

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ  
Національний університет кораблебудування  
імені адмірала Макарова

**Н. М. Філіппова**

**COMPASS  
for Research Students**

**Навчальний посібник**  
для підготовки до кандидатського іспиту  
з англійської мови

*Видання друге, доповнене і перероблене*

*Рекомендовано Вченою радою НУК*



ВИДАВНИЦТВО  
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Структура посібника орієнтована на те, щоб допомогти молодим науковцям розвинути навички читання, говоріння та письма на основі типових комунікативних професійно-орієнтованих ситуацій. Посібник складається з п'яти розділів і дев'яти додатків.

Призначено для магістрів, аспірантів і здобувачів технічних спеціальностей, які готуються до кандидатського іспиту з англійської мови.

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## РОЗДІЛ І

### Особливості науково-технічного функціонального стилю

*Learning the academic skills  
necessary to succeed in a tertiary  
environment can be an arduous,  
difficult and complex process.  
Kathy Cox, David Hill “EAP now!”*

#### Q & A

#### ***1. Why is it important for a researcher to understand what is academic style?***

##### ***1.1. What is a global language? What makes a global language?***

“A language achieves a genuinely status when it develops a special role that is recognized in every country... Why a language becomes a global language has little to do with the number of people who speak it...

A language becomes an international language for one chief reason: the political power of its people – especially their military power. The explanation is the same throughout the history. Why did Greek become a language of international communication in the East over 2,000 years ago? Not because of the intellects of Plato and Aristotle: the answer lies in the swords and spears wielded by the armies of Alexandre the Great. Why did Latin become known throughout Europe? Ask the legions of the Roman Empire. Why did Arabic come to be

spoken so widely across northern Africa and the Middle East? Follow the spread of Islam, carried along by the force of the Moorish armies from the eighth century. Why did Spanish, Portuguese, and French find their way into Americas, Africa and the Far East? Study the colonial policies of the Renaissance kings and queens, and the way these policies were ruthlessly implemented by armies and navies all over the known world. The history of a global language can be traced through the successful expeditions of its soldier / sailor speakers. And English has been no exception”. (*David Crystal. English as a global language*).

Thus the increasing globalization of the marketplace is forcing companies to pay more attention to international developments. Domestic firms are adjusting their structures and methods of operation to fit a broader and rapidly changing economic environment. They are increasing their geographical outreach because more of their suppliers and customers are located in various countries. This internationalization is illustrated in four ways. First, companies change their basic goals to conform to a global marketplace. Second, they adapt their products to global markets. Third, they do not set up international bureaucracies, instead, they hire foreign nationals who understand the local markets. Fourth, universities using English as the medium of instruction are expending and rapidly creating a generation of middle-class professionals; economic development is only increasing the middle class, a group that is more likely to learn and use English in jobs.

### ***1.2. What is the role of the contemporary English language as the global language of science?***

Наука – це одна з основних функціональних сфер, в яких реалізується домінуюче місце англійської мови, першої глобальної мови в історії людства, яка набула особливого значення в соціальній комунікації різних галузей виробництва

і бізнеса. Економічний успіх – це той фактор, який виявляється головним для функціональної активності англійської мови і робить її привабливою для вивчення.

Після Другої Світової війни величезна кількість наукових і технологічних ресурсів була зосереджена в США, і англійська мова спочатку представляла мову науки, освіти, технологій, а потім новітніх комунікаційних технологій (WWW), які стали третьою цивілізаційною революцією після виникнення писемності і друку.

Накопичення величезних ресурсів інформації наприкінці ХХ сторіччя, відкриття законів комунікації на природній мові і розвиток комп'ютерних технологій зробили можливим її упорядковувати, обробляти, зберігати і забезпечити надійний пошук.

Позитивна роль глобальної англійської мови полягає у тому, що створення інформаційних ресурсів, їх поповнення, в основному, відбувається на англійській мові. Оскільки володіння інформацією приносить економічну вигоду, англійська мова стала привабливою: вона відкриває доступ до глобальних інформаційних ресурсів (85 % світової наукової інформації доступно на англійській мові); вона забезпечує можливості досягнення більш високих життєвих стандартів (обсяг наукової інформації англійською мовою різко зріс, а іншими мовами залишився незмінним або зменшився).

Розповсюдження англійської мови як лінгва-франка (універсального інтердіалекта), мови міжнародної наукової і технологічної комунікації, дозволило забезпечити створення універсального набору понять і стандартів, своєрідної поняттєвої і термінологічної мови – еталону. Вона, як і середньовічна латина, зв'язує різні національні наукові школи: особливо в сфері точних наук, де англійська мова – це засіб передачі об'єктивованого, безособового знання

Домінуюча позиція англійської мови – це факт. Носії англійської мови, до деякої міри, стають “привілейованою”

частиною наукового співтовариства: вони не відчують труднощів, пов'язаних з вивченням мови і продукуванням лінгвістично правильних текстів. Тому створюється ситуація нерівноправ'я як мов, так і їх носіїв. Наукова значимість текстів на англійській мові оцінюється як більш висока; поняття мовного домінування означає більш вигідне інформаційне і соціально-економічне положення носіїв цієї мови.

Різні держави по-різному ставляться до цього факту: уряд одних дозволяє англійській мові брати активну участь у процесах глобалізації (напр., Фінляндія); уряд інших розглядає англійську мову як мову, яка регламентує сфери спілкування і розцінюється як нейтральна (напр., Філіппіни); в деяких країнах англійська мова – це мова залучення до “західного” світу, з яким пов'язана ідея економічного розквіту (напр., Бразилія). Цікавий приклад відношення до глобальної мови для збереження своєї показує уряд канадської франкофонної провінції Квебек, яка знаходиться в щільному оточенні англомовного середовища: динаміка їх мовної політики включає п'ять компонентів:

- 1) соціально-історичний контекст (науково-технічна політика, соціальні цінності, мовна ситуація);
- 2) мовна ідеологія (мовна лояльність суспільства, адаптованість до англійської мови);
- 3) тип знання (природничі, технічні, соціальні, гуманітарні);
- 4) етап науково-технічної діяльності (інновації, визнання, публікації, комерціалізація);
- 5) мовна політика (створення програмного забезпечення, баз даних, мовних ресурсів, спеціальної термінології, навчальних програм).

Завдяки такій схемі стримання англійської мови і підтримки французької частка англійської мови у науковій комунікації залишилась тією ж, а частка французької виросла.

### **1.3. What are the dangers of a global language?**

*“The benefits which would flow from the existence of a global language are considerable, but some commentators have pointed to possible risks. Perhaps a global language will cultivate an elite monolingual linguistic class, more complacent and dismissive in their attitudes towards other languages. Perhaps those who have such a language at their disposal – and especially those who have it as a mother tongue – will be more able to think and work quickly in it, and to manipulate it to their own advantage at the expense of those who do not have it, thus maintaining in a linguistic guise the chasm between rich and poor. Perhaps the presence of a global language will make people lazy about learning other languages, or reduce their opportunities to do so. Perhaps a global language will hasten the disappearance of minority languages or make all other languages unnecessary”*  
(David Crystal)

### **1.4. What is the academic style?**

Функціональний стиль, взагалі, пов'язаний з використанням спеціальної групи мовних засобів (фонетичних, графічних, граматичних, лексичних, синтаксичних, текстових) у конкретній сфері спілкування для забезпечення функцій найбільш ефективної передачі й отримання інформації. Тобто спілкування і порозуміння саме в цій сфері розрізняють стиль художньої літератури, публіцистичний стиль, стиль ділових документів, розмовний стиль, науковий стиль. Різниця між ними, в першу чергу, обумовлена різними учасниками комунікації, різними комунікативними цілями, різними комунікативними завданнями, різними ситуаціями використання мови.

Науковий функціональний стиль – це специфічна система використання мовних засобів для забезпечення ефективного наукового спілкування, результати якого описуються або інтерпретуються у наукових творах, які

представляють різні жанри: статті, монографії, підручники, посібники, анотації, реферати, кваліфікаційні роботи, дисертації, патенти, інструкції, специфікації, доповіді, резюме. Жанр – це засіб вираження конкретної комунікативної мети автора. Звичайно дослідник виконує такі комунікативні завдання: висунення, формулювання наукової гіпотези, концепції, законів існування явищ, пояснення розвитку явищ або процесів, доказ гіпотез, обговорення різних підходів до розуміння проблеми.

До специфічних якостей наукового функціонального стилю відносять:

- об'єктивність,
- логічність,
- узагальненість,
- абстрактність,
- ясність (експліцитність),
- стислість.

### ***1.5. What do you know about Common Reference Levels?***

*“There does appear in practice to be a wide, though by no means, consensus on the number and nature of levels appropriate to the organisation of language learning and the public recognition of achievement...”*

*In order to orient learners, teachers and other users within the educational system for some practical purpose a more detailed overview is necessary. Such an overview can be presented in the form of a grid showing major categories of language use at each of the six levels. The example in Table 2 is a draft for a self-assessment orientation tool based on the six levels. It is intended to help learners to profile their main language skills, and decide at which level they might look at a checklist of more detailed descriptors in order to self-assess their level of proficiency...*

*‘Can do’ descriptors are provided for reception, interaction and production.*

*'Can do' descriptors are provided for some of the strategies employed in performing communicative activities. Strategies are seen as a hinge between the learner's resources (competences) and what he/she do with them (communicative activities)... Scaled descriptors are provided for aspects of linguistic competence, pragmatic competence and sociological competence... (CEFR, p. 28, 30).*

*Linguistic competences. CEFR attempts to identify and classify the main components of linguistic competence defined as knowledge of, and ability to use, the formal resources from which well-formed, meaningful messages may be assembled and formulated... Here, we distinguish: lexical competence, grammatical competence, semantic competence, phonological, orthographical competence, orthopedic competence.*

*Pragmatic competence. Pragmatic competences are concerned with the user/learner's knowledge of the principles according to which messages are: a) organized, structured and arranged; b) used to perform communicative functions; c) sequenced according to interactional and transactional schemata.*

*Sociolinguistic competence is concerned with the knowledge and skills required to deal with the social dimension of language use (linguistic markers of social relations, politeness conventions, expressions of folk wisdom, register differences, dialect (CEFR, p. 108).*

Table 1 – Common Reference Levels: self-assessment grid (A1, A2)

|                                                                       |                           | A1                                                                                                                                                                                                                                                                      | A2                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1                                                                     | 2                         | 3                                                                                                                                                                                                                                                                       | 4                                                                                                                                                                                                                                                                                       |
| U<br>N<br>D<br>E<br>R<br>S<br>T<br><br>A<br>N<br>D<br><br>I<br>N<br>G | <i>Listening</i>          | I can recognise familiar words and very basic phrases concerning myself, my family and immediate concrete surroundings when people speak slowly and clearly.                                                                                                            | I can understand phrases and the highest frequency vocabulary related to areas of most immediate personal relevance (e.g. very basic personal and family information, shopping, local area, employment). I can catch the main point in short, clear, simple messages and announcements. |
|                                                                       | <i>Reading</i>            | I can understand familiar names, words and very simple sentences, for example on notices and posters or in catalogues.                                                                                                                                                  | I can read very short, simple texts. I can find specific, predictable information in simple everyday material such as advertisements, prospectuses, menus and timetables and I can understand short simple personal letters.                                                            |
| S<br>P<br>E<br>A<br>K<br><br>I<br>N<br>G                              | <i>Spoken Interaction</i> | I can interact in a simple way provided the other person is prepared to repeat or rephrase things at a slower rate of speech and help me formulate what I'm trying to say. I can ask and answer simple questions in areas of immediate need or on very familiar topics. | I can communicate in simple and routine tasks requiring a simple and direct exchange of information on familiar topics and activities. I can handle very short social exchanges, even though I can't usually understand enough to keep the conversation going myself.                   |

Continuation of Table 1

| 1                               | 2                        | 3                                                                                                                                                                                                           | 4                                                                                                                                                                                    |
|---------------------------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                 | <i>Spoken Production</i> | I can use simple phrases and sentences to describe where I live and people I know.                                                                                                                          | I can use a series of phrases and sentences to describe in simple terms my family and other people, living conditions, my educational background and my present or most recent job.  |
| W<br>R<br>I<br>T<br>I<br>N<br>G | <i>Writing</i>           | I can write a short, simple postcard, for example sending holiday greetings. I can fill in forms with personal details, for example entering my name, nationality and address on a hotel registration form. | I can write short, simple notes and messages relating to matters in areas of immediate needs. I can write a very simple personal letter, for example thanking someone for something. |

Table 2 – Common Reference Levels: self-assessment grid (B1, B2)

|                                                                   |                  | B1                                                                                                                                                                                                                                                                                                                  | B2                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1                                                                 | 2                | 3                                                                                                                                                                                                                                                                                                                   | 4                                                                                                                                                                                                                                                            |
| U<br>N<br>D<br>E<br>R<br>S<br>T<br><br>A<br>N<br>D<br>I<br>N<br>G | <i>Listening</i> | I can understand the main points of clear standard speech on familiar matters regularly encountered in work, school, leisure, etc. I can understand the main point of many radio or TV programmes on current affairs or topics of personal or professional interest when the delivery is relatively slow and clear. | I can understand extended speech and lectures and follow even complex lines of argument provided the topic is reasonably familiar. I can understand most TV news and current affairs programmes. I can understand the majority of films in standard dialect. |

Continuation of Table 2

| 1                                    | 2                         | 3                                                                                                                                                                                                                                                                                            | 4                                                                                                                                                                                                                                                                                                         |
|--------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                      | <i>Reading</i>            | I can understand texts that consist mainly of high frequency everyday or job-related language. I can understand the description of events, feelings and wishes in personal letters.                                                                                                          | I can read articles and reports concerned with contemporary problems in which the writers adopt particular attitudes or viewpoints. I can understand contemporary literary prose.                                                                                                                         |
| S<br>P<br>E<br>A<br>K<br>I<br>N<br>G | <i>Spoken Interaction</i> | I can deal with most situations likely to arise whilst travelling in an area where the language is spoken. I can enter unprepared into conversation on topics that are familiar, of personal interest or pertinent to everyday life (e.g. family, hobbies, work, travel and current events). | I can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible. I can take an active part in discussion in familiar contexts, accounting for and sustaining my views.                                                                         |
|                                      | <i>Spoken Production</i>  | I can connect phrases in a simple way in order to describe experiences and events, my dreams, hopes and ambitions. I can briefly give reasons and explanations for opinions and plans. I can narrate a story or relate the plot of a book or film and describe my reactions.                 | I can present clear, detailed descriptions on a wide range of subjects related to my field of interest. I can explain a viewpoint on a topical issue giving the advantages and disadvantages of various options.                                                                                          |
| W<br>R<br>I<br>T<br>I<br>N<br>G      | <i>Writing</i>            | I can write simple connected text on topics which are familiar or of personal interest. I can write personal letters describing experiences and impressions.                                                                                                                                 | I can write clear, detailed text on a wide range of subjects related to my interests. I can write an essay or report, passing on information or giving reasons in support of or against a particular point of view. I can write letters highlighting the personal significance of events and experiences. |

Table 3 – Common Reference Levels: self-assessment grid (C1, C2)

|                                      |                           | C1                                                                                                                                                                                                                                                                                                   | C2                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1                                    | 2                         | 3                                                                                                                                                                                                                                                                                                    | 4                                                                                                                                                                                                                                                                                                                                                        |
| U<br>N<br>D<br>E<br>R<br>S<br>T      | <i>Listening</i>          | I can understand extended speech even when it is not clearly structured and when relationships are only implied and not signalled explicitly. I can understand television programmes and films without too much effort.                                                                              | I have no difficulty in understanding any kind of spoken language, whether live or broadcast, even when delivered at fast native speed, provided. I have some time to get familiar with the accent.                                                                                                                                                      |
| A<br>N<br>D<br>I<br>N<br>G           | <i>Reading</i>            | I can understand long and complex factual and literary texts, appreciating distinctions of style. I can understand specialised articles and longer technical instructions, even when they do not relate to my field.                                                                                 | I can read with ease virtually all forms of the written language, including abstract, structurally or linguistically complex texts such as manuals, specialised articles and literary works.                                                                                                                                                             |
| S<br>P<br>E<br>A<br>K<br>I<br>N<br>G | <i>Spoken Interaction</i> | I can express myself fluently and spontaneously without much obvious searching for expressions. I can use language flexibly and effectively for social and professional purposes. I can formulate ideas and opinions with precision and relate my contribution skilfully to those of other speakers. | I can take part effortlessly in any conversation or discussion and have a good familiarity with idiomatic expressions and colloquialisms. I can express myself fluently and convey finer shades of meaning precisely. If I do have a problem I can backtrack and restructure around the difficulty so smoothly that other people are hardly aware of it. |

Continuation of Table 3

| 1                               | 2                        | 3                                                                                                                                                                                                                                                                                | 4                                                                                                                                                                                                                                                                                                                        |
|---------------------------------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                 | <i>Spoken Production</i> | I can present clear, detailed descriptions of complex subjects integrating subthemes, developing particular points and rounding off with an appropriate conclusion.                                                                                                              | I can present a clear, smoothly-flowing description or argument in a style appropriate to the context and with an effective logical structure which helps the recipient to notice and remember significant points.                                                                                                       |
| W<br>R<br>I<br>T<br>I<br>N<br>G | <i>Writing</i>           | I can express myself in clear, well-structured text, expressing points of view at some length. I can write about complex subjects in a letter, an essay or a report, underlining what I consider to be the salient issues. I can select style appropriate to the reader in mind. | I can write clear, smoothly-flowing text in an appropriate style. I can write complex letters, reports or articles which present a case with an effective logical structure which helps the recipient to notice and remember significant points.<br>I can write summaries and reviews of professional or literary works. |

### Завдання

#### 1. What is the difference between General English (GE), English for Professional Purposes (EPP) and (English for Academic Purposes (EAP))?

General English is for those seeking basic language knowledge, such as casual conversations, daily activities, and travel. Academic English focuses on the more technical aspects of language and is used for university studies, research, and academic writing. Unlike General English, Academic English cannot contain slang, figurative language, contractions, first-person pronouns or colloquialisms. EAP (English for Academic

Purposes) refers to students' academic needs and EPP (English for Professional Purposes) refers to the actual needs of professionals. EAP includes research on discourse, from very specific language features to more generic studies based on academic genres, and focuses on specific skills in listening, reading, writing, reading.

Speaking effectively begins with clear understanding of purpose and content. The way we speak depends on the topic, goal and the level of formality we need.

***Speaking skills:***

- speaking fluently at a natural speed,
- using clear pronunciation,
- using appropriate intonation (stress, rhythm, linking),
- using a tone appropriate to the reason for speaking (i.e. to inform, to emphasise, to persuade),
- using supporting details,
- organising an oral presentation in a logical way,
- developing complex ideas within a short talk,
- using words and phrases appropriate to the context,
- using accurate grammar,
- organising opinions, points with details, examples, explanations,
- speaking without preparation.

***Reading skills:***

- understanding overall meaning,
- understanding specific information and details,
- identifying a writer's purpose, style, tone or attitude,
- understanding academic vocabulary,
- following a logical and chronological sequence,
- understanding supporting views and examples,
- identifying words and phrases appropriate to the context,
- inferring the meaning of unfamiliar words.

***Listening skills:***

- understanding overall meaning,
- understanding grammar,
- understanding academic vocabulary,
- understanding meaning from intonation, tone,
- identifying the main ideas and supporting points,
- identifying the speaker's purpose, style, tone or attitude,
- inferring the meaning of unfamiliar words,
- comprehending explicit and implicit information.

***Writing skills:***

- writing a summary with a word limit,
- communicating the main points in writing,
- using appropriate vocabulary and grammar,
- writing for a purpose (to persuade, to summarise),
- supporting the ideas with details, figures, explanations, examples,
- organising sentences, paragraphs in a logical way,
- developing complex ideas with a complete essay,
- conveying degrees of certainty about ideas and opinions,
- synthesising information,
- writing to strict length requirements.

***2. Read the following. What is important for understanding Academic English style?***

✓ “The language of the science is a peculiarly difficult subject, for language is a product of complex and ever-changing conditions. Words cannot be fixed or stabilized and they carry with them a history that needs to be traced right up to the moment of their usage”. (*Emeritus Prof. Charles Singer in the Encyclopaedia Britannica 1965, under SCIENCE, Vol. 20, pp. 122–3*).

✓ “The form of an article is more important than most professional scientists are willing to admit. Authors who earn

a living by writing, and who are thus persuaded that it is a great indulgence on the part of readers to consent to read any article from start to finish, must constantly be surprised at the assumption by part-time authors that the written word is instantly devoured by all who see it. The problem is not simply language but the lack of conviction that authors must take trouble to help their readers understand". (*John Maddox (then Editor of Nature), in Nature, vol. 221, January 11, 1969, pp. 128–30*).

✓ "The best English writers occasionally use some of the strange constructions mentioned in this article, often to produce a special effect for a particular occasion. They do so, however, only at long intervals. The greater part of their writing is so smooth and fluent that the reader forgets that he is reading and knows only that he is absorbing ideas". (*Dr. John R. Baker, in Nature, vol. 176, November 5, 1955, pp. 851–2*).

✓ "People prefer to read well below their education level..." Douglas Mueller, president of the Gunning-Mueller Clear Writing Institute in Santa Barbara. California, quoted by William E. Blundell in *The Asian Wall Street Journal*.

✓ "... in the words of another old grammarian, the golden rule of writing is 'that the words or members most nearly related should be placed in the sentence as near to one another as possible, so as to make their mutual relation clearly appear'" (*A Dictionary of Modern English Usage by H. W. Fowler, 2 nd ed. revised by Sir Ernest Gowers, Clarendon Press, 1965*).

✓ "English for Academic Purposes (EAP), commonly known as Academic English, entails training students, usually in a higher education setting, to use language appropriate for study. It is one of the most common forms of English for Specific Purposes (ESP)".

