchange ideas, to ask questions freely, to explain to one another, to clarify ideas in meaningful ways and to express feelings about their learning. These skills acquired at an early age will be greatly beneficial throughout their adult working life.

Many teachers feel as though they do not know how to teach using manipulatives and therefore, hesitate to use them in the classroom. Many math teachers, who attended college more than ten years ago, were usually taught on the abstract level, textbook, pencil and paper, all through their school days. There are classes and workshops for teachers to learn how to teach using manipulatives. The companies that make the manipulatives also provide books and pamphlets on ways the material can be used. There are articles on using manipulatives in mathematics teaching journal such as the National Council of Teachers of Mathematics' Arithmetic Teacher magazine. Manipulatives help relieve boredom in children allowing them to explore and use their imagination.

Many manipulatives are inexpensive and can be everyday objects. Money, 2 – color counters, calculators, rulers, dominoes, playing cards, button and number cubes are a few of the commonly available manipulatives that can successfully be used in

the classroom. These manipulatives can be used to teach such concepts such as angles, area, decimals, factoring, estimation, fractions, measurement, counting, percent, prime numbers, probability, geometry and whole numbers.

There are companies, which specialize in manipulatives that can be ordered from a catalog or online. No matter where a school is located, materials can be made available through the mail. These companies also make available to teachers such manipulatives as tangrams, pattern blocks, fraction towers, geoboards, algebra tiles, Cuisenaire rods, miras and polyhedral models.

When I initially introduced pattern blocks to my Geometry students, I was met with opposition and disbelief. It was a consensus that these students had not used pattern blocks since elementary school. However, many students actually began to explore and build figures with these blocks. I gave them this little bit of play time before taking on the task for that particular lesson, which was angle measurement of polygons. We must remember, everyone likes to play games even adults, look at our various hobbies, such as bowling, tennis, golf, art, race cars, chess, playing cards, etc. This holds true for high school students, they still enjoy playing games. Manipulatives require a great deal of prior planning and organization. But considering the many benefits that manipulatives offer, it is well worth the effort. Students will find math more attainable, fun and exciting, hopefully returning them to the prior successes of their early math experiences.

Авторська редакція