✓ Program. An EAP program focuses instruction on skills required to perform in an English-speaking academic context across core subject areas generally encountered in a college or university setting. Programs may also include a more narrow

focus on the more specific linguistic demands of a particular area of study”. (*Wikipedia*)

**3. Try to answer the following question:**

***Why do people take up science?***

***Read the following meditations of C. P. Snow on this subject.***

***Do you agree with the author?***

***Make use of the vocabulary given below.***

“One can do science because one believes that practically and effectively it benefits the world. A great many scientists have had this as their chief conscious reason. One can do science because it represents the truth. One selected one’s data – set one’s puzzle for oneself, as it were – and in the end solved the puzzle by showing how they fitted other data of the same kind. It is rather as though one was avidly interested in all the countryside between this town and the next: one goes to science for an answer, and is given a road between the two. One can also do science because one enjoys it. Many people like unraveling puzzles. Scientific puzzles are very good ones, with reasonable prizes. So that either without examining the functions of science, being indifferent to them or taking them for granted, a number of men go in for research as they would for law; living by it, obeying its rules, and thoroughly enjoying the problem-solving process. This is a perfectly valid pleasure, among them you can find some of the most effective of scientists. Nowadays I should allow more for accident; many men become scientists because it happens to be convenient and they may as well do it as anything else. But the real urgent drives remain”.

\*\*\*

*to do science;*

*to benefit the world / one’s nation (to be a benefit to the world/  
nation);*

*to represent the truth;*

*to like unravelling / solving puzzles;*

*to go in for/to take up;  
to do research;  
to enjoy the problem-solving process;  
to be committed to science;  
to be a committed scientist;  
to gain enjoyment from research;  
to enjoy science;  
to examine the functions of science;  
to take smth for granted;  
to have a belief in scientific values;  
one's dedicated search for scientific truth, a capacity for  
(detailed) scientific analysis / criticism;  
to have a scrupulous / tidy / analytical mind;  
to be out of one's reach;  
to have insight / imagination / drive, etc.;  
to envy smb. for the precision / rapidity / elegance of  
one's experiments;  
one's subtle / fertile mind;  
to be quick / bright / slow, etc.;  
to be full of facts / speculations / ideas, etc.;  
to overflow with a sort of scientific wit;  
to be a born scientist / scholar;  
to rush into work;  
to tackle / to solve the problem;  
to strike / to keep up to a useful line of one's own;  
to have a sudden flash of an idea;  
spurred by the success;  
to develop / to use a method of...;  
to generalize.*

**4. What are the main characteristics of academic writing style?**

**ACADEMIC ENGLISH**

In your years of studying English you have probably become aware of the fact that there is a difference between English that

is used in informal situations and English that is used in formal situations. When you are speaking, it is sometimes difficult to determine how formal your English should be. In writing it is less difficult to determine which style of language is appropriate. The research paper is the most formal kind of academic activity you will be required to complete, and the language that you use in writing it must be suitable to the formality of the assignment.

Although not all teachers agree on the exact characteristics of formal English, there are several commonly accepted conventions of language use that should be followed when you write your paper. The following are some general guidelines to help you use formal language when you write research papers:

- ✓ Do not use contracted forms of verbs (e.g., doesn't, it's, etc.).

- ✓ Avoid two-word verbs, especially those that have one-word synonyms (e.g., bring up, look over, etc.).

- ✓ Do not use slang expressions or colloquial expressions. A good dictionary will help you identify these (e.g., blow off, kid, etc.).

- ✓ Avoid the use of "a lot of"; use the more formal equivalents of "a great deal of," "a large number of," or "many."

- ✓ Make your word choices as accurate as possible. Words like "thing" and "way" should be avoided in favor of more precise terms.

- ✓ Avoid the use of the dash (–) as a punctuation mark. If your sentence is properly composed, a comma, colon, or semicolon can be substituted.

Using formal English in writing your paper does not mean using "unnatural" language. Formal English is clear and logical.

***5. Compare the texts of articles, abstracts in English and Ukrainian on the identical topics and define the similarities and differences in their structures, uses of grammar or vocabulary language means.***

**6. Answer the questions about your university studies and research:**

How long did your University course last?

Did you have ample (enough) time to discover your interests?

Where the syllabuses overloaded? When you studied of University?

Did every scrap of knowledge find application?

Is there any thing as useless knowledge?

Should textbooks be more self-instructive?

Does what is taught in science sometimes lag behind present-day concepts?

Have you seen how “science is done”?

When did you choose your special field?

What did you specialize in?

Have you acquired skills in research? What are they?

Did you do your research mainly for your graduation paper?

Who was your supervisor (scientific advisor)?

Were the results valuable enough for professional journal publication?

Is there a gap between “pure” and applied sciences?

Applied sciences are of prime importance in our time; aren't they?

Are you the person who can advance a new theory, work out a new method; find a suitable technique for the experiment; see a new approach to the problem; develop a new technique, create a new device.

Do you like to be a man of wide interests, to be a team leader, to develop new skills, to get help and support?

What is a very productive research year for you? (to give a report, to write a paper, to participate in a scientific conference, to apply data to feather research) make quick progress in your research, to be though with your research.

What, in your opinion, is the most important problem today?

What conditions are necessary for its successful solution?

There are scientists who have exceptional all excellent minds who work independently, others are creators of scientific schools who share their experience, knowledge they possess with their pupils.

***7. Read the detailed explanation of Common Reference Levels in “Common European Framework of Reference for Languages: Learning, Teaching, Assessment”.***

What do the scale descriptors focus on for linguistic, pragmatic and sociological competences?

## ПОЗДІІІ ІІ Phonetic Basics in Use

### ***1. Read the poem about the intricacies of the English pronunciation.***

*What is your experience in reading in English?  
Have you got any problems?  
What problems have you got?*

When the English tongue we speak,  
Why is “break” not rhymed with “weak”?  
Will you tell me why it’s true,  
We say “sew”, but likewise “few”?  
And the maker of a verse  
Can’t rhyme his “horse” and “worse”.  
“Beard” sounds not the same as “heard”.  
“Cord” is different from a “word”.  
“Cow” is “cow”, but “low” is “low”,  
“Shoe” is never rhymed with “toe”.  
Wherefore “done”, but “gone” and “lone”.  
Is there any reason known?  
And in short it seems to me  
Sounds and letters disagree.

UNKNOWN

*Give your examples of reading difficulties if any.*

## 2. Study the following tables:

Таблиця 1 – Таблиця графічних відповідностей англійських літер і літеросполучень

| Літери і літеросполучення                              | Місце вживання                                                                               | Звукова відповідність | Приклад                                                                       |
|--------------------------------------------------------|----------------------------------------------------------------------------------------------|-----------------------|-------------------------------------------------------------------------------|
| 1                                                      | 2                                                                                            | 3                     | 4                                                                             |
| -a-<br>-ai-<br>-ei-, -ey-<br>-ea-<br>-eigh-<br>-aight- | I тип читання                                                                                | [ei]                  | wave, trade<br>mail, daily<br>they, grey<br>great, break<br>eight<br>straight |
| -o-<br>-oa-<br>-ow-<br>-ought-                         | I тип читання<br>gthtl<br>-l-,<br>-ll-, -ld-, -st-, -th-<br>у кінці слова                    | [ou]                  | globe, ocean, old,<br>post<br>boat, coast<br>bow, tow<br>though               |
| -e-<br>-ea-<br>-ee-<br>-ie-<br>-ei-                    | I тип читання<br><br>перед -v- (-e-),<br>-f-, перед -l-,<br>після -с-<br>перед -v-(-e-), -l- | [i:]                  | me, we<br>sea, speak<br>see, meet<br>believe, chief<br>ceiling, receive       |
| -i-, -y-<br>-igh-                                      | I тип читання<br>перед -nd-, -ld-                                                            | [ai]                  | my, line, find<br><br>high, right                                             |
| -u-<br>-ew-<br>-ui-<br>-oo-<br>-ou-, -o-               | I тип читання                                                                                | [ju:] [u:]            | cube, rule<br>few, new<br>fruit, cruise<br>cool, tool<br>you, route, do       |
| -e-<br>-ea-                                            | II тип читання<br>перед -d-, -t-,<br>-th-, -l-                                               | [e]                   | west, deck<br>ready, weather                                                  |

Продовження таблиці 1

| 1                                                                                    | 2                                                                                       | 3    | 4                                                                                          |
|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------|--------------------------------------------------------------------------------------------|
| -i-, -y-<br>-y-<br>-age<br>-edge                                                     | II тип читання<br>в кінці слова                                                         | [i]  | in, it<br>many, very<br>language<br>knowledge                                              |
| -o-<br>-a-                                                                           | II тип читання<br>після -w-, -wh-,<br>-qu-                                              | [ɔ]  | on, long<br>want, water                                                                    |
| -u-<br><br>-ful<br>-oo-                                                              | у закритому<br>складі після -b-,<br>-p-,<br>-f-<br>перед -k-                            | [u]  | full, pull<br><br>peaceful<br>book, took                                                   |
| -u-<br>-o-<br>-ou-                                                                   | II тип читання<br>у закритому<br>складі перед -n-,<br>-m-, -v-, -th-<br>у деяких словах | [ʌ]  | up, hull<br>mothers ton<br>country, young                                                  |
| -ar-<br>-a-                                                                          | III тип читання<br>перед -ff-, -ph-,<br>-f-, -ss-, -s-, -th-<br>-n- + голосна           | [a:] | barge, far<br>craft, class, past                                                           |
| -or-<br>-au-, -aw-<br>-a- + -l-, -ll-, -k-<br>-a-, -ar-<br>-oar-<br>-ough-<br>-augh- | III тип читання<br><br>після -w-, -wh-,<br>-qu-                                         | [o:] | port, sport<br>august, draw<br>all, talk<br>warm<br>quarter<br>board<br>though<br>daughter |
| -er-<br>-ur-<br>-ir-<br>-ear-<br>-or-                                                | III тип читання<br>III тип читання<br>III тип читання<br><br>після -w-                  | [ə:] | serve, stern<br>turn, surface<br>first, third<br>early, learn<br>work, world               |

Продовження таблиці 1

| 1                       | 2                                                              | 3             | 4                                               |
|-------------------------|----------------------------------------------------------------|---------------|-------------------------------------------------|
| -oi-<br>-oy-            |                                                                | [oi]          | boil, toil<br>boy, voyage                       |
| -ou-<br>-ow-            | у закритому<br>складі<br>в кінці складу<br>перед -n-, -l-, -d- | [au]          | out, south<br>now, how, town,<br>crowd          |
| -are-<br>-air-<br>-ere- | у деяких словах                                                | [eə]          | prepare, square<br>chair, pair<br>where, there  |
| -ere-<br>-ear-<br>-eer- |                                                                | [iə]          | here, sphere<br>hear, dear<br>engineer, pioneer |
| -ire-<br>-io-<br>-ia-   |                                                                | [aiə]         | fire, wire<br>lion, pioneer                     |
| -ure-<br>-our-          |                                                                | [uə]<br>[juə] | pure, Urals<br>tour, contour                    |
| -our-<br>-ower-         |                                                                | [auə]         | hour, our<br>power, flower                      |

Таблиця 2 – Правила читання приголосних та їх сполучень

| Приголосні та їх сполучення | Місце вживання                                                                                                      | Звукова відповідність               | Приклад                                                                                                            |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| 1                           | 2                                                                                                                   | 3                                   | 4                                                                                                                  |
| -с-<br>-ch-<br><br>-ck-     | перед -е-, -і-, -у-<br><br>у запозичених<br>з франц. мови<br>у словах грець-<br>кого походження<br>у середині слова | [k], [s]<br>[tʃ],<br><br>[ʃ]<br>[k] | cargo, act,<br>face, cycle,<br>cinema, chair,<br>change<br>machine, Chicago<br>mechanical,<br>anchor<br>pack, deck |

Продовження таблиці 2

| 1             | 2                                                            | 3                          | 4                                                              |
|---------------|--------------------------------------------------------------|----------------------------|----------------------------------------------------------------|
| -g-           | перед -e-, -i-, -y-                                          | [g]<br>[dʒ]<br>[ai]<br>[f] | go, regular,<br>barge, logic<br>night, light,<br>enough, laugh |
| -igh-<br>-gh- | у деяких словах                                              |                            |                                                                |
| -x-           | перед ударним<br>складом, якщо<br>немає інших<br>приголосних | [kx]<br>[gz]               | text, mix,<br>example, exact                                   |
| -th-          | в оточенні голос-<br>них і в службо-<br>вих словах           | [ə]<br>[p]<br>[ʃ]          | thick, youth,<br>weather, the                                  |
| -ti-          | у середині слова                                             |                            | partial, ambition                                              |
| kn-           | на початку слова                                             | [n]                        | know, knot                                                     |
| -wr-          |                                                              | [r]                        | white, wrong                                                   |
| -wh-          | у деяких<br>випадках<br>у деяких<br>випадках                 | [h]<br>[w]                 | who, whom,<br>whose, what, why,<br>when                        |
| -ph-          | у словах грець-<br>кого походження                           | [f]                        | physics, photo                                                 |
| -sh-<br>-si-  | у середині слова                                             | [ʃ]                        | ship, show<br>Asia                                             |

Таблиця 3 – Правила читання голосних і сполучень голосних

| Голосна<br>та їх<br>сполу-<br>чення | Звукова відповідність |            |             |              | Сполу-<br>чення<br>голосних   | Звукова<br>відповід-<br>ність | Приклади               |
|-------------------------------------|-----------------------|------------|-------------|--------------|-------------------------------|-------------------------------|------------------------|
|                                     | тип читання           |            |             |              |                               |                               |                        |
|                                     | I                     | II         | III         | IV           |                               |                               |                        |
| 1                                   | 2                     | 3          | 4           | 5            | 6                             | 7                             | 8                      |
| -a-                                 | [ei]<br>name          | [æ]<br>lab | [a:]<br>car | [ɛə]<br>care | ai<br>au, aw<br>a-lf, lf, lve | [ei]<br>[ɔ:]<br>[a:]          | sail<br>launch,<br>saw |

Продовження таблиці 3

| 1        | 2            | 3            | 4            | 5             | 6                                                                                          | 7                                                                                                        | 8                                                                                                                      |
|----------|--------------|--------------|--------------|---------------|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
|          |              |              |              |               | a-l, ll<br>a-ss, st, sk,<br>sp, nt, nce,<br>ft                                             | [ɔ:]<br>[a:]                                                                                             | half<br>small, salt<br>past<br>class<br>dance<br>craft                                                                 |
| -o-      | [ou]<br>no   | [ɔ:]<br>stop | [ɔ:]<br>port | [ɔ:]<br>shore | oo<br><br>ou, ow<br><br><br>oa<br>oi, oy<br>oor, our,<br>oar<br><br>o-ld<br>ou-gh - t<br>o | [u:]<br>[u] перед k<br>[au]<br><br>[ou]<br>[u]<br>[ʌ]<br>[ou]<br>[oi]<br>[ɔ:]<br><br>[ou]<br>[ɔ:]<br>[ʌ] | cool<br>book<br>now<br>round<br>grow<br>group<br>double<br>boat<br>oil<br>door, your<br>car<br>cold<br>thought<br>some |
| -e-      | [i:]<br>me   | [e]<br>and   | [ə:]<br>term | [iə]<br>here  | ea<br><br><br>ear<br>ee<br>ew, eu<br><br>eer, ear<br>eight                                 | [i:]<br>[e]<br>[ei]<br>[iə]<br>[ə:]<br>[i:]<br>[ju:]<br><br>[iə]<br>[ei]<br>[ai]                         | dean<br>head<br>great<br>real<br>early<br>deep<br>new<br>neutral<br>year<br>eight<br>height                            |
| -u-      | [ju]<br>cube | [ʌ]<br>hull  | [ə]<br>turn  | [ju]<br>purl  | ui                                                                                         | [u]                                                                                                      | cruise                                                                                                                 |
| -i-, -y- | [ai]<br>line | [i]<br>six   | [ə:]<br>firm | [aiə]<br>wire | ie<br>i -nd, ld, gh                                                                        | [i]<br>[ai]                                                                                              | chief<br>find<br>bright<br>child                                                                                       |

**3. Practice the following:**

**A**

**cake – cat – car – care**

1. Haste makes waste.
2. Tastes differ.
3. Take care of a penny and a pound will take care of itself.
4. Accidents will happen in the best families.
5. Manners make the man.
6. First catch your hare, then cook it.
7. Bad news has wings.
8. Practice is the best master.
9. A drowning man catches at a straw.
10. Standing pools gather filth.
11. Forewarned is forearmed.
12. Each day has its care and each care has its day.
13. All cats are grey in the dark.
14. Caution is the parent of safety.
15. A clean hand wants no washing.
16. You can't eat your cake and have it.
17. No pains – no gains.
18. There is one thing about baldness: it is neat.
19. He laughs best who laughs last, but who laughs first sees the point.
20. A great ship asks deep water.
21. After rain comes fair weather.
22. Life is not clear sailing in calm waters.
23. Many commanders sink the ship.
24. Make every bargain clear and plain that none may afterwards complain
25. Fancy that!
26. Grasp all, lose all.
27. You scratch my back, I'll scratch yours.
28. Waste not, want not.

29. Many hands make light work.
30. The cat is out of the bag.

## O

### code – cod – corn – core

1. A rolling stone gathers no moss.
2. No rose without a thorn.
3. No news – good news.
4. Every dog has his day.
5. Honesty is the best policy.
6. Drop by drop the sea is drained.
7. Lost time is never found again.
8. No cross, no crown.
9. The world is moving so fast these days that a man who says it can't be done is generally interrupted by someone doing it.
10. Better short of pence than short of sense.
11. Any port in a storm.
12. A fool and his money are soon parted.
13. Good clothes open all doors.
14. Too good to be true.
15. Too many cooks spoil the broth.
16. Between two stools one falls to the ground.
17. Confession is good for every soul.
18. A pound in a purse is worth two in a book.
19. Politeness oils the wheels of life.
20. Joy and sorrow are as near as today and tomorrow.
21. None is so busy as those who do nothing.
22. Exception proves the rule.
23. Money makes money.
24. A man is as old as he feels, and a woman as old as she looks.
25. Cowards die many times, the brave but once.
26. What's worth doing is worth doing well.
27. Blood is thicker thwn water.

28. Don't cross the bridge until you come to it.
29. It takes two to tango.
30. Two wrongs don't make a right.

**E**

**he – hell – her – here**

1. Extremes meet.
2. He who hesitates is lost.
3. A hedge between keeps friendship green.
4. Best defence is attack.
5. Every family has a black sheep.
6. Every little helps.
7. Better an egg today than a hen tomorrow.
8. Better late than never.
9. Never ask of money spent.  
    Where the spender thinks it went.  
    Nobody was ever meant.  
    To remember or invent.  
    What he did with every cent.
10. Good to begin with, better to end well.
11. East or West – home is best.
12. Too far East is West.
13. Better short of pence than short of sense.
14. Experience teaches us wisdom.
15. He who has ears let him hear.
16. A new broom sweeps clean.
17. Where the river is deepest it makes least noise.
18. A friend in need is a friend indeed.
19. Let sleeping dogs lie.
20. The only way to keep your health eat what you don't want, drink what you don't like and do what you don't rather not.
21. Live and learn.
22. Easily earned money is quickly spent.

23. Early to bed and early to rise makes a man healthy, wealthy and wise.
24. There is a skeleton in every house.
25. Seeing is believing.
26. You can't teach an old dog new tricks.
27. A leopard can't change its spots.
28. Beggars can't be choosers.
29. The grass is always greener on the other side of the fence.
30. Half a loaf is better than no bread.

### I – Y

#### site – sit – sir – siren

1. Time flies.
2. Lost time is never found again.
3. Old friends and old wine are best.
4. A stitch in time saves nine.
5. He gives twice who gives quickly.
6. Time is money.
7. Strike while the iron is hot.
8. What greater crime then loss of time.
9. After dinner sit a while, after supper walk a mile.
10. Better kiss a miss than miss a kiss.
11. A little explained, a little endured, a little forgiven, the quarrel is cured.
12. Speech is silver but silence is gold.
13. Wishes do not wash dishes.
14. More wishes are silly fishes.
15. A little learning is a dangerous thing.
16. Alcohol is like love, the first kiss is magic, the second is intimate, the third is routine.
17. To find a girl's faults, praise her to her girl-friends.
18. The early bird catches the worm.
19. Fire and water are good servants but bad masters.
20. No smoke without fire.

21. If wishes were horses, beggars might ride.
22. Out of sight, out of mind.
23. To live in hearts we leave behind is not to die.
24. Idleness is the mother of all evil.
25. There is no place like home.
26. It's the tip of the iceberg.
27. Don't bite the hand that feeds you.
28. The pen is mightier than the sword.
29. Don't cross the bridge until you come to it.
30. Time and tide wait no man.

U

**cute – cut – curve – cure**

1. It is the duty of a student  
Without exception to be prudent.  
If smarter than his teacher.  
Tact demands that he conceals the fact.
2. Too good to be true.
3. Exception proves the rule.
4. Lucky at cards, unlucky in love.
5. A hungry man is an angry man.
6. Love in a hut, with water and a crust is cinders, ashes and  
dust.
7. Much will have more.
8. Old love does not rust.
9. So many countries, so many customs.
10. The customer is always right.
11. The tongue is not steel, yet it cuts.
12. Well begun is half done.
13. Measure twice and cut once.
14. Still water runs deep.
15. It is a good wife who never grumbles,  
It is a good horse that never stumbles.
16. It's double Dutch.

17. Tough luck.
18. Business before pleasure.
19. Let him put in a finger and he will put in his whole hand.
20. Curiosity is incurable.
21. Curiosity killed the cat (Satisfaction brought it back).
22. Business is business.
23. Buy now, pay later.
24. Don't put off till tomorrow that which they should have done yesterday.
25. Judge not that cannot be judged.
26. Truth will out.
27. All work and no play makes Jack a dull boy.
28. Hunger is the best sauce.
29. Don't judge a book by its cover.
30. Robbing Peter to pay Paul.

***4. Practice the following tongue – twisters:***

\*\*\*

If a white chalk chalks on a black blackboard,  
will a black chalk chalk on a white blackboard?

\*\*\*

They cheered the hero when he appeared.

\*\*\*

The theatre is somewhere here.

\*\*\*

I'll have a proper cup of coffee in a proper coffee-cup.

\*\*\*

Peter Piper picked a peck of pickled pepper;  
A peck of pickled pepper Peter Piper picked;  
If Peter Piper picked a peck of pickled pepper,  
Where's the peck of pickled pepper Peter Piper picked?

\*\*\*

The ham merman hammers the hammer on the hard highroad.

\*\*\*

Tommy Trot, a man of law,  
Sold his bed and lay upon straw;  
Sold the straw and lay on grass  
To buy his wife a looking-glass.

\*\*\*

Robert Rowley rolled a round roll round.  
A round roll Robert Rowley rolled round.  
Where is the round roll Robert Rowley rolled round?

\*\*\*

Little Lady Lilly lost her lovely locket.  
Lucky little Lucy found the lovely locket,  
Lovely little locket lay in Lucy's pocket –  
Lazy little Lucy lost the lovely locket!

\*\*\*

When the Twister twists me a twist,  
The twisting of his twist he three times does untwist;  
And if one of the twines of his twist does untwist,  
The twine that untwisted, untwists the whole twist.

\*\*\*

Swan swam over the sea.  
Swim, swan, swim:  
Swan swam back again.  
Well swam, swan!

\*\*\*

A Thatcher of Thatchwood went to Thatchet a-thatching:  
Did a thatcher of Thatchwood go to Thatchet a-thatching?  
If a thatcher of Thatchwood went to Thatchet a-thatching,  
Where's the thatching the thatcher of Thatchwood has thatched?

\*\*\*

As I was going along, along, along,  
A-singing a comical song, song, song,  
The lane that I went was so long, long, long,  
And the song that I sang was as long, long, long,  
And so I went singing along.

***5. Do you like practicing phonetics? Why? Read the following poems and discuss the efficient ways of mastering phonetics.***

### **JUST FOR FUN**

#### ***The Joys of the Language Lab***

Well, I come to classes every day,  
because I can't understand what the English say:  
It's Double Dutch, I'm out of touch,  
but I want to learn the modern way.  
So they set me on top of a tape machine  
and say: "Do you know what this sentence means?"  
I say, "Errr... No." "Well, press that button and away we go."  
I've been sentenced. Just like being in jail.  
Fifty-five times I say the same old phrase,  
fifty-five times the same old way.  
That three-phase drill makes me feel so ill,  
I shout: "Let me out, I've had my fill;  
haven't you heard of overkill?"  
A voice replies: "You've got to stay.  
Our goal is to reinforce your skill.  
There's no escape, so just sit still.  
Linguistic Science will save your soul.  
It won't be long, you'll be on parole  
when you've learned to speak and play each role –

but you've got to work, this is not the dole."

By about now my head is dazed,  
I've got pins-and-needles and my eyes are glazed:  
"It's the third degree, I've been hypnotised,  
I've been grilled and drilled and dehumanised."

But the reassuring voice replies:  
"You can't fool us, your accent's a very poor disguise,  
Confess you're fluent, or you'll be breathanalysed.

Get wise, relax, it's the latest craze,  
sitting on top of an electric chair –  
these days you'll find them everywhere –  
so just sit tight, out of sight, well all right."

After half an hour my headache's bad;  
I'm going deaf as well as mad.  
I can't see my cellmates, can't laugh with the boys;  
all I can hear is this foreign noise  
going on and on, inside my head.

I can still hear it when I go to bed.

Brainwashing, I call it...

"Better to be alive in the language lab  
than speechless and dead, laid out on a slab.

"I think Skinner said.

Or was it Chomsky? Bad influence that chap.

Trying to transform my generation.  
Someone should inform him of motivation.

... Now please don't think that I object;

I'm full of praise and great respect.

But there is one thing, to tell the truth:

I get so lonely in my booth.

All I do is moan and groan  
sitting shackled between two phones.

I just want to TALK to someone:

I've got a mouth and talking's fun.

But I get no mercy from this microphone,  
I might as well talk to a brick or a stone.

(From “English Teaching Forum”,  
1974, No 3, July–Sept.)

\*\*\*

The more we study, the more we know,  
The more we know, the more we forget.  
The more we forget, the less we know.  
The less we know, the less we forget.  
The less we forget, the more we know. Why study?

\*\*\*

Multiplication is vexation,  
Division is as bad;  
The rule of Three it puzzles me,  
And Fractions drive me mad.

**6. Read the following quotations and bits of advice.**

*What are your favourites?*

*Which do you agree or disagree? Why?*

**PHILOSOPHIC ADVICE**

*He who knows not, and knows not that he knows not;  
he is a fool; shun him.*

*He who knows not, and knows that he knows not;  
he is simple, teach him.*

*He who knows, and knows not that he knows;  
he is asleep, wake him.*

*He who knows, and knows that he knows;  
he is wise, follow him.*

*The more that you read, the more things you will know. The  
more that you learn, the more places you'll go (Dr. Seuss).*

*Education is one thing no one can take from you (Etin Norbegren).*

*Give a man a fish and you feed him for a day; teach a man to fish and you feed him for a lifetime (Malmonides).*

*Education's purpose is to replace an empty mind with an open one (Malcolm Forbes).*

*Education is what remains after one has forgotten what one has learned in school (Albert Einstein).*

*Education is not preparation for life; education is life itself (John Dewey).*

*The purpose of education is to turn mirrors into windows (Sydney J. Harris).*

*Education is the most powerful weapon which you can use to change the world (Nelson Mandela).*

*Education is the vaccine of violence (Edward Olmos).*

## ПОЗДІЛ III Reading Basics in Use

### CLIMATE CHANGE – the Global Challenges

*“The infinite growth of finite resources.  
Is the impossibility in a finite environment...”  
(The 2nd Law: Unsustainable.  
Muse rock band group album of 2012)*

***1. Here is the glossary of the key terms. Can you explain these definitions in more detail?***

*Carbon footprint* is the measure of the greenhouse gas emissions released into the atmosphere by a particular person, organization, product, or activity. A bigger carbon footprint means more emissions of carbon dioxide and methane, and therefore a bigger contribution to the climate crisis (*UN Climate Dictionary*).

*Climate change* refers to the long-term changes in the Earth climate that are warming the atmosphere, ocean and land. Climate change is affecting the balance of ecosystems that support life and biodiversity, and impacting health. It also causes more extreme weather events, such as more intense and/or frequent hurricanes, floods, heat waves, and droughts, and leads to sea level rise and coastal erosion as a result of ocean warming, melting of glaciers and loss of ice sheets (*UN Climate Dictionary*).

*Feedback loops* happen when one change in the climate triggers further changes, in a chain reaction that reinforces itself

as time goes on. Ultimately, feedback loops can trigger *tipping points*, at which point the changes in our planet's climate systems become irreversible (*UN Climate Dictionary*).

*Global warming.* Earth is warming up, and humans are at least partially to blame. The causes, effects, and complexities of global warming are important to understand so that we can fight for the health of our planet. Global warming is defined as the increase in the average temperature of the Earth due to the accumulation of greenhouse gases in the atmosphere. It is the long-term warming of the planet's overall temperature. Though this warming trend has been going on for a long time, its pace has significantly increased in the last hundred years due to the burning of fossil fuels. The most harmful greenhouse gases in the atmosphere are water vapour, carbon dioxide, methane, nitrous oxide, ozone, chlorofluorocarbons and hydrofluorocarbons. Effect of global warming and greenhouse effect is seen in the rising sea levels that can, in turn, cause floods and harm the aquatic life (*Britannica*).

*Greenhouse gases* are gases that trap heat in the atmosphere, causing global warming and climate change. The main greenhouse gases are carbon dioxide, methane, nitrous oxide, as well as fluorinated gases used for cooling and refrigeration. To prevent catastrophic climate change, the world's governments must work together to significantly reduce greenhouse gas emissions and keep global warming below the dangerous threshold of 1.5 C (*UN Climate Dictionary*).

*Sustainability* is a social goal for people to co-exist on Earth over a long time. Experts often describe sustainability as having three dimensions: environmental, economic, and social. In everyday use, sustainability often focuses on countering major environmental problems, including climate change, loss of biodiversity, loss of ecosystem services, land degradation, and air and water pollution. A related concept is sustainable development. UNESCO distinguishes the two like this: "Sustainability is often

thought of as a long-term goal (i.e. a more sustainable word), while sustainable development refers to the many processes and pathways to achieve it” (*Wikipedia*).

**2. The following texts inform of the climate change challenges in 2008 and in 2023.**

**Pick up words and word-combinations from the following texts and fill in the following table: a) the reasons; b) the consequences; c) the measures to improve the situation.**

**Climate Change – the Global Challenges**

| Reasons | Consequences | Measures |
|---------|--------------|----------|
|         |              |          |

### **3. EARTN**

#### **3.1. What was the situation in 2008?**

#### **JUST 100 MONTHS LEFT TO SAVE EARTH**

Unjust 100 months’ time, if we are lucky, and based on a conservative estimate, we could reach a tipping point for the beginnings of runaway climate change. Let us be clear exactly what we mean. The concentration of carbon dioxide (CO<sub>2</sub>) in the atmosphere today, the most prevalent greenhouse gas, is the highest it has been for the past 650,000 years.

In just 250 years, as a result of the coal-fired Industrial Revolution, and changes to land use such as the growth of cities and the felling of forests, we have released a great deal of CO<sub>2</sub> into the atmosphere. Currently, approximately 1,000 tonnes of CO<sub>2</sub> are released into the atmosphere every second, due to human activity. Greenhouse gases trap incoming solar radiation, warming the atmosphere. When these gases accumulate beyond a certain

level – a “tipping point” – global warming will accelerate, potentially beyond control.

Faced with circumstances that threaten human civilisation, scientists at least have the sense of humour to term what drives this process as “positive feedback”. In climate change, a number of feedback loops amplify warming through physical processes that are either triggered by the initial warming, or the increase in greenhouse gases. One example is the melting of ice sheets. The loss of ice cover reduces the ability of the Earth’s surface to reflect heat and, by revealing darker surfaces, increases the amount of heat absorbed. Other dynamics include the decreasing ability of oceans to absorb CO<sub>2</sub> due to higher wind strengths, linked to climate change. This has already been observed in the Southern Ocean and North Atlantic, increasing the amount of CO<sub>2</sub> in the atmosphere, and adding to climate change.

Because of such self-reinforcing feedbacks, once a critical greenhouse concentration threshold is passed, global warming will continue even if we stop releasing greenhouse gases into the atmosphere. If that happens, the Earth’s climate will shift into a more volatile state, with different ocean circulation, wind and rainfall patterns, the implications of which are potentially catastrophic for life on Earth. This is often referred to as irreversible climate change.

So, how do we arrive at the ticking clock of 100 months? It’s possible to estimate the length of time it will take to reach a tipping point. To do so you combine current greenhouse gas concentrations with the best estimates for the rates at which emissions are growing, the maximum concentration of greenhouse gases allowable to forestall potentially irreversible changes to the climate system, and the effect of those environmental feedbacks.

We followed the latest data for CO<sub>2</sub>, then made allowances for all human interferences that influence temperatures. We followed the judgments of the mainstream climate science community, represented by the Intergovernmental Panel on Climate Change

(IPCC), on what it will take to retain a good chance of not crossing the critical threshold of the

Earth's average surface temperature rising by 2°C above pre-industrial levels. We were cautious in several ways, optimistic even, and perhaps too much so. A rise of 2°C may mask big problems that begin at a lower level of warming. Collapse of the Greenland ice sheet is more than likely to be triggered by a local warming of 2.7°C, which could correspond to a global mean temperature increase of 2°C or less. The disintegration of the sheet could correspond to a sea-level rise of up to 7 metres.

We also used the lower end of threats in assessing the impact of vanishing ice cover and other carbon-cycle feedbacks. But the result is worrying enough. Given all of the above, in 100 months' time we will reach a concentration of greenhouse gases at which it is no longer "likely" that we will stay below the 2°C temperature rise threshold. "Likely" refers to the definition of risk used by the IPCC. But, even just before that point, there is still a 33 % chance of crossing the line.

And it is wildly unrealistic to think that individuals alone can effect a comprehensive re-engineering of the nation's fossil-fuel-dependent energy, food and transport systems. The government must lead. In their inability to take action commensurate with the scale and timeframe of the problem, the government is mocked both by Britain's own history, and by countries much smaller, poorer and more economically isolated.

The challenge is rapid transition of the economy to live within our environmental means, while preserving and enhancing our wellbeing. We've been here before, and can learn lessons from history. Britain achieved astonishing things while preparing for, fighting and recovering from the Second World War. Between 1938 and 1944, the economy was re-engineered and there were dramatic cuts in resource use and consumption. These coincided with rising life expectancy and falling infant mortality. We consumed less of almost everything, but ate more healthily and

used our disposable income on low-carbon good times. Very public energy restrictions were introduced in government and local authority buildings, shops and railway stations. This was so successful that the results beat cuts previously planned. The public largely assented to measures to curb consumption because they understood that they were to ensure “the fairest possible distribution of the necessities and comforts of daily life”.

Now, 2008, we face the credit crisis, high oil and rising food prices, and the massive added challenge of having to avert climate change. Does a war comparison sound dramatic? In April 2007, Margaret Beckett, then foreign secretary, gave a lecture called “Climate Change: The Gathering Storm”, and said of the second world war: “Climate change is the gathering storm of our generation. And the implications – should we fail to act – could be no less dire: and perhaps even more so”.

Cuba provides an embarrassing example to show up our national tardiness. In 2006 Cuba had a nationwide scheme to replace inefficient incandescent lightbulbs with low-energy alternatives. At the end of the cold war, after losing access to cheap Soviet oil, it switched over to growing most of its food on small, often urban plots, using low-fossil-fuel organic techniques. Half the food eaten in the capital, Havana, was grown in the city’s gardens.

Each of these challenges will draw on things that we already know how to do, but that we lack the political will to do (*Andrew Simms “The Guardian”*).

*3.2. What does keeping to the 1.5 °C threshold mean? What are the promising signs of staying within 1.5 °C to look out for? What are IPCC activities aimed at?*

## **ONE-POINT-FIVE HAS BECOME THE ICONIC FIGURE**

In 2023 in Dubai, UAE, there were COP28, the UN climate talks. The figure “1.5 °C” is rarely far from discussion in any

conversation about climate change. The figure means that it is predicted that by 2100, the world's average temperature will have risen to more than 1,5 °C (2.7F) than pre-industrial level.

The International Panel on Climate Change uses the baseline of 1850–1900, as it is the earliest period with reliable, near global measurements, though the industrial revolution began in the early 1700s.

The crucial figure is based on assessments of the impacts of climate change at different levels of warming. This figure is especially important for the future of sea ice in the polar regions. At 2 °C warming the coldest nights warm by around 6 °C. For island and low-lying nations it would pose an existential challenge.

The year 2023 is registered as the hottest on record in 120,000 years. The IPCC calculated that by the mid-2030s there would be a 50 % chance of the world committing itself to this rise. However, the latest analysis suggests we could reach this threshold sooner – as early as 2029.

*3.3. There are some IPCC greenhouse gas emissions scenarios that accounted for future emissions, mitigation (severity reduction) measures and uncertainties in the model predictions. Read the full text and comment on what the scenarios are based on, what the main conclusion demonstrate.*

### IPCC EMISSIONS SCENARIOS

The IPCC Special Report on Emissions Scenarios (SRES) is based on a thorough review of the literature. They provide the basis for future assessment of climate change and possible response strategies.

The categorization of the scenarios in terms of their emission outcomes illustrate that they can arise from very different developments of main scenario drivers. They depend on the rates of population growth (low or high), high or low incomes,

energy use, globalized technological developments that favour accessibility and economics of fossil fuels, etc.

The most important conclusion from the SRES multi-model, open process, and the large number of scenarios, it has generated is the recognition that there is no simple, linear relationship between driving forces and outcomes.

*3.4. What are sustainable development goals? What are the means of implementation of these ambitious goals to change the world? Read the full text of the 2030 UN Agenda. Are the goals realistic? Why yes? Why not?*

### **TRANSFORMING OUR WORLD: THE 2030 AGENDA FOR SUSTAINABLE DEVELOPMENT**

The Agenda is a plan of action for people, planet and prosperity. The 17 Sustainable Development Goals and 169 targets demonstrate the scale of this Agenda. They are integrated and indivisible and balance on three dimensions of sustainable development: economic, social and environmental.

Goal 1. End poverty in all its forms everywhere.

Goal 2. End hunger and achieve food security and improved nutrition.

Goal 3. Ensure healthy lives and promote well-being for all at all ages.

Goal 4. Ensure inclusive and equitable quality education and promote life-long learning opportunities for all.

Goal 5. Achieve gender equality.

Goal 6. Ensure availability and sustainable management of water and sanitation for all.

Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all.

Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment.

Goal 9. Build resilient infrastructure.

Goal 10. Reduce inequality within and among countries.

Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable.

Goal 12. Ensure sustainable consumption and production patterns.

Goal 13. Take urgent action to combat climate change and its impact.

Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development.

Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt biodiversity loss.

Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective institutions at all levels.

Goal 17. Strengthen the means of implementation and revitalize the global partnership for sustainable development.

#### **4. HEALTH.**

*Our health is inseparably connected to the environment we live in. It is the fact that climate change impacts health: leads to illnesses, death, mental health issues because of weather events (floods, earthquakes, hurricanes, heatwaves), violation of food supply systems (increased hunger, poor nutrition), fresh water shortage, pollution, forced displacement. What do you know about the impact of climate change on human health? Read the following texts and comment on the information.*

*Are you suffering from ecological grief?*

*4.1. What about reducing your impact on the environment?*

**GOOD NEWS**

Though there are climate changes, i.e. increasing air and sea temperatures, changes in rainfall patterns, more frequent and more severe weather events, that have significant consequences for our health, wellbeing and safety, there are things we can do to build the resilience to their effects.

Climate change has been described by the World Health Organization as the biggest threat to health in the 21st century – it affects health and wellbeing in many ways: a) directly, by the increased intensity of severe weather events; b) indirectly, through worsening air quality, spread of infectious diseases; c) by impacting the economy (increased unemployment, financial stress, rising social inequalities).

The good news is that there are simple things to help slow climate change pace.

To stay healthy:

1. During heatwaves stay somewhere cool, drink plenty of water, never leave anyone, in a car, check in on others.
2. Stay safe from mosquito bites wearing loose-fitting clothing when outdoors, using mosquito repellents, making sure there is no stagnant water, ensuring your house is properly fitted with mosquito netting.
3. Increasing your use of ‘active transport’ (walking or cycling much).
4. Reducing processed and packaged food.
5. Eat fruit, vegetables and wholegrains (*BetterHealth Channel*).

*4.2. Who is most at risk of health effects due to climate change?*

There are people who are more vulnerable to the effects of climate change and health: children, pregnant women, older people, people living in rural and remote areas.

Look for the information to explain why.

*4.3. What is allergy? How do allergies depend on climate warming?*

### **GET READY TO ITCH AND SNEEZE**

*A warmer planet could mean we'll suffer more (and stronger) allergies.*

As one of 40 million Americans who suffer from hay fever, Lewis Ziska carries an inhaler in his pocket and takes a whiff to clear his lungs on bad allergy days. But hay fever is more than a personal-health issue for Ziska. A weed ecologies with the U.S. Department of Agriculture's Crop Systems and Global Change Laboratory, Ziska is a leading researcher in allergies and climate change. His findings regarding ragweed, an invasive plant whose pollen is the leading trigger of fall hay fever, are nothing to sneeze at. Global warming and increased atmospheric carbon dioxide from burning fossil fuels appear to supercharge the growth of ragweed. And not only does ragweed grow larger and produce more pollen, its pollen is more allergenic, studies show.

People allergic to ragweed aren't the only ones who'll be sniffing more. Studies show that increased CO<sub>2</sub> levels increase the level of tree pollen, a common source of allergies in springtime. There's evidence that warmer temperatures in Alaska have led to increases in yellow-jacket stings, bad news for people with bee-sting allergies. Not even your basement will be safe: fungal spores also proliferate in warmer temperatures and thrive when carbon-dioxide levels rise.

To test his ragweed hypothesis, Ziska planted the weed in three plots: a rural farm, a semi-rural county park and downtown Baltimore. The urban plot's ragweed produced four times the pollen count of the rural site. "Cities already have more carbon dioxide than rural areas and are hotter", Ziska says. "Cities are a surrogate for global warming".

The impact of global warming and increased CO<sub>2</sub> on allergies is also being studied by government agencies, scientists

and doctors. The Environmental Protection Agency's National Center for Environmental Research is soliciting proposals for climate change and allergy studies to receive funding. The Intergovernmental Panel on Climate Change – the leading international authority on man-induced warming – and the EPA both cited increased allergic reactions due to climate change as a growing concern in 2007 reports.

Allergists are also worried. One new concern: a startling rise in the amount of tree pollen. Warmer temperatures in Europe are causing birch trees to bloom earlier, prompting an earlier and perhaps longer allergy season. Studies at Duke University show that elevated carbon dioxide increases pollen production of loblolly pines. Allergists suspect that record pollen counts are contributing to the onslaught of new allergy and asthma patients. "I'm seeing an epidemic of new cases", says New York City allergist Clifford Bassett.

Christine Rogers of the School of Public Health and Health Sciences at the University of Massachusetts is working with the USDA's Ziska on a study of fungal spores, which cause allergies in about 10 percent of the public. "We have a greater proportion of the public that is sensitive to allergens, so the question of how climate change affects this is ever more important," says Rogers. Fungi – everything from mushrooms in the woods to fungus that grows in damp basements – play an important role in the ecosystem by decomposing plants. If plant biomass increases due to elevated CO<sub>2</sub> and global warming, fungi may proliferate as well, they suspect.

Fungal spores are problematic because they affect air quality indoors as well as out. Higher temperatures will lead to increased use of air conditioners, which spread spores if improperly maintained. Heavier rainstorms and floods predicted under climate-change scenarios will also increase indoor dampness, allowing fungal spores to proliferate in homes and buildings,

according to the 2007 study “Climate Change, Aerobiology, and Public Health in the Northeast United States”. City dwellers who suffer from asthma already are being hit by a “nasty synergy” of hotter temperatures, smog and increasing pollen counts, says Paul Epstein of Harvard’s Center for Health and Global Environment. A large percentage of asthmatics are also allergic to pollen. These patients suffer from a double whammy of pollen and smog on days when ground-level ozone levels are high.

Country folk face new challenges, too. Poison ivy, a woodland plant that causes itching and a weepy rash, is becoming more toxic. Researchers at Duke University stumbled across this discovery while conducting an experiment that involved pumping extra carbon dioxide into a plot of pine trees to see whether the forest would soak up and sequester more carbon, mitigating climate change. But they noticed that poison ivy on the forest floor proliferated. Subsequent testing showed that the poison ivy’s rash-causing oil, urushiol, was more potent than normal.

Climate change could also spell trouble for people allergic to stinging insects. Alaska, which is warming faster than the rest of the country, could be a test case.

In some areas, reports of severe stings from Hymenoptera – the insect order that includes bees, wasps and yellow jackets – are up 600 percent in eight years. Jeffrey Demain, an allergist with the Allergy, Asthma and Immunology Center of Alaska, says yellow jackets and wasps are showing up in places they never lived before.

Skeptics sometimes cite increased crop yields and more-prolific plant growth as reasons to be unconcerned about global warming. But if Ziska and his cohorts are right, the coming global greenhouse will be a sneezier, wheezier and rashier place – and many more people may be whiffing from inhalers (*Paul Tolme “The Time”*).

## **5. HOME.**

### **5.1. SAVING THE WORLD BEGINS AT HOME, WITH JUST ONE THERM AT A TIME**

Up to 25 % of energy use is in homes, but simple efficiency measures can easily cut this by 40 %.

If you are reading this at the kitchen table, in the bath, or on the sofa, then you are inside one of the biggest causes of global warming. Our houses are an enormous source of greenhouse gases such as carbon dioxide, and they rarely feature high enough on our list of environmental concerns. But houses are also an opportunity to do something; we can reduce our carbon footprint, and save money as well as pollution.

Mark Levine, an expert in energy efficient buildings at the Lawrence Berkeley National Laboratory in California, says: “The energy use in houses results in between 20 % and 25 % of all emissions of carbon worldwide. They don’t get nearly the attention they deserve. Energy efficiency measures can cut use in houses by 40 % or more. There is no other approach that has the potential to reduce carbon emissions nearly as much in a cost-effective manner”.

Last year, the UN’s Intergovernmental Panel on Climate Change (IPCC) published its latest reports on global warming. The chapter on buildings, co-written by Levine, said they were responsible for 8.6 bn tonnes of carbon dioxide each year, more than half due to electricity use. That could grow to 11.1 bn tonnes by 2020, and 14.3 bn tonnes in 2030.

Where does it all come from? That depends on where the house is built, and how it is designed. It can be divided into emissions from electricity consumption and emissions from energy used in heating and cooling, both of space (rooms) and water. Keeping the house warm is usually the biggest emitter. Water heating is next. Cooking, lighting and refrigeration all feature. If the house is built in a hot climate, air conditioning can also use energy. Electricity consumption also covers everything

plugged into sockets, from television and kettle to computer and digital radio.

How much energy is used depends on habits and cultures and varies between countries. A survey of 5,000 Europeans by the Energy Saving Trust in London found the British were the worst among several European countries in wasting energy, with people admitting 32 wasteful actions in a typical week. Germans logged just 14 wasteful acts.

The Spanish were the most conscientious about heating and cooling, with only 12 % leaving their heating or air conditioning on when they go out, compared to 28 % in Britain. Italians were the worst for leaving electrical appliances on standby, 80 % regularly leaving six appliances that way. The French were the most likely to wear a sweater instead of turning up the thermostat, while the Germans were more likely to wash clothes at an energy-sapping 60°C; 60 % did so on a regular basis, compared to just 20 % in Spain.

In Britain, 71 % of people left appliances on standby, while 66 % boiled more water than was needed in the kettle, left electrical chargers plugged in and forgot to switch off lights in empty rooms; 33 % snubbed the washing line for a tumble drier. What was the main reason for Britain's bottom place? Almost 50 % of the people surveyed said they were too lazy to change their behaviour.

Donna Dawson, a behavioural psychologist, said this was not necessarily a bad thing: "Habits are an example of learned behaviour so, by their very nature, they can be unlearned again. With more than double the number of people citing laziness rather than lack of awareness as the cause of their bad energy habits, the findings should be seen as fairly positive". So energy-wasters just need to focus on developing environmentally friendly habits.

What else can be done about our homes? The IPCC report's key conclusion was that "substantial reductions in CO<sub>2</sub> emissions from energy use in buildings can be achieved over

the coming years using mature technologies that already exist widely and that have been successfully used. A significant portion of these savings can be achieved in ways that reduce life cycle costs”.

Levine said: “It is possible to build a new house and equip it efficiently so that it uses less than 50 % as much energy as a typical existing house, and saves the homeowner money. For existing houses, energy savings are more difficult, but almost all houses can reduce energy use by 20 % to 25 % with no inconvenience and with very good returns on investment”.

Insulation, such as cavity wall fillers or rolled-out layers in a loft, is cheap and effective. Less heat escaping through the walls and roof means less energy needed to keep the house warm. Double-glazing insulates windows, and plugging leaks and draughts helps insulation do its job. Experts say these improvements to a house’s “thermal envelope” can substantially reduce heating requirements (*David Adam and Paul Evans “The Guardian”*).

## **5.2. YOUNG BUILDERS SHAPE THE ZERO-CARBON HOME**

Trainees learn to lower labour and energy costs and to focus on lower material wastage.

The Smart Life Centre, based at Cambridge Regional College, is the UK’s first facility to focus on green construction. It is part of the Interreg North Sea Programme, funded by the EU to promote sustainable housing in northern Europe, and is partnered with similar institutions at Malmo, Sweden and in Hamburg, Germany. It cost \$4.6m.

Smart Life helps the house-building industry to research modern methods of construction, such as factory pre-fabrication and energy-efficient building materials, including timber frame construction.

It offers training in the skills that house builders in Britain will need to meet a government target for all new homes to achieve

a zero-carbon standard. The deadline for the implementation of that standard is 2016.

Trials of zero-carbon homes built with ultra-high insulation and generating their own renewable energy are already under way at the Building Research Establishment (BRE) in Watford, which is in north-west of London.

This work is taking place under the Carbon Challenge, a government initiative that is meant to accelerate the building industry's response to climate change.

At Smart Life, young trainees, who have mostly just left school, learn about photovoltaic and ground-source heat pumps, condensing boilers and the recycling of grey water.

Barrie Wicklen, director of learning and skills at Cambridge Regional College, says: "Young people are excited by the possibilities of green construction. They can progress from entry level up to being an architectural or a civil engineering technician, a quantity surveyor or to a degree in construction".

The county council in Cambridgeshire, which helped to fund the centre, is building low-carbon homes in Cambridge and is also taking part in zero-carbon homes trials by the Building Research Establishment.

Richard Bateman, the manager of Smart Life UK, says that the trials are a step forward in the design of sustainable housing. "The houses we built were a mix of timber frame, light gauge steel and sprayed concrete.

BRE's report is due out early next year, but we made big savings in build time and labour costs. And we generated a third less waste, which helps the environment".

With their energy saving features, ecohomes will reduce harmful CO<sub>2</sub> emissions. Bateman believes that Smart Life can learn from its partner institutions in Malmo and Hamburg, both cities that also have a shortage of land for development and a need to reduce greenhouse gases.

Tor Fossum, who is head of the environmental strategy unit at the Helix Centre in Malmo, says important lessons have been learned.

“In the start of the project there were different definitions of what actually sustainable construction and modern methods of construction meant among the project partners. During the project these definitions and the differences were sorted out. Smart Life has given us a great exchange of experiences between the project partners”.

The Malmo centre hosts important research into sustainability. There is a regional energy agency in the centre focusing on energy efficiency and renewables, providing a valuable resource for the local building sector. “The result of the dialogue is a special focus on energy efficiency, phasing out dangerous chemicals from building materials, and an emphasis on biodiversity”, Fossum says (*Stephen Hoare “The Guardian”*).

### **5.3. ROOF: IS WHITE RIGHT FOR YOUR HOME?**

White roofs create an additional 20 percent energy savings by cutting cooling costs, some say this built-in financial incentive should propel urban rooftops around the globe to lighten up.

Think much urban rooftops reflect, called albedo (al-BEE-doh) in scientific terms: lit would be a one-time carbon-offset equivalent to preventing 44 billion tons of CO<sub>2</sub> from entering the atmosphere. It’s about the same as taking all the earth’s automobiles off the road for 11 years.

Geoengineers have had similar ideas: covering the Sahara with enormous sheets of white plastic, for instance, or painting the Black Hills of South Dakota white.

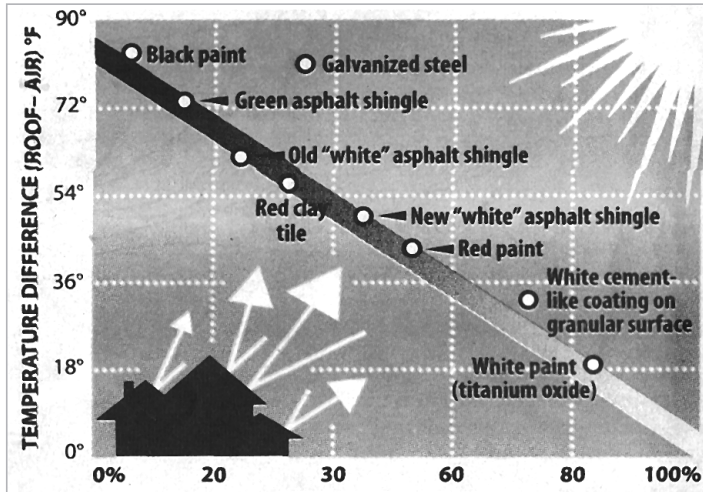
“Now that we know what a great help it is on climate change, we expect more utilities to give incentives for homeowners who go entirely white with their roofing material, not just ‘cool’ colors like pastel blues, reds, and greens”.

To promote energy efficiency, Georgia and Florida already give incentives to owners who install white or light-colored roofs. Going a step further, California has since 2005 mandated that all flat roofs (mostly commercial and industrial) must be white. Some utilities also now offer homeowners an incentive of 20 cents per square foot on a tile roof that may cost \$1.20 a foot.

Still, the cost of going with a “cool roof” usually isn’t much more than a typical darker roof. Asphalt shingles with a white or light tint are roughly the same cost as other shades. Painting a black asphalt roof with the reflective white coating, however, is obviously more expensive than the black surface alone. But energy savings largely offset the price of painting through reduced air conditioning costs. In the southwest, cool-roof pastel colors or bright white tile can cost a bit more than the standard reddish color – although there are tile suppliers that charge about the same cost for cool colors, roofing industry experts say. “I went through their calculations and got roughly the same numbers” – says Michael MacCracken, former director of climate-change research under President Bill Clinton. “Some of it is a bit idealized. But what they say is a valid thing to do for any single building ... and seems valuable for an urban area to try to reduce heat-island effects while realizing some contributions for the globe as well”. Still, not everyone is enthusiastic. Roofing contractors who specialize in solid black asphalt-based roofs and roofing materials have told Akbari they think the idea is for the birds. Even those who like the idea worry it will run into resistance from homeowners who don’t like white.

In July 2009 California begins requiring sloping rooftops (mostly residential) to be light-colored cool-roof colors. One reason: The mandate will be an economic boon to homeowners, he says. Past studies have shown that white roofs’ net energy savings (cooling-energy savings minus heating-energy penalties) are around 20 percent. Such savings would save the United States more than \$1 billion a year on air conditioning, the study says.

The material and color of the top of your house has a big impact on how much hotter the roof is, compared with the air around it.



## SOLAR REFLECTIVITY

While geoengineers say the research was worthwhile to focus attention on the issue, the study “greatly overstates the benefits”, he wrote in the e-mailed response to the study. Mr. Gaskill, president of Environmental Reference Materials, a consulting firm in Research Triangle Park, N. C., argues that something much larger and more direct is needed. For example, aircraft could spray sulfur-based compounds into the high atmosphere to reflect sunlight back into space. The effect would be similar to what clouds from volcanic eruptions have done over history. (He also had proposed the idea of plastic sheeting for the Sahara).

India and China are already eligible under Kyoto’s Clean Development Mechanism (CDM) to be paid for projects that qualify as carbon offsets. Prices for CDM offsets for CO<sub>2</sub> now

run \$ 25 per ton, Rosenfeld says. Putting cool-roof standards into building codes could mean CDM payments of \$ 250 for every 1,000 square feet of white roof area (“The Christian Science Monitor”).

#### **5.4. ECOFRIENDLY CLOTHING CARE HEAT UP THAT IRON: A GUIDE TO ECOFRIENDLY CLOTHING CARE**

***Greener options can be as simple as washing in cold water.***

Even if a person’s closet doesn’t contain a single item made of organic or recycled fabric, she can still help the environment – without heading to the store. That’s because more energy goes into caring for and cleaning a garment than making it.

In fact, about 60 percent of the energy use associated with a piece of clothing comes from cleaning it, according to a 2006 University of Cambridge Institute for Manufacturing study.

Greener options can be as simple as switching to an environmentally friendly detergent, washing in cold water (which can save you \$65 a year and cut your washer’s energy use by 75 percent), and skipping the fabric-softener sheets. Spending extra time on the laundry means greater energy savings and, often, cost savings as well.

Air-drying is the cheapest and most environmentally friendly way to dry clothes. It’s not effort-free, and clotheslines may not be an option if you live in an apartment or a neighborhood where they’re against regulations. But there are ways to work around that.

For example, people use a drying rack for their clothes.

Their garments that are labeled dry clean-only. However, the Los Angeles mother of three isn’t up for long sessions with her iron, so she says she buys only things that will look good coming off the drying rack.

If your budget has room for a new appliance, a dryer with an automatic sensor can cut energy costs significantly, ultimately

paying for itself. It's a great way for consumers to save energy without even trying".

Because front-loading washers spin so much faster than top loaders (allowing them to use less water), those owners will be spending more time with an iron, smoothing out the creases in natural fibers that set in during the wash. On the other hand, "with a top loader and polyester, the wrinkles are literally going to fall out of clothes. But for those living in areas where conserving water is a big concern a front-loading washer is absolutely the best choice (Yvonne Zipp "Christian Science Monitor").

## **6. RECYCLING**

***Organic and inorganic waste is a massive contributor to global greenhouse gas emissions. A zero-waste lifestyle keeps material out of landfills and reduces our carbon footprint.***

***Learn what is recyclable.***

***What does it mean "Swap out disposable items for reusable items".***

***6.1. What is upcycled vs downcycled materials? What are the examples of upcycling and downcycling?***

There are many ways to recycle products.

Upcycling turns a recycled material into something of equal or greater value than the original product or it refers to the reuse of an item instead of throwing it away. Recycled office paper, cardboard, aluminium cans are upcycled as new office paper, new cardboard or new cans.

Downcycling turns a product into a different product, e.g. a plastic bottle is turned into a fleece jacket.

***6.2. Project Drawdown estimates that recycling between 2020 and 2050 will reduce emissions by 5.5 to 6.02 gigatons of carbon dioxide, equivalent to taking over one billion cars off the streets for one year.***

***Look for the information about the Project.***

*6.3. In 2003, Kamikatsu became the first municipality in Japan to make a zero-waste declaration.*

### **THINK YOU CAN RECYCLE?**

#### ***Meet the villagers of Kamikatsu, Japan, who sort their trash 34 ways***

It was not that long ago that life in Kamikatsu revolved around the state of the rice crop and the number of tourists arriving to soak in the waters of the local hot spring. Now the tiny village, in the densely wooded mountains of Shikoku island in south-west Japan, has a new obsession: rubbish.

Since 2003 Kamikatsu's 2,000 residents have been part of a so far unheralded ecological experiment that, if successful, could force bin men across the country to look for new jobs.

Urban Japanese householders, who balk at having to divide rubbish into flammable and inflammable items, bottles and cans, should consider their counterparts in Kamikatsu.

Here, household waste must be separated into no fewer than 34 categories before being taken to a recycling centre where volunteers administer firm, but polite, reprimands to anyone who forgets to remove the lid from a plastic bottle or rinse an empty beer can.

At stake is Kamikatsu's quest to end its dependence on incineration and landfill by 2020 and claim the title of Japan's first zero-waste community.

An hour's drive from the nearest city and 600km from Tokyo, the village was forced to change the way it managed its waste in 2000, when new regulations on dioxin emissions forced it to shut down its two incinerators.

"We were no longer able to burn our rubbish, so we thought the best policy was not to produce any in the first place", said Sonoe Fujii of the village's Zero Waste Academy, a nonprofit organisation that oversees the scheme.

Despite initial opposition, the zero-waste declaration, passed by the village assembly in 2003, has spawned an unlikely army of ecowarriors.

When Kikue Nii is not tending her allotment or catching fish from the river at the bottom of her garden, she is up to her elbows in garbage.

“At first it was very hard work”, said the 65-year-old, as she emptied another bowl of vegetable peelings into the electric garbage disposal unit next to her back door. In the corner of her garden, more kitchen waste sat in a conventional composter.

“I was working when the scheme started and found myself spending my lunch break dealing with our rubbish”, she said. “It took ages to sort everything into different types. But it comes naturally now”.

However, she draws the line at her husband’s empty beer cans: “They are his responsibility”, she said.

That Nii and her neighbours struggled in the early days of the zero-waste campaign is understandable, given the daunting myriad of rules.

Glass bottles must be relieved of their caps and sorted by colour. Plastic bottles for soy sauce and cooking oil must be kept separate from Pet (polyethylene teraphthalate) bottles that once contained mineral water.

All bottles, cans and even plastic food wrappers must be washed; newspapers and magazines have to be piled into neat bundles tied with a twine made from recycled milk cartons.

Any waste that is not composted is taken to the village’s zero-waste centre. Early one morning a trickle of cars turned into a deluge as residents arrived to drop off their rubbish on the way to work. The site can accommodate a dizzying array of items, from bottles, cans and newspapers to crockery, batteries, nappies, cigarette lighters, ballpoint pens and an improbably large number of broken mirrors.

Anything in good enough condition to be reused ends up at the Kuru Kuru recycling store, where residents are free to drop off or take home free of charge whatever they like, mostly clothes, crockery and ornaments.

All but a few categories of rubbish are recycled. Wooden chopsticks are pulped and made into paper, and cooking oil reappears in fertiliser.

But for other items, such as shoes, futons and carpets, the only option remains incineration. Glass and ceramic ware and lightbulbs are buried in landfills, while batteries have to be shipped to a recycling plant on the northern island of Hokkaido.

Critics point out that some of the composters use electricity and that most residents of Kamikatsu, spread out over an area that ranges from 100 metres to 800 metres above sea level, have no choice but to take their rubbish to the zero-waste centre by car.

“We’re still some way from reaching our zero-waste goal, but the difference is amazing compared with a few years ago”, said Yasuo Goto, a 75-year-old retired farmer who works part-time as a caretaker at the centre.

His optimism is supported by data showing that Kamikatsu’s recycling rate has soared from 55 % a decade ago to about 80 % today.

“I can’t say with absolute confidence that we will reach the target, but we’re doing our best to make it happen”, said Fujii. To stand any chance of reaching its 2020 goal the greenest citizens still have a public relations battle to win.

A recent poll showed that 40 % of residents were still unhappy about at least one aspect of the zero-waste policy. “We still have opponents, particularly because almost everything has to be washed”, Fujii said. “All we can do is talk to the doubters and explain why what they’re doing is so important. I think consciousness is growing that this is a good thing; that it’s not just the right thing to do, but the only thing to do” (*Justin McCurry “The Guardian”*).

*Since 2003, Kamikatsu has transformed its open-air burning practices for waste disposal into a system of buying, consuming to reach carbon neutrality. Google the information on Kamikatsu experience in recycling and being known as Japan's zero-waste town which is more that 80 % of its way to meeting the goal by 2030.*

*Why can recycling help limit the climate crisis?*

*What examples of living sustainably by recycling do you know?*

*Do you know about regional policies of positive impact on climate change through recycling?*

### **7. DISCUSS:**

- ✓ What does “going green” mean for you?
- ✓ What are the green initiatives of the local government?
- ✓ What are the national and regional environmental challenges?
- ✓ Is the global environmental battle lost?

### **AI CHALLENGES**

*“What we want is a machine that can learn from experience, and the possibility of letting the machine alter its own instructions provides the mechanism for this.”*  
*Alan Turing.*

### ***Can you answer the following questions:***

- Is AI a real thing?
- Why does it matter now?
- What do you know about the history of AI?
- How is it used?
- What are AI risks in terms of ethical and socioeconomic consequences, i.e. privacy?
- Why is AI important for you?

***Read the following texts. Compile miniglossaries of the basic AI terms.***

*Artificial Intelligence is the ability of a digital computer or computer-controlled robot to perform tasks usually associated with intelligent beings, their abilities to reason, draw inferences, do problem-solving, discover meaning, generalize, learn from past experience.*

## **HISTORY**

The earliest substantial research in AI is attributed to Alan Mathison Turing, the British logician and computer pioneer who in 1935 offered the idea of a computing machine which consisted of the limitless memory and the scanner which can move through the memory, symbol by symbol, read what it finds and write further symbols. Turing's stored-program concept was based on a program of instructions in the memory in the form of instructions: the machine was supposed to operate by modifying and improving its own program. Many of his ideas were reinvented by others, i.e. his original idea to train a network of artificial neurons to perform specific tasks. He also predicted that computers would play very good chess (IBM Deep Blue, a chess computer, beat the world chess champion, in a six-game match in 1997).

The first successful AI program was written in 1951 by Christopher Strachey, later Director of the Programming Research Group at the University of Oxford (Strachey's checkers (draughts) program ran on the Ferranti Mark I computer at the University of Manchester).

The earliest demonstration of machine learning was published in 1952: Shopper, written by Anthony Oettinger at the University of Cambridge (the EDSAC computer), which simulated world was a mall of eight shops: it was instructed to buy an item, memorized items in the shops (just as a human shopper might).

In 1952, in the US, Arthur Samuel extended Strachey's checkers program, included mechanisms for learning

and generalization. It was one of the first examples of evolutionary computing: the use of some automatic method of generating and evaluating successive generations of a program, until a highly proficient solution evolves. One of the leaders of evolutionary computing, John Holland, wrote test software for a neural-network “virtual” rat that could be trained to navigate through a maze.

Logical reasoning and problem solving are known to be important aspects of intelligence. The Logic Theorist, the program written in 1956 by Allen Newell and Clifford Shaw of the Rand Corporation and Herbert Simon of the Carnegie Mellon University and designed to prove theorem, and the General Problem Solver (1957), the program for solving puzzles by using a trial and error approach, were the first attempts of focusing on these abilities.

Two of the best-known early AI programs, Eliza and Parry (1966), written by Joseph Weizenbaum of MIT’s AI Laboratory and Kenneth Colby from Stanford University, simulated human intelligent conversation though they relied on canned sentences (constructed in advance by the programmer).

Among the first AI-tailored programming languages, there is Information Processing Language (IPL), LISP (List Processor), PROLOG (Programmation et Logique), which were supplanted in the 21st century by Python, Java, C++.

To cope with the complexity of the real world, Marvin Minsky and Seymour Papert of the MIT AI Laboratory proposed to focus microworld programs, i.e. simpler artificial environments. Some of the examples of the microworld approach are the SHRDLU (1972), the robot arm, or Shakey, a mobile robot.

Expert systems are also considered a type of microworld, i.e. a self-contained and relatively uncomplicated model of a ship’s hold and its cargo. There are many commercial expert systems for medical diagnosis, chemical analysis, financial management, computer installation design, airline scheduling, cargo placement.

Their basic components are a knowledge base and an inference engine. Often the rules that human experts use contain vague expressions, therefore the inference machine uses fuzzy logic.

In 1954 Belmont Parley and Wesley Clark of MIT offered the first artificial neural network of 128 neurons which were able to train their networks to recognize simple patterns. In 1986 David Rumelhart and James McClelland trained a network of 920 artificial neurons. The work on neuronlike computing includes the following: visual perception, language processing, financial analysis, medicine, telecommunication.

Nouvelle AI is the approach which emphasizes on human behaviour performance.

In the 21st century, faster processing power and larger datasets (“big data”) led to the language model of Chat GTP (Generative Pertained Transformer) which is trained on 45 terabytes of text (Eliza – on 50 kilobytes). The improvement in neural network training led to machine learning called deep learning, in which neural networks have four and more levels and are able to learn in supervised. In November 2022, Chat GPT astonished academics, journalists because it was impossible to distinguish human writing from Chat GTP-generated writing.

Natural Language Processing (NLP) involves how computers can process and parse language similarly to the way humans do. NLP models use computational linguistics, statistics, machine-learning and deep-learning models which help them to “learn” as they process information. Among the examples of using NLP there are voice-operated GPS systems, customer service chatbots, language translation programs, monitoring social media (*Adapted from Britannica*).

## **IS ARTIFICIAL GENERAL INTELLIGENCE (AGI) POSSIBLE?**

“The ongoing success of applied AI and cognitive simulation seems assured but artificial general intelligence or strong AI to

duplicate human intellectual abilities remains controversial and out of reach. Decades of research in symbolic AI have failed to produce any firm evidence that a symbol system can manifest human levels of general intelligence; connectivists are unable to model the nervous systems of even the simplest invertebrates; the critics of nouvelle AI regard as simply mystical the view that high-level behaviours involving language understanding, planning, reasoning will somehow emerge from the interaction of basic behaviours such as obstacle avoidance, gaze control and object manipulation.

However, this lack of substantial progress may simply be the testimony to the difficulty of AGI, not to its impossibility” (*Britannica*).

## **SHAPING EUROPE’S DIGITAL FUTURE**

### *What is integrated connectivity?*

In April 2021, the European Commission proposed the first EU regulatory framework for AI (EU AI Act), the world’s first comprehensive AI law. The main objective is to classify different AI systems according to various risk levels they pose to users.

The EU Parliament’s priority is to make sure that AI systems used in the EU are safe, transparent, traceable, environmentally friendly. AI systems should be overseen by people, rather than by automation, to prevent harmful outcomes.

It is declared that the European AI Office will be the centre of AI expertise across the EU. It will play a key role in implementing the AI Act to foster the development and use of trustworthy AI and international cooperation, while protecting against AI risks. The office was established within the European Commission and forms the foundation for a single European AI governance system. The future competitiveness of Europe’s economy depends on the advanced digital network infrastructures and services, since fast, secure and widespread connectivity is essential for

the deployment of the technologies. The issues that arise are as follows:

- integrated connectivity;
- collaborative computing infrastructures;
- “Connected collaborative computing” Network (“3C Network”) – end-to-end integrated infrastructures and platforms for telco cloud and edge, which could be used to orchestrate the development of innovative technologies and AI applications for various use cases.

The White Paper on “How to master Europe’s infrastructure needs” analyses the challenges of future connectivity networks which Europe currently faces: in Europe there are 27 national telco markets with different levels of network coverage, different national management and different regulations.

On March 13, 2024, the European Parliament passed the much-anticipated European AI Act which is the first attempt to regulate AI globally. It adopts a risk-based approach to the deployment and use of AI systems.

### AI RISKS

The Regulatory Framework defines 4 levels of risk for AI systems: minimal risk, limited risk, high risk, unacceptable risk.

*Minimal or no risk* includes applications such as AI video games or spam filters.

*Limited risk* systems include those where the users may not realize they are interacting with AI, e.g. chatbots, AI-generated content.

*High risk* negative effect is divided into the categories:

- AI systems that are used in products under the EU’s product safety legislation (lifts, medical devices, toys, aviation, cars).
- AI systems which will have to be registered in an EU database, e.g. management of critical infrastructure, education, employment, law enforcement, migration, border control.

*Unacceptable risk* AI systems are systems considered a threat to people and will be banned. They include:

- Cognitive behavioural manipulation of vulnerable groups of people, e.g. voice-activated toys that encourage dangerous behaviour of children.
- Social scoring, i.e. classifying people based on social status or personal characteristics.
- Real-time and remote biometric identification and categorisation of people.

The EU's digital measures also include cryptocurrency dangers, fighting cybercrimes, boosting data sharing, digital markets, online gaming.

### DISCUSSION:

***What are your 2030 predictions for AI development, risks, threats, opportunities?***

Humanoid robots available as the workforce.

Advancements in AI innovations and infrastructure.

Healthcare and education facing AI.

OpenAI revealing their AI first hardware product.

Chinese DEEPSEEK future.

US Stargate Project venture led by OpenAI, Oracle, MGX and aimed at building data centres across the USA.

***Use “will, is going to, is doing, must, is due to, can/could, may/might, likely/unlikely, is expected” to illustrate your degree of certainty/uncertainty.***

## РОЗДІЛ IV

### Research Discussion Basics in Use

*The following lists of necessary words can help you present your research and summarize the main points.*

*To sound more natural when answering the questions, use the connectors for:*

| a) giving opinions:           |                               |
|-------------------------------|-------------------------------|
| <i>Absolutely...</i>          | <i>I think so...</i>          |
| <i>Without a doubt...</i>     | <i>I guess so...</i>          |
| <i>For sure...</i>            | <i>I suppose so...</i>        |
| <i>In my view...</i>          | <i>I agree with you...</i>    |
| <i>I'd say, it's...</i>       | <i>I disagree with you...</i> |
| b) adding information:        |                               |
| <i>Besides...</i>             |                               |
| <i>Another thing is...</i>    |                               |
| <i>On top of that...</i>      |                               |
| <i>One more thing...</i>      |                               |
| <i>Together with...</i>       |                               |
| <i>As far as I know...</i>    |                               |
| <i>To my knowledge...</i>     |                               |
| c) adding emphasis:           |                               |
| <i>Apparently...</i>          |                               |
| <i>Undoubtedly...</i>         |                               |
| <i>For sure...</i>            |                               |
| <i>In fact...</i>             |                               |
| <i>What's more...</i>         |                               |
| <i>To say nothing of...</i>   |                               |
| <i>Actually I think...</i>    |                               |
| <i>As a matter of fact...</i> |                               |

|                                                                                                                    |  |
|--------------------------------------------------------------------------------------------------------------------|--|
| <b>d) clarifying:</b>                                                                                              |  |
| <i>If we're talking about...</i>                                                                                   |  |
| <b>e) contrasting:</b>                                                                                             |  |
| <i>But...</i><br><i>However...</i><br><i>That said...</i>                                                          |  |
| <b>f) giving examples:</b>                                                                                         |  |
| <i>For example...</i><br><i>For instance...</i><br><i>To my knowledge...</i><br><i>As far as I know...</i>         |  |
| <b>g) listing/ordering:</b>                                                                                        |  |
| <i>First...</i><br><i>Second...</i><br><i>Then...</i><br><i>Next...</i><br><i>Finally...</i>                       |  |
| <b>h) cause/effect:</b>                                                                                            |  |
| <i>Because...</i><br><i>So...</i>                                                                                  |  |
| <b>i) concluding:</b>                                                                                              |  |
| <i>Finally...</i><br><i>Overall...</i><br><i>In a nutshell...</i><br><i>All in all...</i><br><i>In conclusion.</i> |  |

# **1. What does your research deal with?**

*What is the general field of your research?*

Explain what science you are doing your research in.

|                           |                                                              |                                                                                                                                                                                                                                                                                                         |
|---------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ecology                   | concerns<br>considers<br>deals with<br>involves<br>refers to | the relationships living things have to each other and to their environment.                                                                                                                                                                                                                            |
| Economics                 |                                                              | how goods and services get produced and how they are distributed. By goods and services, economists mean everything that can be bought and sold. By producer, they mean the processing and making of goods and services. By distributed, they mean the way goods and services are divided among people. |
| Electronics               |                                                              | closely related to the science of electricity making possible such modern wonders as television, radio, radar, computers, robotics.                                                                                                                                                                     |
| Electrical engineering    |                                                              | the development, production and testing of electrical and electronic devices and equipment.                                                                                                                                                                                                             |
| Environmental engineering |                                                              | efforts to prevent and control air, water, soil and noise pollution.                                                                                                                                                                                                                                    |
| Materials engineering     |                                                              | the structure, properties, production and uses of various materials.                                                                                                                                                                                                                                    |
| Marine engineering        |                                                              | the design; construction and repair of ships and subenaries.                                                                                                                                                                                                                                            |
| Computer engineering      |                                                              | the design, development and improvement of computers, storage and printout units and computer information networks.                                                                                                                                                                                     |
| Project management        |                                                              | the application of processes, methods, skills, knowledge and experience to achieve specific project objectives according to the project acceptance critetia within agreed parameters.                                                                                                                   |

### DESCRIPTION OF A PROCESS OR PROCEDURE

When we give a **general description of a process or procedure**, we use: the present passive tense (is produced, are used, is designed)

When we describe a **particular procedure**, we use: the past passive tense (was produced, were made, was designed)

When we describe a **sequence or order**, we use: the present active tense (it heats .... it melts, it becomes liquid).

*Examples:*

1. **Deformation** is the process in which an object's shape or form is changed permanent, e.g. the deformation of a rubber band by an excessive force, causing a permanent change in shape. Deformation is also the amount by which an object is deformed from its natural state or the increase in length, e.g. when a metal wire is extended beyond its elastic limit, or when a long wire is stretched, there is a deformation of 3 cm.

2. **Absorption** is the formation of a thin layer of a substance attached to the solid or liquid surface, e.g. a clean metal surface in contact with a gas is quickly covered by a thin layer of the gas. Molecules of the gas are held on the surface by physical or chemical forces. Often the layer is only one molecule thick. In some cases it may be two or more molecules thick. In adsorption the substance is held on the surface, in absorption it penetrates into the interior of the materials.

3. **Electromagnetic radiation.** The first electromagnetic waves were produced by Hertz (in 1888) using the apparatus shown. A and A<sub>1</sub> were two square metal plates, one above the other, forming a kind of capacitor. The induction coil charged the capacitor, and when the insulation between T<sub>1</sub> and T<sub>2</sub> broke down, sparks passed between the knobs, forming a damped oscillatory current. The oscillatory current consisted of accelerating electric charges, which produced a changing electric field, in turn inducing a magnetic field at right angles to the gap between the knobs. A pattern of changing electric and magnetic fields was thus

produced by the oscillatory current. Some of the lines of force formed closed loops which travelled into space carrying away some of the kinetic energy of the charges. An electromagnetic wave was produced with the electric vector parallel to  $T_1T_2$ ; the corresponding magnetic vector was perpendicular to  $T_1T_2$ , and both vectors were perpendicular to the wave direction. A coil of wire, of one turn, with a gap between two knobs,  $R_1$  and  $R_2$ , was held in a vertical plane in line with  $T_1T_2$ ; it became linked with the magnetic field and an e.m.f. was induced in it, resulting in a spark discharge between  $R_1$  and  $R_2$ . With the coil at right angles to  $T_1T_2$ , no spark discharge took place, so the radiation was polarized. Using the apparatus, the radiation was shown to have all the properties of a wave: it could be reflected from a metal sheet, refracted by a non-conductor such as paraffin wax, and exhibited interference and the formation of stationary waves.

## 2. What are the aims and tasks of your research?

|                                  |                                                                                                                            |                                                                                                                             |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| The tasks of the research are... | to study<br>to investigate<br>to analyze<br>to explain<br>to predict<br>to interpret<br>to draw conclusions<br>to consider | the nature of ...<br>the causes of ...<br>the role of ...<br>the action of ...<br>the results on ...<br>the behavior of ... |
|                                  | to obtain<br>to collect and process.<br>to work out<br>to develop                                                          | the dependences<br>the relationships<br>the data<br>the facts                                                               |
|                                  | to define<br>to determine<br>to classify<br>to categorize<br>to generalize                                                 | the assumption<br>the hypothesis<br>the advantages                                                                          |

|  |                                                                                                       |  |
|--|-------------------------------------------------------------------------------------------------------|--|
|  | to solve<br>to reveal<br>to find out<br>to prove                                                      |  |
|  | to describe<br>to outline<br>to clarify<br>to emphasize<br>to demonstrate<br>to illustrate<br>to show |  |
|  | to estimate<br>to calculate<br>to compute<br>to measure                                               |  |
|  | to examine<br>to check<br>to test<br>to verify                                                        |  |
|  | to compare<br>to evaluate<br>to judge<br>to criticize<br>to justify                                   |  |
|  | to plan (procedures)<br>to carry out<br>to arrange<br>to note (changes)                               |  |

***What is the aim of the following research?***

The aim of “Robotics and Automated Manufacturing” by R. C. Dorf is to consider the fundamental concepts and applications of robotics and computer-aided manufacturing systems that may be effectively used in workplaces. This book first considers the problems of productivity and automation. It then reviews the history, development and classification of robots, their mechanical and electrical components, sensors and vision systems.

***What are the aims and tasks of new coating techniques?***

Flame and plasma coating of metallic and ceramic film as a protection against corrosion and abrasion is a new reliable and economic coating technique.

For example, a valve ring with a diameter of about 340 mm is made of titanium alloy with a tungsten-cobalt abrasion protection coating applied to the inner and outer surface by plasma coating. To avoid stresses in the metal ceramic coating, the valve ring is heated on the inner side during the spraying and cooled during the final spray of the outer side. The surface is completed by abrasive methods. A new development in the thermic spraying field is demonstrated by vacuum plasma coating. Thanks to increased particle velocity and gas-free atmosphere, comparatively dense, oxide-free and closely adhering coatings can be produced.

The chemical deposition from the gas phase is often used to produce abrasion- and corrosion-resistant coatings.

***3. Is the research you are doing relevant (very important)?***

*What problems are fundamental for your research?*

*Are they complicated?*

*What problems do you consider promising?*

|                                                               |    |                                        |                                                                   |                       |                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------|----|----------------------------------------|-------------------------------------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The research<br>The problem<br>The study<br>The investigation | is | rather<br>very<br>highly,<br>extremely | necessary<br>urgent                                               | because<br>it enables | –to increase<br>to raise<br>to reduce<br>to modify<br>to improve<br>to change;<br>–may provide<br>a valuable<br>information<br>(on, for);<br>–may provide<br>a possible key to;<br>–may contribute to;<br>–may throw the<br>light on;<br>–may help to<br>understand the<br>mechanism of;<br>–calls for<br>(demands) further<br>research;<br>–requires much<br>effort |
|                                                               |    |                                        | significant<br>important<br>specific<br>interesting<br>attractive |                       |                                                                                                                                                                                                                                                                                                                                                                      |
|                                                               |    |                                        | complicated<br>difficult                                          |                       |                                                                                                                                                                                                                                                                                                                                                                      |
|                                                               |    |                                        | promising<br>useful<br>fruitful                                   |                       |                                                                                                                                                                                                                                                                                                                                                                      |
|                                                               |    |                                        | up-to-date<br>(updated)<br>topical                                |                       |                                                                                                                                                                                                                                                                                                                                                                      |

#### 4. What does the preliminary research show?

|                                         |                                    |                                                         |                                                             |                                      |                      |                                           |
|-----------------------------------------|------------------------------------|---------------------------------------------------------|-------------------------------------------------------------|--------------------------------------|----------------------|-------------------------------------------|
| Up to<br>now there<br>has /<br>havebeen | little<br>lack of<br>not<br>enough | reliable<br>satisfac-<br>tory<br>accurate<br>sufficient | informa-<br>tion<br>data<br>arguments<br>proofs<br>evidence | on the<br>subject;<br>the<br>problem | because<br>it mainly | deals<br>with;<br>concerns;<br>relates to |
|-----------------------------------------|------------------------------------|---------------------------------------------------------|-------------------------------------------------------------|--------------------------------------|----------------------|-------------------------------------------|

|                                               |                  |              |                                                                                         |
|-----------------------------------------------|------------------|--------------|-----------------------------------------------------------------------------------------|
| The previous<br>The recent<br>The preliminary | research<br>data | was<br>seems | unsatisfactory<br>insufficient<br>unreliable<br>inaccurate<br>incomplete<br>fragmentary |
|-----------------------------------------------|------------------|--------------|-----------------------------------------------------------------------------------------|

***What do you want the further research for?***

|    |              |                 |                                              |                                |                                                                                                                              |                                                                                            |
|----|--------------|-----------------|----------------------------------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| We | want<br>need | more<br>further | reliable<br>accurate<br>complete<br>detailed | data<br>information<br>methods | to prove<br>to determine<br>to develop<br>to improve<br>to modify<br>to intensify<br>to increase<br>to decrease<br>to reduce | parameters,<br>design,<br>operating<br>characteris-<br>tics,<br>efficiency,<br>consumption |
|----|--------------|-----------------|----------------------------------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|

|                                                                                                  |                                                                                                                                                  |             |                                                        |
|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------|
| Some further<br>Much further<br>More reliable                                                    | information                                                                                                                                      | is required | to identify ...<br>to evaluate ...<br>to establish ... |
| The information<br>Some of our information<br>Much of the information<br>Much of the information | comes from experiments on ...<br>has come from recent studies of ...<br>is obtained from recent studies ...<br>obtained has been provided by ... |             |                                                        |

*Read the text and explain what further information you might need.*

The idea of building a car that is fast and stylish is a powerful attraction. Warren Mosler is a lifelong racing fan, he started driving stock cars in 1983. In 1985 he set up a car centre in Riviera Beach, Florida, and began developing a new super sports car under the aegis of a firm called Consulier Industries. Like others before him, Mosler had long envisioned crafting the automotive ideal. "I always believed it was possible to manufacture a car so light it could easily outperform the industry's production super sports cars". And now he has unveiled his new Consulier GTP. A limited-production two-seater, the Consulier features a streamlined design that some people find attractive and others don't. The car's body is certainly unusual: it has no metal. It is made entirely of lightweight composite materials. The Consulier weighs under 2,000 pounds, much less than other super sports cars. Because it is so light, drivers can

“decelerate in it much faster than in similar cars” and thus make turns more quickly. The car also features a “scooped” front nose and an air foil on the back – both designed to improve handling.

**5. What methods do you use in your research?**

|            |                                                       |                                                                                                                                                                  |
|------------|-------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The method | is (not)<br>are (not)<br>seem to be<br>appeared to be | satisfactory<br>conventional<br>suitable<br>adequate<br>accurate<br>precise<br>effective (efficient)<br>reliable<br>sufficient<br>simple<br>complete<br>detailed |
|            |                                                       | routine and conventional<br>old, though still in use<br>modified, greatly improved<br>no longer used, unsuitable                                                 |
|            |                                                       | new (newly elaborated)<br>promising<br>up-to-date (updated)                                                                                                      |
|            |                                                       | useful<br>quite adequate (in terms of)<br>most efficient<br>valid<br>practicable<br>precise<br>tedious but reliable                                              |

|                      |                                   |
|----------------------|-----------------------------------|
| It should be further | improved<br>corrected<br>modified |
|----------------------|-----------------------------------|

|                              |    |                       |                                           |                                                                      |
|------------------------------|----|-----------------------|-------------------------------------------|----------------------------------------------------------------------|
| At present the method of ... | is | commonly widely often | used best suited (for) used (for) used of | in the studies of ...<br>in research<br>for the determination of ... |
|                              |    | hardly rarely seldom  |                                           | in our country<br>all over the world                                 |
|                              |    | never                 |                                           | in laboratory conditions                                             |

*Explain the following characteristics of the research methods.*

|                |                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                        |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Observation | <ul style="list-style-type: none"> <li>– спостерігати</li> <li>– звертати увагу</li> <li>– помітити</li> <li>– виявити</li> </ul>                                                                                                                                                                                                                      | <ul style="list-style-type: none"> <li>– observe, watch</li> <li>– discover, find out</li> </ul>                                                                                                                                                       |
| 2. Hypothesis  | <ul style="list-style-type: none"> <li>– припускати, що</li> <li>– зробити висновок</li> <li>– розмірковувати</li> <li>– виходити з припущення</li> </ul>                                                                                                                                                                                              | <ul style="list-style-type: none"> <li>– assume, suppose</li> <li>– make a conclusion that</li> <li>– conclude</li> <li>– make an assumption</li> </ul>                                                                                                |
| 3. Experiment  | <ul style="list-style-type: none"> <li>– провести експеримент</li> <li>– перевірити припущення</li> <li>– переконатись на досвіді (в правильності припущення)</li> <li>– досліджувати</li> <li>– вивчити</li> <li>– проаналізувати</li> <li>– порівняти</li> <li>– виміряти</li> <li>– обчислити</li> <li>– визначити</li> <li>– знехтувати</li> </ul> | <ul style="list-style-type: none"> <li>– make an experiment</li> <li>– verify</li> <li>– to research</li> <li>– study</li> <li>– analyze</li> <li>– compare</li> <li>– measure</li> <li>– calculate</li> <li>– determine</li> <li>– neglect</li> </ul> |
| 4. Theory      | <ul style="list-style-type: none"> <li>– відкрити</li> <li>– встановити (зв'язок, залежність)</li> <li>– створити</li> <li>– довести</li> <li>– створити теорію, розробити</li> <li>– вирішити проблему</li> <li>– ввести поняття</li> <li>– описати</li> </ul>                                                                                        | <ul style="list-style-type: none"> <li>– discover</li> <li>– relate</li> <li>– create</li> <li>– prove</li> <li>– work out, develop</li> <li>– solve a problem</li> <li>– introduce</li> <li>– describe</li> </ul>                                     |

|                |                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                       |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5. Application | <ul style="list-style-type: none"> <li>– застосовувати (де, для чого) для виробництва, отримання, в якості</li> <li>– використовувати (як що) сировину, вихідне, джерело</li> <li>– служити чим</li> <li>– йти на що</li> <li>– виготовляти що</li> <li>– дати можливість</li> <li>– споживати</li> </ul> | <ul style="list-style-type: none"> <li>– use</li> <li>– apply</li> <li>– serve as</li> <li>– share</li> <li>– produce</li> <li>– employ</li> <li>– utilize</li> </ul> |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### ***6. What experiments are you planning to carry out?***

|    |                              |                                 |                                                                                                                                       |                                         |                                                                                               |
|----|------------------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------------------------------------------------------------------|
| We | carry out<br>make<br>conduct | the<br>series of<br>experiments | to show<br>to examine<br>to test<br>to obtain<br>to measure<br>to determine<br>to reveal<br>to correct<br>to predict<br>to accumulate | reliable<br>optimal<br>necessary<br>new | hypothesis<br>data correlation<br>parameters<br>components<br>facts<br>changes<br>information |
|----|------------------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------------------------------------------------------------------|

|                                                      |                                                                                 |
|------------------------------------------------------|---------------------------------------------------------------------------------|
| The first experiments<br>The preliminary experiments | were unsuccessful ...<br>showed                                                 |
|                                                      | helped to clear up ...<br>contributed to better understanding<br>of the problem |

|       |                                                                                                     |            |
|-------|-----------------------------------------------------------------------------------------------------|------------|
| It is | initial, early, previous, preliminary, precise, thorough, specific, promising, reliable, successful | experiment |
|       | discouraging, unreliable, unsuccessful                                                              |            |

|                     |                |    |                                             |
|---------------------|----------------|----|---------------------------------------------|
| Further experiments | led<br>enabled | us | to the conclusion that ...<br>to understand |
|---------------------|----------------|----|---------------------------------------------|

*What does the experimental set up consist of?*

|                         |                                                                |                              |
|-------------------------|----------------------------------------------------------------|------------------------------|
| My research needs       | sophisticated<br>complex<br>complicated<br>updated<br>specific | experimental<br>installation |
| The experimental set up | consists of<br>contains                                        | ...                          |

|                                              |                                        |
|----------------------------------------------|----------------------------------------|
| To accumulate all the necessary data, we use | registers metres<br>oscilloscopes      |
| To make necessary measurements, we use       | precise instruments<br>various devices |

|         |                     |                                           |
|---------|---------------------|-------------------------------------------|
| Then we | process<br>classify | the results obtained<br>the data obtained |
|---------|---------------------|-------------------------------------------|

|               |                                                          |
|---------------|----------------------------------------------------------|
| They seem/are | sufficient<br>convincing<br>reliable<br>complete         |
|               | amazing<br>striking<br>encouraging                       |
|               | insufficient<br>fragmentary<br>discouraging<br>ambiguous |

A modern research laboratory is an important part of any scientific centre. Their researchers make their experiments and collect necessary data. New research often requires sophisticated experimental installations (internal combustion engines, power turbines) and up-to-date experimental facilities to accumulate data for the advancement of science (metres, registers, oscilloscopes, etc.). As a rule, a researcher plans his experiments

to test his hypothesis. At present research in all fields depends on computer handling very large amount of data obtained from various experiments. A lab chief tries to equip a lab with reliable modern devices, organizes research groups, re-equips a lab with up-to-date machines and devices, staffs them with more research workers and engineers, improves the working conditions of the staff, gets funds, improves research activities. Lab assistants and technicians keep lab equipment in good order, repair metres, check and adjust devices, clean instruments and apparatuses, adjust them, assemble new devices. If you want reliable information on the subject, if you want to verify your results, you learn the methods for your experiment, make all the necessary preparations, make all measurements, process the results. If the method (approach) is suitable, if the experiment is well-designed, the data are in full conformity with the theory. Then you are satisfied with your results.

***7. How can you interpret (explain) the data obtained, make generalized statements about the information obtained?***

✓ Tables and figures are used to present the results of experiments. When referring to a figure in the text, the word “Figure” is abbreviated as “Fig”, while “Table” is not abbreviated. Both words are spelled out completely in descriptive legends.

Figures and tables are numbered independently, in sequence with their appearances in the text, starting with Fig. 1 and Table 1 in each chapter (e.g. Fig. 2.1 or Table 3.2). If, in revision, you change the presentation sequence of the figures and tables, you must renumber them to reflect the new sequence.

***A table*** is used for a set of data. However, if you can bring a table or part of it into words, it is preferable to do so.

***Figures*** are visual presentations of results. They can be graphs, diagrams, pictures, drawings, schematics, maps, etc. Graphs are the most common type of figures and will

be discussed in detail; examples of other types of figures are included at the end of this section. Graphs show trends or patterns of relationships; tables are mainly used to give exact data. Sometimes also in figures exact data are given as well.

The main purpose of figures is to show a certain trend, a prognosis or an extrapolation. The title is always given below the illustration and starts with “Fig...”. No full stop is put at the end of the title.

✓ There are different kinds of figures: *line graphs, surface graphs, bar diagram or histogram, bar group diagram or component bar diagram, pie chart diagram, pole diagram, flow chart, triangle diagram, cartogram and scheme.*

A *line graph* gives the relation between the independent variable (x-axis) and the dependent variable (y-axis) of observations on one object. Time is always set on the x-axis. Usually, the origin of both x and y axes starts at 0.

Accumulation of dependent variables leads to *surface graphs*. To distinguish; the different variables, the surfaces can be differently coloured or filled up.

When similar observations are carried out not on one object, but on many similar objects, the; use of bar *diagrams* or *histograms* is advisable.

In a *bar diagram* the bars are apart from each other. The distance between the bars is e.g. half of the bar width. In a histogram bars are joint together.

In a *pie chart diagram*, the total amount is given by the total surface of the pie. Ruts of that total amount can be given by circle segments. The disadvantage of such m figure is that it is difficult to compare the different parts.

To show the route of different products in an overall production process a flow diagram can be drawn. A *flow scheme* in a discussion or a flow scheme in a biological process can be shown in a flow diagram as well. The width of the route can be a measure for the importance of the flow.

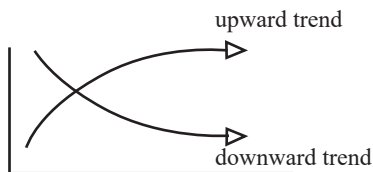
|                   |                         |                         |
|-------------------|-------------------------|-------------------------|
| A histogram       | shows                   | the percentage of ...   |
| A vertical axis   | shows                   | the percentage of ... . |
| A horizontal axis | compares                | ... .                   |
| A graph           | shows                   | the manner of ...       |
| A diagram         | shows                   | one way to measure      |
| A pie chart       | gives information about | ... .                   |

|                |            |                          |     |
|----------------|------------|--------------------------|-----|
| As can be seen | from<br>in | the chart<br>the diagram | ... |
| According      | to         | the table                | ... |
| As is shown    | in         | the graph<br>the figures | ... |
| It can be seen | from       | the statistics           | ... |

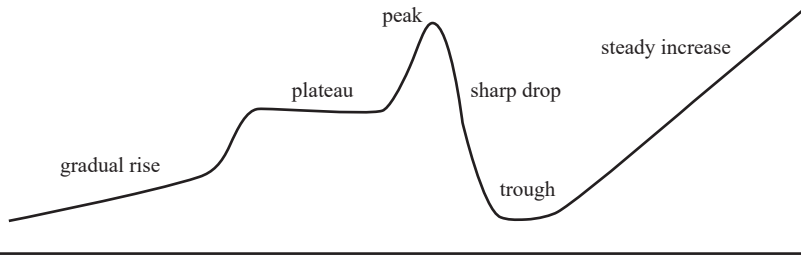
|             |                                                                                                                             |                                                                                     |                                         |
|-------------|-----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------|
| There was a | minimal<br>slight<br>small<br>slow<br>gradual<br>steady<br>marked<br>large<br>dramatic<br>steep<br>sharp<br>rapid<br>sudden | rise<br>increase<br>fluctuation<br>decrease<br>decline<br>reduction<br>fall<br>drop | in relation to ...<br>compared with ... |
|-------------|-----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------|

**7.1. Study the useful vocabulary to interpret data in graphs:**

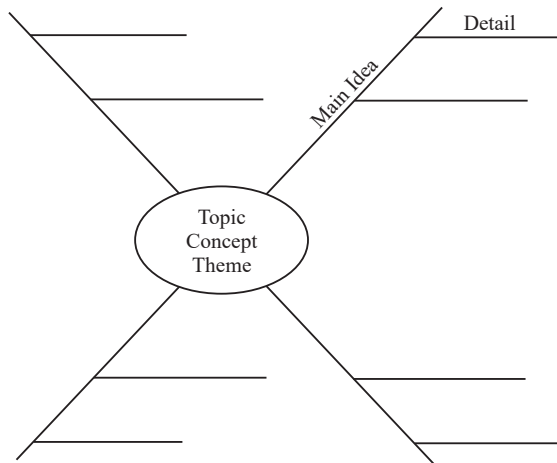
a *trend* involves a *direction*:



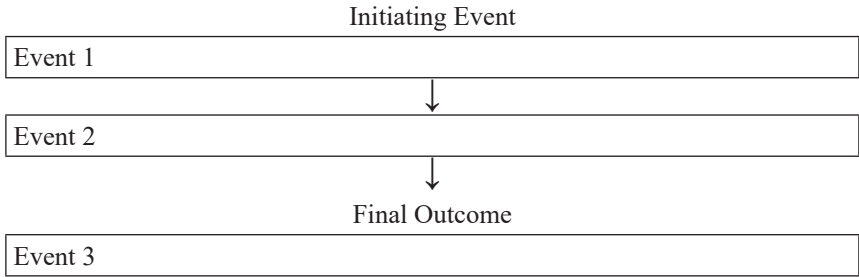
a *curve* involves a *shape* and *position*:



**Spider Map** is used to describe a central idea: a thing, process, concept, or proposition with support. Key frame questions: What is the central idea? What are its attributes? What are its functions?



**Flow chart** is used to describe the stages of something; the steps in a linear procedure; a sequence of events; or the goals, actions, and outcomes of a historical figure or character in a novel. Key questions: What is the object, procedure, or initiating event? What are the stages or steps? How do they lead to one another? What is the final outcome?



***Continuum / Scale*** is used for time lines showing historical events or ages, degrees of something, shades of meaning, or ratings scales.

Key questions: What is being scaled? What are the end points?



**Compare / Contrast Matrix** is used to show similarities and differences between two things (people, places, events, ideas, etc.). Key questions: What things are being compared? How are they similar? How are they different?

|             |        |        |
|-------------|--------|--------|
|             | Name 1 | Name 2 |
| Attribute 1 |        |        |
| Attribute 2 |        |        |
| Attribute 3 |        |        |

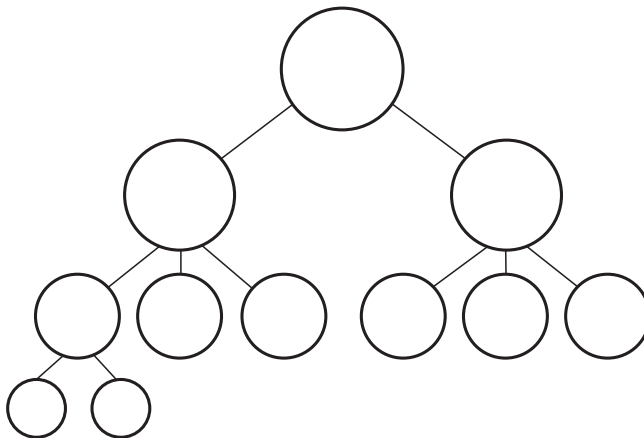
**Problem / Solution Outline** is used to represent a problem, solutions, and results.

Key questions: What was the problem? Who had the problem? Why was it a problem? What attempts were made to solve the problem? Did those attempts succeed?

|            |                     |                  |
|------------|---------------------|------------------|
| Problem    | Who?                |                  |
|            | What?               |                  |
|            | Why?                |                  |
|            | How?                |                  |
|            | How many?           |                  |
|            | How much?           |                  |
|            | How long?           |                  |
| Solution   | Attempted Solutions | Results obtained |
|            | 1.<br>2.            | 1.<br>2.         |
| End Result |                     |                  |

**Network Tree** is used to show causal information, a hierarchy, or branching procedures.

Key questions: What is the super ordinate category? What are the subordinate categories? How are they related? How many levels are there?



7.2. Interpret the data in the following graphs.

**THE EVOLUTION OF MARINE  
PROPULSION MACHINERY,  
1840s–1990s**

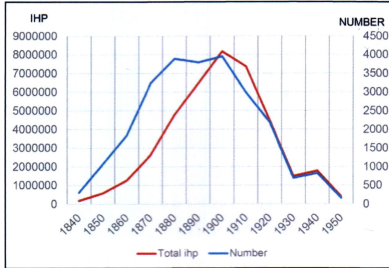


Fig 1. Merchant steam recip

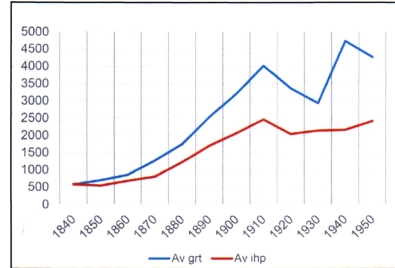


Fig 2. Merchant steam recip

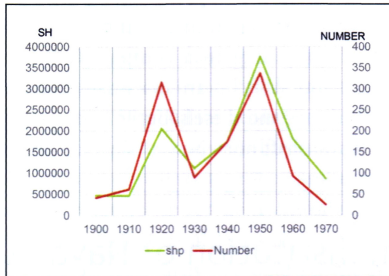


Fig 3. Steam Turbine Merchant  
Ships

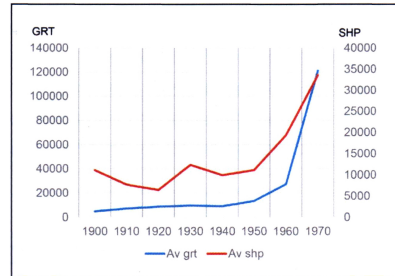


Fig 4. Steam Turbine Merchant  
Ships

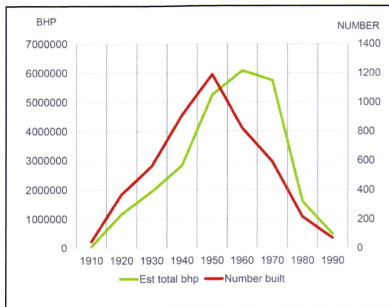


Fig 5. Diesel Merchant Ships

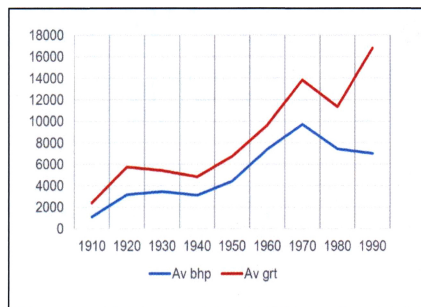


Fig 6. Diesel Merchant Ships

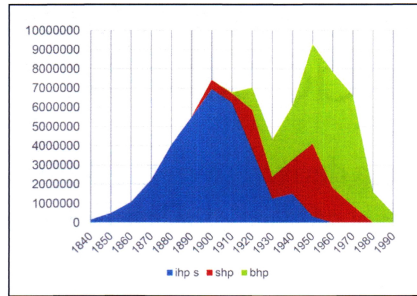


Fig 7. Horsepower of Merchant Ships

Data derived from the British Shipbuilding Database offers an insight into 150 years of technological progress, writes Ian Buxton.

The evolution of marine propulsion machinery is well-known in qualitative terms, but not in quantitative terms. Statistical information is fragmentary and often inconsistent, so trends can be difficult to determine. The powerful British Shipbuilding Database, involving 81,000 British built or engine ships over the past two centuries, now permits detailed analysis across a period during much of which the British marine engineering industry was the dominant force. This analysis is based on deep sea ships whose size, speed, power and endurance requirements drove most technical development, excluding smaller vessels, sailing ships and warships, for the decades from the 1840s–1990s.

The broad outline can be summarized:

- ✓ Coal-fired steam reciprocating machinery, initially paddle but soon superseded by screw in deep sea ships. Over the 1840–1950 period, thermal efficiency increased from about 4 % to 20 %, mainly due to higher boiler pressures and temperatures. Latterly, oil firing was used for most ships.

- ✓ Steam turbines for faster higher powered ships from 1900 to the mid–1970s, with either coal or oil-fired boilers.

Initially for passenger vessels, followed by cargo liners, and finally tankers and early container ships. Thermal efficiency increased from about 15 % to 35 % over this period.

✓ Diesel engines from 1910 to date. At first, only low powers were available, but 30 % thermal efficiency was a big attraction, albeit using oil which was more expensive than coal on a calorific value basis. The power of slow speed diesels had increased to over 20,000bhp by the 1960s, while thermal efficiency gradually increased to over 50 %. Such capability pushed out all other prime movers except in a few niche applications and in warships.

The 1920s saw a battle between the three main prime movers, with many published papers extolling one or the other, but it took another half century for diesel to sweep the field. A further 50 years later, the internal combustion engine continues to dominate, now capable of using a variety of fuels.

While the analysis includes only British engined ships, these were representative of the world fleet for most of the period. But by 1990, British manufacture of prime movers for deep sea merchant ships had ceased, so the figures also chart the growth and decline of the country's marine engineering industry. Short sea and smaller vessels such as ferries, coasters, fishing vessels and service craft like tugs are omitted which, although numerous, made up only a modest proportion of installed power. Therefore, the graphs are based almost entirely on passenger vessels, dry cargo ships and tankers, with the addition from the 1950s of bulk carriers and some specialist types like ro-ros.

For much of the 19th century, powers were usually recorded as nominal horsepower (nhp), a formula based largely on cylinder dimensions. But sufficient data on actual indicated horsepower (ihp) exists to develop approximate

conversion factors (varying from 2–6 ihp/nhp) and bring everything to a comparable basis. Brake and shaft hp are essentially similar for turbines and diesels, but in aggregating all types, shaft horsepower (shp) for steam reciprocators has been taken as 85 % of ihp. Thus, the combined sum comes to 30,876 ships totalling 71M equivalent shaft horsepower, averaging 193 ships per annum over 160 years. If warships were included that aggregate power nearly doubles, largely due to steam turbines.

Table 1 – The evolution of shaft horsepower

|                            | 1840–1909 |                 |          | 1910–1999 |                 |          |
|----------------------------|-----------|-----------------|----------|-----------|-----------------|----------|
|                            | Number    | Horsepower<br>M | Av power | Number    | Horsepower<br>M | Av power |
| Steam reciprocating<br>IHP | 18,095    | 24.06           | 1,330    | 6,867     | 15.51           | 2,260    |
| Steam turbine<br>SHP       | 42        | 0.47            | 11,100   | 1,099     | 11.83           | 10,760   |
| Diesels BHP                |           |                 |          | 4,773     | 24.99           | 5,240    |
| Total equivalent<br>SHP    | 18,137    | 20.92           |          | 12,739    | 50.01           |          |

Figs. 1–6 summarise the three main machinery types in decade totals by number, gross tonnage and horsepower and with averages. Fig. 7 shows the horsepower split: 47.4 % steam recip, 17.3 % steam turbine, 35.2 % diesel. (Naval Architect, February 2021).

**8. What results have you obtained? What results are you planning to obtain?**

|         |             |                                                                                                                         |             |                                                                             |
|---------|-------------|-------------------------------------------------------------------------------------------------------------------------|-------------|-----------------------------------------------------------------------------|
| I think | the results | obtained                                                                                                                | are         | of some theoretical and practical importance of some interest of importance |
|         | the data    | – are compatible with<br>– agree with<br>– are fully consistent with<br>– are in line with<br>– contradict<br>– confirm |             | the assumption predictions                                                  |
|         |             | – have                                                                                                                  | many        | advantages                                                                  |
|         |             |                                                                                                                         | Some        | positive features                                                           |
|         |             |                                                                                                                         | A number of | shortcomings faults                                                         |

*How did you analyse the previous results?*

|                                                                 |                                             |                                                                                    |
|-----------------------------------------------------------------|---------------------------------------------|------------------------------------------------------------------------------------|
| To                                                              | predict<br>draw<br>come<br>search<br>deduce | a conclusion on the advantages and disadvantages, as much as you can from the data |
| it was                                                          | necessary<br>important                      | to like into account<br>to discuss<br>to weight up                                 |
| all the relevant aspects of the problem<br>a range of variables |                                             |                                                                                    |
| The results                                                     | show<br>demonstrate<br>indicate             | an interesting trend<br>tendency                                                   |

***What do you think about the results obtained?***

*Read the article which is related to the topic of your research using the following expressions:*

|                                        |                         |
|----------------------------------------|-------------------------|
| The data / the results obtained        | to be in agreement with |
| The findings presented                 | to be consistent with   |
| The conclusions / the predictions made | to be in line with      |
| The evidence reported                  | to be in keeping with   |
| The facts outlined                     | to be valid for         |
| The information available              | to be true for          |

### ***9. What are the prospects of your research?***

|                            |                           |                             |
|----------------------------|---------------------------|-----------------------------|
| As a result of my research | I'd like<br>I am planning | to show ...<br>to prove ... |
|----------------------------|---------------------------|-----------------------------|

By the year 1990, there may be over 100,000 robots installed in the US. The form, design and technology of these robots will improve as time progresses. It will be made possible to use robots in hundreds of thousands of applications as a number of technical problems are overcome.

The first technical need is the improvement of the accuracy of positioning the robot. Through better calibration procedures and improved mechanical systems, the arbitrary accuracy of the system will be improved.

Another area needing improvement is the dynamic performance of robots. In many assembly tasks, present-day robots are too slow and clumsy to effectively work in cooperation with human labor. Much also remains to be done in the design of grippers. Sensors of many different kinds also need to be developed. Robots must become able to see, feel and sense the position of objects in a number of different ways. In addition, control systems are needed which can process sensory data from a large number of sensors simultaneously.

In the coming decade we can look for systems with improved reliability, lighter weight, lower cost and more extended sensor capabilities.

***10. What are the spheres of your research application?***

|    |                   |                                         |     |                                                                      |
|----|-------------------|-----------------------------------------|-----|----------------------------------------------------------------------|
| It | must be<br>can be | applied<br>used<br>employed<br>utilized | for | intensifying ...<br>protecting ...<br>increasing ...<br>reducing ... |
|----|-------------------|-----------------------------------------|-----|----------------------------------------------------------------------|

One of the major potentialities of robotic devices is performing tasks in environments in which humans cannot operate safely or efficiently. One such environment is under water where robots can be used for construction and repair of structures, retrieving lost objects, gathering underwater mining and drilling equipment. Undersea functioning will require on-board computer processing for sensing and mobility far greater than is currently available. Underwater robots could be weightless with their buoyancy controlled by filling or emptying air chambers. They could be maneuvered by propelling or by jets of water; even walking underwater could easily be accomplished by a two-legged robot.

## РОЗДІЛ V

### Writing Research Basics in Use

*Easy writing makes hard reading.*

*Ernest Hemingway*

*Practice is the mother of all inventions.*

*Proverb*

Для забезпечення таких основних вимог до наукового тексту, як об'єктивність, логічність, точність, прозорість, перевірність, доказовість змісту, нейтральність, важливо забезпечити правильну його композицію. В першу чергу, правильна композиція передбачає системну послідовність усіх компонентів змісту: актуальність дослідження, характеристика теми або предмету дослідження, формулювання мети, задач, проблеми, гіпотези, попередня інформація або історія досліджень цієї проблеми, доказ, опис експериментів, висновки, список літератури. Це зосереджує увагу автора і читача на обґрунтованості основних ідей, об'єктивній логіці доказової частини, валідності висновків, а тобто вона важлива як для адекватного представлення матеріалів дослідження, так і для адекватного, однозначного сприйняття цих матеріалів.

Характеристика теми/предмету дослідження (Forward, Introduction) – це традиційний і обов'язковий перший компонент наукового тексту. Його сигнал – це конструкції, які знайомлять читача з темою: *The article deals with..., concerns..., provides the analysis...* У цьому сегменті тексту автор репрезентує актуальність і новину дослідження.

Головна комунікативна задача другого компоненту наукового тексту – це актуалізація наукової залежності за допомогою опису теоретичного підґрунтя, методологічної бази тексту автора і надання попередньої інформації з історії дослідження: становлення теорії, історія появи концепцій, їх взаємозв'язок, взаємозалежності між різними концепціями, тенденції, пріоритети, перспективи розвитку: *The preliminary research demonstrates..., The careful review reveals..., The previous findings seem inconsistent, unreliable, fragmentary, insufficient.*

Компонент тексту, який присвячений меті і завданням дослідження, визначає стратегію наукового пошуку: *The aim of the research is to prove..., The tasks consist in determining..., focusing on..., identifying...* Завдання автора полягає у тому, щоб орієнтувати читача на інформацію, яка буде запропонована в подальшому тексті (*after that..., it follows that..., next*).

Формулювання проблеми, висування гіпотези визначає, що показує протиріччя між тим, що вже відомо, і тим, що буде описано. Тобто використовуються мовні засоби, які показують контрастність поданої інформації, і безпосередньо актуалізують цей сегмент тексту: *the hypothesis, assumption, suggestion; to assume, to hypothesize, to suppose; presumably, admittedly; it may/can/might be a reason..., it must be...; it is assumed that..., it is supposed that...* Формулювання гіпотези, нового авторського знання, визначення новизни, оригінальності даної теми теж актуалізується за допомогою стереотипних мовних засобів: *new approach, a fresh look at, a new model, filling a gap in the previous investigations by including...*

Компонент наукового тексту, який представляє нове наукове знання і докази гіпотези і пов'язаний з аргументами міркування, спростування, підтвердження, обґрунтування, характеризується тим, що в ньому послідовно і чітко встановлюються причинні і наслідкові відношення, встановлюється

достовірність повідомлення, систематизуються аргументи. Стереотипні і стандартні засоби оформлення – це лексичні і синтаксичні конструкції: *so that, therefore; consequently; as a result, due to this; this means*. Роль поступового смислового переміщення виконують лексичні засоби із значенням узагальнення: *always, exist, constant, wherever*. Для аргументації, встановлення неістинності/хібності ствердження використовуються словосполучки або дієслова: *on the contrary, on the opposite, on the one side, on the other side; to argue, to contradict, to disapprove, to object*.

Комунікативно-прагматичним варіантом доказу гіпотези є опис експерименту, засобів і методів вимірювання або спостереження: *test, experiment, procedure, methods, measurement; to examine, to select, to identify, to measure, to observe, to carry out*. Типовим є використання інфінітивних конструкцій (*to achieve the result..., to study the effect..., to verify the data obtained*) або встановлення послідовності (*first, second, then, finally*).

Особливу роль виконує компонент наукового тексту, який демонструє висновки: *in conclusion, in summary; to conclude, to sum up; as previously stated, as mentioned above, as stated before*. Для нього характерні лексичні одиниці, які висловлюють завершеність, валідність висновків: *our research shows, demonstrates, highlights, reveals that...*

Для англomовного наукового тексту характерна некатегоричність висловлювання, яка обумовлена нормативними традиціями, притаманими цьому стилю, тому типовими сигналами цього композиційного сегменту є конструкції, які виражають модельні відношення важливості, доцільності, об'єктивної необхідності подальших досліджень: *to be important, relevant, interesting; to lead to a better understanding of..., to provide a basis for further studies*.

Кожен науковий жанр (реферат, автореферат, анотація, наукова стаття, дисертації, монографії, підручник) висуває

свої вимоги і правила побудови композиції тексту. Вони визначаються спеціальними організаціями або редакційними вимогами видавництв або часописів.

Отже, правильно побудована композиція наукового тексту, правильне розташування всіх його елементів, правильна пов'язність логіко-смісловими відношеннями – це запорука правильного сприйняття, правильної оцінки такого тексту читачами.

***1. Study the following:***

***Дослідження:***

***Investigation*** – the process intended to explain or find the truth about something such as a situation, problem.

***Research*** – serious study of a subject that is intended to discover new facts or test new ideas.

***Exploration*** – examination or discussion of something carefully in order to find out more about it.

***Basic framework for a research report***

1. Title.
2. Introduction
  - 2.1. Outline (abstract) of the research.
  - 2.2. Statement of the problem (aims, tasks, importance)
3. Main body
  - 3.1. Historical background (review of the literature)
  - 3.2. Design of the investigation (plan)
  - 3.3. Methods and procedures (experiment, measurement, techniques used, methods)
  - 3.4. Results
4. Conclusion
  - 4.1. Recommendations and suggestions for further research (discussion and conclusions)
  - 4.2. Summary of conclusions

5. Extras
  - 5.1. List of contents
  - 5.2. List of figures/tables
  - 5.3. Acknowledgements
  - 5.4. Bibliography
  - 5.5. Appendices

A typical research report introduces the subject and presents a problem that needs to be addressed, describes a hypothesis for solving the problem, describes an experiment for testing the hypothesis, describes the results, and describes the implications of the results. Most research reports can thus be divided into four sections: introduction, materials and methods, results, and discussion (known as the IMRD format). The report is usually preceded by an abstract and followed by acknowledgments (when appropriate), references, and appendixes (if necessary).

## INTRODUCTION

The introduction of a research report serves as a transition between a general subject area and the particular research of the report. It often presents the motivation for the study by describing an existing situation in relation to the problem, need, or inadequacy that must be addressed. It then presents a hypothesis for the resolution of the problem. Look at the following examples.

## MATERIALS AND METHODS

The materials and methods section of a research report describes what materials were used in the study and how the data were collected. The methods section is usually presented in chronological order.

If the precise nature of the materials and methods is especially important, they are sometimes listed with separate subheadings, as shown in the following example.

## DISCUSSION

The discussion section is concerned with the significance of the results. Some common approaches are to discuss 1) the hypothesis in terms of the results, 2) the experimental design, 3) possible sources of error, 4) the results of other researchers, and/or 5) possible scientific explanations of the results. This is often followed by a description of the limitations of the study and suggestions for further research.

### *2. Explanation is appropriate for each section:*

|                                                                    |                                                                                                                |
|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| Definitions                                                        | ...is a science about (study of... that deals with) (approach, method)                                         |
| Structure                                                          | to be divided into ...                                                                                         |
| Historical background (period, duration, interval, origin, source) | temporary, permanent, eventual, periodic, successive                                                           |
|                                                                    | to originate, to form, to develop, to set up, to found, to raise (bring up) a hypothesis, to cause, to outline |
| State-of-the art                                                   | modern, up-to-date, contemporary, obsolete, preceding, outdated                                                |
|                                                                    | to become, to mark, to achieve, to widen, to deepen                                                            |
| Methods (mode, operation, system, procedure)                       | to use, to apply, to work out, to develop                                                                      |
| Relation to other sciences                                         | to be related to, applied, relationship, dependence                                                            |
| Importance                                                         | important, significant, leading, breakthrough                                                                  |
|                                                                    | to play an important role in..., to occupy an important place in....                                           |
| Organization (grouping together, classification, differentiation)  | to head, to lead, to found, to publish                                                                         |

a) the presentation in a logical order of information and data upon which a decision can be made to accept or reject the hypothesis;

- b) a compilation of important data and explanatory material (outside the main body);
- c) the sections in sequence;
- d) a survey of selective and relevant reading;
- e) the presentation of principles, relationships, correlations and generalizations, the interpretation of results, deductions, recommendations;
- f) an accurate listing in strict alphabetical order of all the sources;
- g) a concise summary, overview of the whole report;
- h) thanking all those involved (friends, supervisors, sponsors, colleagues);
- i) detailed descriptions and discussion of the hypothesis and the theoretical structure in which they will be tested and examined, the methods used;
- j) a concise account of the main findings;
- k) a statement and discussion of the hypothesis and the theoretical structure in which they will be tested and examined, the methods used;
- l) the sequence of charts and diagrams;
- m) a clear declaration of proposals and hypothesis.

***3. Put down the definitions of the sciences you major in, the key terms you use for your research.***

***4. Fill in the chart describing a phenomenon you deal with: pressure, electricity, gravitation, heat and mass transfer, etc.***

|                                  |  |
|----------------------------------|--|
| essence                          |  |
| sources                          |  |
| characteristics/properties       |  |
| classification                   |  |
| importance (application, impact) |  |
| prospects for further research   |  |

**5. Fill in the chart (describing a process: preparation, production, manufacture, control, regulation).**

|                                |  |
|--------------------------------|--|
| topicality, relevance          |  |
| essence                        |  |
| causes/factors                 |  |
| problem – solution             |  |
| prospects for further research |  |

**6. Fill in the chart (describing an experiment: tools, instruments, devices, machines, apparatuses, meters, mechanisms; to carry out, to demonstrate, to detect, to represent, to measure, to reveal)**

|                                                      |  |
|------------------------------------------------------|--|
| object                                               |  |
| purpose                                              |  |
| methods of measurement                               |  |
| equipment                                            |  |
| measurement results                                  |  |
| coordination, agreement with theoretical predictions |  |
| conclusions                                          |  |

**7. Describe objects you deal with during your research:**

|                                                              |                                                                                                                                                            |
|--------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Composition<br>(склад)                                       | <ul style="list-style-type: none"> <li>– consists of</li> <li>– constitute ( %)</li> <li>– be made up</li> <li>– contain</li> <li>– incorporate</li> </ul> |
| State/condition<br>(стан)                                    | <ul style="list-style-type: none"> <li>– change (from the initial to the final state)</li> <li>– pass (from one state to another)</li> </ul>               |
| Properties<br>(властивості)                                  | <ul style="list-style-type: none"> <li>– be have the property</li> <li>– be characterized</li> <li>– be distinguished by</li> </ul>                        |
| Change:<br>properties; states;<br>characteristics<br>(зміни) | <ul style="list-style-type: none"> <li>– be modified</li> <li>– be changed</li> <li>– vary from...to</li> <li>– be transformed</li> </ul>                  |

|                                                           |                                                                                                                                                                                                                                                                                                                  |                                                                                                |
|-----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| властивостей<br>станів)                                   | <ul style="list-style-type: none"> <li>– become</li> <li>– increase</li> <li>– decrease</li> </ul>                                                                                                                                                                                                               |                                                                                                |
| Relationship<br>(зв'язки,<br>взаємовідносини)             | <ul style="list-style-type: none"> <li>– depend on</li> <li>– be connected with</li> <li>– influence, have an effect, impact (on)</li> <li>– more</li> <li>– less</li> <li>– change in A with B</li> <li>– correspond to</li> <li>– connect (be connected)</li> <li>– establish (the connection with)</li> </ul> |                                                                                                |
| Form/shape<br>(форма)                                     | <ul style="list-style-type: none"> <li>– be shaped as, be in form (shape), take the form of</li> <li>– form</li> <li>– conform to</li> <li>– make the shape of</li> <li>– hold its shape</li> </ul>                                                                                                              |                                                                                                |
| Materials (засоби,<br>властивості,<br>характеристики)     | <ul style="list-style-type: none"> <li>– be made of</li> <li>– be made from</li> <li>– be manufactured</li> <li>– grade, classify</li> <li>– use, apply</li> </ul>                                                                                                                                               | Surface: smooth, grounded,<br>chrome-coated, painted; front,<br>rear, top, bottom, right, left |
| Arrangement/<br>location<br>(розміщення,<br>розподілення) | <ul style="list-style-type: none"> <li>– arrange</li> <li>– dispose</li> <li>– place</li> <li>– arrange according to</li> <li>– some order</li> <li>– arrange in</li> <li>– be lined up with</li> <li>– be arranged</li> <li>– be placed</li> <li>– be positioned</li> </ul>                                     |                                                                                                |
| Connection /<br>joining                                   | <ul style="list-style-type: none"> <li>– joint</li> <li>– connect</li> <li>– fasten</li> <li>– secure</li> </ul>                                                                                                                                                                                                 |                                                                                                |
| Size/ dimensions<br>(габарити)                            | <ul style="list-style-type: none"> <li>– breadth</li> <li>– height</li> <li>– thickness</li> <li>– mass</li> <li>– weight</li> </ul>                                                                                                                                                                             |                                                                                                |

**8. Connectives are very important for making the text logical and clear.**

**8.1. Listing / Ordering**

|                                                                  |
|------------------------------------------------------------------|
| prior, previously                                                |
| firstly, first of all, at first, to begin with, in the beginning |
| first and foremost                                               |
| secondary, thirdly                                               |
| then, next, further                                              |
| afterwards, moreover                                             |
| finally, lastly, in the end                                      |
| last but not least                                               |
| in conclusion, to conclude, to sum up, in brief, thus            |

|               |                 |
|---------------|-----------------|
| <b>Formal</b> | <b>Informal</b> |
|---------------|-----------------|

**AIR CONDITIONER**

**Firstly**, when cooling, warm room air is drawn across the indoor coil (evaporator) where heat is transferred to the refrigerant passing through the coil.

**Secondly**, this heat is then transferred via the refrigerant to the outdoor coil (condenser) where it is dissipated to the atmosphere.

**Thirdly**, as the room air, which is being cooled, passes across the indoor coil, moisture may also be removed from it and drained to an outlet outdoors. This moisture condenses on the indoor coil in the same way as moisture in your breath when you breathe on a cold window. As well as heat being extracted from the air in the area to be cooled and transferred outside, the indoor air is also dehumidified. This improves comfort conditions in hot, sticky weather. The operation of most air conditioners is controlled by a thermostat which is either built into the air conditioner or independently mounted. The thermostat is adjustable so that once you set it to your desired temperature it automatically maintains it.

And ***last but not least*** in domestic air conditioners the compressor is switched on by the thermostat, only as long as necessary to maintain the room temperature thus ensuring the lowest operating coast.

## 8.2. Adding / Prioritizing

|                                                                                    |  |
|------------------------------------------------------------------------------------|--|
| in addition to<br>as previously mentioned                                          |  |
| in particular<br>especially<br>equally<br>likewise<br>correspondingly<br>similarly |  |
| besides<br>except                                                                  |  |
| also<br>again                                                                      |  |
| above all<br>moreover                                                              |  |

## SHIP DEHUMIDIFYING

The engine room includes associated spaces – control room, steering gear room, workshop and spare parts store, also needs protection. In addition, here is to be found various devices sensitive to humidity such as electric motors, regulation equipment, etc.

***As previously mentioned***, the dehumidification is arranged in a closed system with distribution of the dry air to the various departments of the engine room via a provisional duct system. The process air (return air) is obtained through free suction at the dehumidifier. For reactivation, use is made of external air conducted via a duct to the dehumidifier. The wet air from the dehumidifier is discharged into the open.

Especially important is dimensioning. As a standard value for dimensioning an adequate dry air flow can be determined at 0.1–0.2 air changes/h calculated in terms of the volume of the engine room. If it is acceptable that the humidity is not under control at certain times 0.05 air changes/h can be used for dimensioning. In such a case the control room should be supplied with a separate dehumidifier.

*Besides* engine room spaces, accommodation is also dehumidified. By dehumidifying cabins and public rooms the furnishing are protected against damage by moisture. Woodwork and textiles are preserved intact if the humidity can be limited to 50 % RH, i.e. the same value which prevents corrosion attacks on steel details.

For the distribution of dry air use is made of the existing central unit for the air conditioning plant operating with 100 % return air, and with the fan running at reduced speed.

Since the central unit deals with a comparatively large air flow only a part of the recirculated air is dehumidified. The dry air is conducted via a duct to the suction side of the central unit. The intake for reactivation air on the dehumidifier as well as the outlet for wet air are linked by ducts to the open.

The dehumidifier is set for a dry air flow corresponding to 0.2–0.3 air changes/h calculated in terms of the total volume of the spaces served.

*Moreover*, wheel house, radio cabin and radar cabin are also dehumidified. These cabins are normally linked to the air conditioning system and are thus included in the spaces dehumidified via a central unit in accordance with the above. In other cases cabin separate dehumidification must be provided – closed system – to protect the sensitive electronic equipment.

### 8.3. Contrasting / Prioritizing

|                                                                                                        |  |
|--------------------------------------------------------------------------------------------------------|--|
| but<br>however<br>contrary to<br>on the contrary<br>on the one hand ... on the other hand<br>otherwise |  |
| nevertheless<br>although<br>even is/even though<br>in spite of despite that<br>not with standing       |  |
| in any case<br>at any rate                                                                             |  |

## DEHUMIDIFICATION SYSTEMS WITHIN SHIPBUILDING INDUSTRY

*In spite of the fact* that ships are in water, water is a great problem. Munters Company deals with the problem of condensation. When a ship sweats, moisture condenses on its interior surfaces. Hulls rust, paint blisters, wiring and electronic circuits malfunction. Cans rust, produce rots and mildews, cartons get soggy and labels get stained. Liquid cargo becomes contaminated. Sandblasting and painting must be rescheduled or redone. The result is millions of dollars lost every year. And even more revenue is lost while ships sit idle for unnecessary repairs.

*However*, condensation is a problem that can be solved, Munters has the solution. Condensation is prevented when the dew point temperature in the hold or tank is kept lower than that of the ship's structure and cargo temperature. In any case, a Munters dehumidifier will maintain a required dew point level, regardless of outside weather conditions or extreme temperature changes. All Munters dehumidifiers are designed on the principle, which uses a slowly revolving wheel, impregnated with desiccant,

to draw moisture from air. As air moves through the wheel, it is dried and returned at a safe dew point level.

*Although* the dehumidification principle remains the same, each type of vessel, tank or container has its own unique and individual requirements. Munters offers a complete line of dehumidifiers, and control equipment, or systems specifically designed to meet the needs of differing situations.

*On the other hand*, one of the newest projects that Munters participating in is the inert gas system on LNG ships carrying cargo at  $-127^{\circ}\text{C}$ . Munters dehumidifier is an integral part of this system. Dry inert gas used to fill LNG tanks prevents the formation of a flammable atmosphere and ice build-up inside the LBG tanks. In a nutshell, this is how the system works: Gas from an inert gas generator is routed through a gas scrubber, which cools it and removes solid particles and acidic components from the gas. A Munters dehumidifier then dries the gas, which has become saturated in the scrubber.

#### ***8.4. Cause – Reason / Result***

|                   |
|-------------------|
| so                |
| therefore         |
| as a result       |
| consequently      |
| because of (this) |
| thus              |
| hence             |
| for this reason   |

### **DEHUMIDIFICATION**

The relative humidity in painting is usually too high. Therefore are different ways to lower it.

*Thus* a straight method is to decrease the moisture content of the air by dehumidification. At anti-corrosive painting, the method

of sorption dehumidification is used, involving that a hygroscopic agent absorbs the moisture out of the air. **For this reason**, this method is equally good at all temperatures. One usually dehumidifies to a relative humidity of 35–50 % RH, which causes rust-preventing. At dehumidification, some kind of shielding is necessary. **Because of** insufficient hightness it will do with awnings or a plastic foil on a bolt arrangement. In closed premises and indoors the entire volume is dehumidified.

The dehumidifier is based on Munters' sorption rotor. It is divided into two zones: a working zone where the rotor absorbs moisture from the process air, and a reactivation zone where hot reactivation air absorbs moisture from the rotor. The rotor is turning slowly, about 10 r/h. The dehumidification and reactivation is continuous. **Therefore** the dehumidifier operates without problems also at temperatures below zero.

### **8.5. Adding emphasis**

Formal.

Moreover (adding emphasis to the arguments you've made).

Furthermore (adding emphasis to the arguments you haven't already made).

In addition to (smth extra exists).

Informal.

On top of that,

As well as that,

For sure.

### **8.6. Giving examples**

For example / For instance

As far as I know,

To my knowledge.

## **9. Put down the summary of your research.**

**List of Irregular Verbs  
(in alphabetical order)**

**A**

|       |       |        |                    |
|-------|-------|--------|--------------------|
| arise | arose | arisen | <b>підніматися</b> |
|-------|-------|--------|--------------------|

**B**

|        |              |              |                       |
|--------|--------------|--------------|-----------------------|
| bear   | bore         | borne        | <b>носити</b>         |
| become | became       | became       | <b>ставати</b>        |
| begin  | began        | Begun        | <b>починати</b>       |
| bend   | bent         | bent         | <b>згинати</b>        |
| bind   | bound        | bound        | <b>зв'язувати</b>     |
| bleed  | bled         | bled         | <b>стікати кров'ю</b> |
| blow   | blew         | blown        | <b>дути</b>           |
| break  | broke        | broken       | <b>ламати</b>         |
| breed  | bred         | bred         | <b>виросувати</b>     |
| bring  | brought      | brought      | <b>приносити</b>      |
| burn   | burnt/burned | burnt/burned | <b>горіти</b>         |
| burst  | burst        | burst        | <b>розриватися</b>    |
| buy    | bought       | bought       | <b>купувати</b>       |

**C**

|        |        |        |                  |
|--------|--------|--------|------------------|
| catch  | caught | caught | <b>ловити</b>    |
| choose | chose  | chosen | <b>вибирати</b>  |
| cling  | clung  | clung  | <b>чіплятися</b> |
| come   | came   | came   | <b>приходити</b> |
| cost   | cost   | cost   | <b>коштувати</b> |
| creep  | crept  | crept  | <b>повзти</b>    |
| cut    | cut    | cut    | <b>різати</b>    |

**D**

|       |                    |                    |                        |
|-------|--------------------|--------------------|------------------------|
| deal  | dealt              | dealt              | <b>мати справу з</b>   |
| dig   | dug                | dug                | <b>копати</b>          |
| do    | did                | done               | <b>робити</b>          |
| dream | dreamt/<br>dreamed | dreamt/<br>dreamed | <b>мріяти</b>          |
| drive | drove              | driven             | <b>водити (машину)</b> |

**E**

|     |     |       |             |
|-----|-----|-------|-------------|
| eat | ate | eaten | <b>їсти</b> |
|-----|-----|-------|-------------|

**F**

|        |        |        |                  |
|--------|--------|--------|------------------|
| fall   | fell   | fallen | <b>падати</b>    |
| feel   | felt   | felt   | <b>почувати</b>  |
| feed   | fed    | fed    | <b>годувати</b>  |
| fight  | fought | fought | <b>боротися</b>  |
| find   | found  | found  | <b>знаходити</b> |
| fly    | flew   | flown  | <b>літати</b>    |
| freeze | froze  | frozen | <b>замерзати</b> |

**G**

|       |        |        |               |
|-------|--------|--------|---------------|
| give  | gave   | given  | <b>давати</b> |
| go    | went   | gone   | <b>йти</b>    |
| grind | ground | ground | <b>терти</b>  |
| grow  | grew   | grown  | <b>рости</b>  |

**H**

|      |      |        |                          |
|------|------|--------|--------------------------|
| hang | hung | hung   | <b>вішати</b>            |
| have | had  | had    | <b>мати</b>              |
| hide | hid  | hidden | <b>ховати</b>            |
| hit  | hit  | hit    | <b>ударити</b>           |
| hold | held | held   | <b>тримати</b>           |
| hurt | hurt | hurt   | <b>спричинити (біль)</b> |

***K***

|      |      |       |                |
|------|------|-------|----------------|
| keep | kept | kept  | <b>тримати</b> |
| know | knew | known | <b>знати</b>   |

***L***

|       |                |                |                    |
|-------|----------------|----------------|--------------------|
| lay   | laid           | laid           | <b>положити</b>    |
| lead  | led            | led            | <b>керувати</b>    |
| lean  | leaned/leant   | leaned/leant   | <b>опиратися</b>   |
| leap  | leaped/lept    | leaped/lept    | <b>плигати</b>     |
| learn | learnt/learned | learnt/learned | <b>вивчати</b>     |
| leave | left           | left           | <b>лишати</b>      |
| lend  | lent           | lent           | <b>позичати</b>    |
| let   | let            | let            | <b>дозволяти</b>   |
| light | Lighted/lit    | lighted/lit    | <b>освітлювати</b> |

***M***

|      |       |       |                   |
|------|-------|-------|-------------------|
| make | made  | made  | <b>робити</b>     |
| mean | meant | meant | <b>означати</b>   |
| meet | met   | met   | <b>зустрічати</b> |

***P***

|     |      |      |                 |
|-----|------|------|-----------------|
| pay | paid | paid | <b>платити</b>  |
| put | put  | put  | <b>покласти</b> |

***R***

|      |      |        |                    |
|------|------|--------|--------------------|
| read | read | read   | <b>читати</b>      |
| ride | rode | ridden | <b>їхати верхи</b> |
| ring | rang | rung   | <b>дзвонити</b>    |
| rise | rose | risen  | <b>підійматися</b> |
| run  | run  | run    | <b>бігати</b>      |

**S**

|        |                    |                    |                               |
|--------|--------------------|--------------------|-------------------------------|
| say    | said               | said               | <b>казати</b>                 |
| see    | saw                | seen               | <b>бачити</b>                 |
| sell   | sold               | sold               | <b>продавати</b>              |
| send   | sent               | sent               | <b>посилати</b>               |
| set    | set                | set                | <b>установити</b>             |
| shake  | shook              | shaken             | <b>трясти</b>                 |
| shine  | shone              | shone              | <b>сяяти</b>                  |
| shoot  | shot               | shot               | <b>стріляти</b>               |
| shrink | shrank             | shrunk             | <b>скорочуватися</b>          |
| shut   | shut               | shut               | <b>закривати</b>              |
| sing   | sang               | sung               | <b>співати</b>                |
| sink   | sank               | sunk               | <b>тонути</b>                 |
| sit    | sat                | sat                | <b>сидіти</b>                 |
| steep  | slept              | slept              | <b>спати</b>                  |
| slide  | slid               | slid               | <b>ковзати</b>                |
| smell  | smellt/<br>smelled | smellt/<br>smelled | <b>нюхати</b>                 |
| speak  | spoke              | spoken             | <b>говорити</b>               |
| spell  | spelt/spelled      | spelt/spelled      | <b>говорити по<br/>буквах</b> |
| spend  | spent              | spent              | <b>проводити</b>              |
| spin   | spun               | spun               | <b>крутити</b>                |
| spread | spread-            | spread             | <b>розповсюджувати</b>        |
| spring | sprang             | sprung             | <b>підстрибувати</b>          |
| stand  | stood              | stood              | <b>стояти</b>                 |
| steal  | stole              | stolen             | <b>красти</b>                 |
| stick  | stuck              | stuck              | <b>втикати</b>                |

|        |        |        |                  |
|--------|--------|--------|------------------|
| sting  | stang  | stung  | <b>жалити</b>    |
| strike | struck | struck | <b>ударяти</b>   |
| swear  | swore  | sworn  | <b>сваритися</b> |
| sweep  | swept  | swept  | <b>підмітати</b> |
| swim   | swam   | swum   | <b>плавати</b>   |
| swing  | swung. | swung  | <b>качати</b>    |

**T**

|       |         |         |                    |
|-------|---------|---------|--------------------|
| take  | took    | taken   | <b>брати</b>       |
| teach | taught  | taught  | <b>навчати</b>     |
| tear  | tore    | torn    | <b>розривати</b>   |
| tell  | told    | told    | <b>розказувати</b> |
| think | thought | thought | <b>думати</b>      |

**U**

|            |            |            |                 |
|------------|------------|------------|-----------------|
| understand | understood | understood | <b>розуміти</b> |
|------------|------------|------------|-----------------|

**W**

|       |            |         |                                      |
|-------|------------|---------|--------------------------------------|
| wake  | woke/waked | woken   | <b>будити</b>                        |
| wear  | wore       | worn    | <b>носити</b>                        |
| win   | won        | won     | <b>вигравати</b>                     |
| wind  | wound      | wound   | <b>заводити</b><br><b>(годинник)</b> |
| write | wrote      | written | <b>писати</b>                        |

**Quick irregular verb chart**

|       |       |       |
|-------|-------|-------|
| bleed | bled  | Bled  |
| breed | bred  | Bred  |
| creep | crep  | Crept |
| deal  | dealt | Dealt |
|       | felt  | Felt  |

|        |        |        |
|--------|--------|--------|
| feed   | fed    | Fed    |
| keep   | kept   | Kept   |
| lead   | led    | Led    |
| leap   | lept   | Lept   |
| leave  | left   | Left   |
| mean   | meant  | Meant  |
| meet   | met    | Met    |
| read   | read   | Read   |
| sleep  | slept  | Slept  |
| sweep  | swept  | Swept  |
| bend   | bent   | Bent   |
| lend   | lent   | Lent   |
| send   | sent   | Sent   |
| spell  | spelt  | Spelt  |
| spend  | spent  | Spent  |
| begin  | began  | Began  |
| ring   | rang   | Rung   |
| shrink | shrank | Shrunk |
| sing   | sang   | Sung   |
| sink   | sank   | Sunk   |
| spring | sprang | Sprung |
| sting  | stang  | Stung  |
| swim   | swam   | Swum   |
| blow   | blew   | Blown  |
| fly    | flew   | Flown  |
| grow   | grew   | grown  |
| know   | knew   | known  |

|        |         |         |
|--------|---------|---------|
| arise  | arise   | arisen  |
| drive  | drove   | driven  |
| ride   | rode    | ridden  |
| rise   | rose    | risen   |
| shine  | shone   | shone   |
| write  | wrote   | written |
| bring  | brought | brought |
| buy    | bought  | bought  |
| catch  | caught  | caught  |
| fight  | fought  | fought  |
| teach  | taught  | taught  |
| think  | thought | thought |
| broad  | broad   | broad   |
| burst  | burst   | burst   |
| cast   | cast    | cast    |
| cost   | cost    | cost    |
| cut    | cut     | cut     |
| hit    | hit     | hit     |
| hurt   | hurt    | hurt    |
| let    | let     | let     |
| put    | put     | put     |
| set    | set     | set     |
| shut   | shut    | shut    |
| spread | spread  | spread  |
| bind   | bound   | bound   |
| find   | found   | found   |
| grind  | ground  | ground  |

|         |        |        |
|---------|--------|--------|
| wind    | wound  | wound  |
| bear. . | bore   | borne  |
| swear   | swore  | sworn  |
| tear    | tore   | torn   |
| wear    | wore   | worn   |
| break   | broke  | broken |
| choose  | chose  | chosen |
| freeze  | froze  | frozen |
| speak   | spoke  | spoken |
| steal   | stole  | stolen |
| wake    | woke   | woken  |
| lay     | laid   | laid   |
| make    | made   | made   |
| pay.    | paid   | paid   |
| say     | said   | said   |
| cling   | clung  | clung  |
| dig     | dug    | dug    |
| hang    | hung   | hung   |
| spin    | spun   | spun   |
| stick   | stuck  | stuck  |
| strike  | struck | struck |
| swing   | swung  | swung  |
| win     | won    | won    |
| eat     | ate    | eaten  |
| fall    | fell   | fallen |
| give    | gave   | given  |
| hide    | hid    | hidden |

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Н. М. ФИЛИПОВА

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|       |       |        |
|-------|-------|--------|
| sell  | sold  | sold   |
| shake | shook | shaken |
| slide | slid  | slid   |
| take  | took  | taken  |
| tell  | told  | told   |

---

## Appendix 2

### Nouns that are always singular

Some nouns are always singular in English. Compare “money” with “coins” and “notes”.

|                             |                                                                                                                                                                                                  |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Advice</b>               | He gave me much excellent advice.                                                                                                                                                                |
| <b>Damage</b>               | All the damage was done during July. Damage to buds and shoots of spruce is heavy.                                                                                                               |
| <b>Equipment</b>            | All equipment was purchased in 2006.                                                                                                                                                             |
| <b>Evidence</b>             | Further evidence is needed.                                                                                                                                                                      |
| <b>gear</b><br>[=equipment] | The gear is simple.<br>Different types of gear are heeded for sampling.                                                                                                                          |
| <b>Glassware</b>            | All glassware is heated to 180 °C.                                                                                                                                                               |
| <b>Information</b>          | Much information is needed on many points.,<br>Individual ants convey scraps of information (an item/a piece/a considerable amount/of information<br>a large fund of information on the subject) |
| <b>Knowledge</b>            | Most of our knowledge is limited to a few species.<br>All knowledge is assumed to be tentative. A good knowledge of all these aspects is essential.                                              |
| <b>Work</b> [=energy]       | The work done by a moving force is measured in joules.                                                                                                                                           |
| <b>work</b> [=research]     | The work of Mendel was overlooked for 35 years.<br>Much of the earlier work was not valid.                                                                                                       |

### Nouns that have specific plural forms

|          |                          |                         |
|----------|--------------------------|-------------------------|
| alumna   | <i>колишня студентка</i> | alumnae                 |
| alumnus  | <i>колишній студент</i>  | alumni                  |
| analysis | <i>аналіз</i>            | analyses                |
| antenna  | <i>антена</i>            | antennae / antennas     |
| appendix | <i>додаток</i>           | appendices / appendixes |
| axis     | <i>вісь</i>              | axes                    |

|             |                                    |                            |
|-------------|------------------------------------|----------------------------|
| bacillus    | <i>бацила</i>                      | bacilli                    |
| bacterium   | <i>бактерія</i>                    | bacteria                   |
| basis       | <i>базис, основа</i>               | bases                      |
| bureau      | <i>письмовий стіл</i>              | bureaux / bureaux          |
| cactus      | <i>кактус</i>                      | cacti / cactuses           |
| codex       | <i>кодекс</i>                      | codices                    |
| crisis      | <i>кризис</i>                      | crises                     |
| criterion   | <i>критерій</i>                    | criteria                   |
| curriculum  | <i>навчальний план</i>             | curricula                  |
| datum       | <i>дана величина</i>               | data                       |
| diagnosis   | <i>діагноз</i>                     | diagnoses                  |
| erratum     | <i>помилка<br/>(рос. опечатка)</i> | errata                     |
| foot        | <i>нога (ступня)</i>               | feet                       |
| formula     | <i>формула</i>                     | formulae                   |
| fungus      | <i>грибок</i>                      | fungi                      |
| hypothesis  | <i>гіпотеза</i>                    | hypotheses                 |
| index       | <i>індекс</i>                      | indices ( <i>indexes</i> ) |
| locus       | <i>траєкторія</i>                  | loci                       |
| matrix      | <i>матриця</i>                     | matrices                   |
| maximum     | <i>максимум</i>                    | maxima                     |
| medium      | <i>середовище</i>                  | media                      |
| memorandum  | <i>замітка</i>                     | memoranda                  |
| minimum     | <i>мінімум</i>                     | minima                     |
| nucleus     | <i>ядро</i>                        | nuclei                     |
| oasis       | <i>оазис</i>                       | oases                      |
| parenthesis | <i>дужки</i>                       | parentheses                |
| phenomena   | <i>явище</i>                       | phenomena                  |
| radius      | <i>радіус</i>                      | radii                      |
| syllabus    | <i>конспект</i>                    | syllabi                    |

*COMPASS for Research Students*

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|          |                              |         |
|----------|------------------------------|---------|
| stimulus | <i>стимул</i>                | stimuli |
| stratum  | <i>слой</i>                  | strata  |
| tempo    | <i>темп</i>                  | tempi   |
| terminus | <i>кінцева станція, мета</i> | termini |
| thesis   | <i>дисертація</i>            | theses  |
| tooth    | <i>зуб</i>                   | teeth   |

**Pronunciation of Greek Letters**

|         |                           |         |
|---------|---------------------------|---------|
| alpha   | [ˈɛlfə]                   | альфа   |
| beta    | [ˈbi:tə, beɪtə]           | бета    |
| gamma   | [ˈgəmə]                   | гамма   |
| delta   | [ˈdeltə]                  | дельта  |
| epsilon | [ˈepˈsaɪlən, ˈepsɪlən]    | епсилон |
| zeta    | [ˈzi:tə, ˈzeɪlən]         | дзета   |
| eta     | [ˈi:tə, ˈeɪtə]            | ета     |
| theta   | [ˈθi:tə]                  | тета    |
| iota    | [aɪˈoʊtə]                 | нота    |
| kappa   | [ˈkæpə]                   | каппа   |
| lambda  | [ˈlæmbdə]                 | лямбда  |
| mu      | [mju:]                    | мю      |
| nu      | [nju:]                    | ню      |
| xi      | [ksi:]                    | кси     |
| omikron | [ouˈmaɪkrən]              | омікрон |
| pi      | [paɪ]                     | пі      |
| rho     | [rou]                     | ро      |
| sigma   | [ˈsɪgmə]                  | сигма   |
| tau     | [tau]                     | тау     |
| upsilon | [juːpˈsaɪlən, ˈjuːpsɪlən] | іпсилон |
| phi     | [ˈfi:]                    | фі      |
| chi     | [ˈhi:]                    | хі      |
| psi     | [ˈpsi:]                   | пси     |
| omega   | [ˈoʊmɪgə]                 | омега   |

**Chemical Elements (with pronunciation)**

|      |                      |                          |            |
|------|----------------------|--------------------------|------------|
| Ac   | Actinium             | [æk'tiniəm]              | Актиній    |
| Ag   | Argentum             | ['ɑ:gentəm]              | Срібло     |
| Al   | Aluminium            | [,æljʊ'minjəm]           | Алюміній   |
| Am   | Americium            | [me' risiəm]             | Америцій   |
| Ar A | Argon                | ['ɑ:gɒn]                 | Аргон      |
| As   | Arsenic              | ['ɑ:snik]                | Миш'як     |
| At   | Astatium             | [ə'steitiəm]             | Астат      |
| Au   | Aurum = Gold         | ['ɔ:rəm], [gould]        | Золото     |
| B    | Boron                | ['bɔ:rən]                | Бор        |
| Ba   | Barium               | ['beəriəm]               | Барій      |
| Be   | Beryllium            | [bə' riljəm]             | Берилій    |
| Bi   | Bismuth              | ['bizmæθ]                | Бісмут     |
| Bk   | Berkelium            | [bə: ' keiljəm]          | Барк(е)лій |
| Br   | Bromine              | ['broumi:n]              | Бром       |
| C    | Carbon               | ['ka:bn]                 | Вуглець    |
| Ca   | Calcium              | ['kælsiəm]               | Кальцій    |
| Cd   | Cadmium              | ['kædmiəm]               | Кадмій     |
| Ce   | Cerium               | ['si:riəm]               | Церій      |
| Cf   | Californium          | [,kæli' fɔ:niəm]         | Каліфорній |
| Cl   | Chlorine             | ['klɔ:ri:n]              | Хлор       |
| Cm   | Curium               | ['kju:riəm]              | Кюрій      |
| Co   | Cobalt               | [kə' bɔ:lt]              | Кобальт    |
| Cr   | Chromium =<br>Chrome | ['kroum(əm),<br>['kroum] | Хром       |

|      |                          |                                  |            |
|------|--------------------------|----------------------------------|------------|
| Cs   | C(a)esium                | [ˈsi:ziəm]                       | Цезій      |
| Cu   | Cuprum = Copper          | [ˈkju:prəm], [ˈkɒpə]             | Мідь       |
| Dy   | Dysprosium               | [disˈprouʃiəm]                   | Диспрозій  |
| Er   | Erbium                   | [,ə:biəm]                        | Ербій      |
| Es   | Einsteinium              | [ainˈstainiəm]                   | Ейнштейній |
| Eu   | Europium                 | [ju:ˈroupiəm]                    | Європій    |
| F    | Fluorine                 | [ˈfluəri:n]                      | Фтор       |
| Fe   | Ferrum = Iron            | [ˈferəm], [ˈaiən]                | Залізо     |
| Fm   | Fermium                  | [ˈfə:mjəm]                       | Фермій     |
| Fr   | Fransium                 | [ˈfrænsiəm]                      | Францій    |
| Ga   | Gallium                  | [ˈgæliəm]                        | Геллій     |
| Gd   | Gadolinium               | [,gædəˈliniəm]                   | Гадоліній  |
| Ge   | Germanium                | [dʒə:ˈmeiniəm]                   | Германій   |
| H    | Hydrogen                 | [ˈhaidridʒən]                    | Водень     |
| He   | Helium                   | [ˈhi:ljəm]                       | Гелій      |
| H    | Hafnium                  | [ˈhɑ:fniəm]                      | Гафній     |
| Hg   | Hydrargyrum =<br>Mercury | [haiˈdrɑ:dʒirəm],<br>[ˈmə:kjuri] | Ртуть      |
| Ho   | Holmium                  | [ˈhoulmiəm]                      | Гольмій    |
| In   | Indium                   | [ˈindiəm]                        | Індій      |
| Ir   | Iridium                  | [aiˈri:diəm]                     | Іридій     |
| J, I | Iodine                   | [ˈaiədi:n]                       | Йод        |
| K    | Kalium =<br>Potassium    | [ˈkeilism],<br>[paˈtagsjsm]      | Калій      |
| Kr   | Krypton                  | [ˈkriptən]                       | Криптон    |
| La   | Lanthanum                | [ˈlænəənəm]                      | Лантан     |
| Lw   | Lawrentium               | [,lə:ˈrentiəm]                   | Лоренцій   |
| Li   | Lithium                  | [ˈliəiəm]                        | Літій      |

|    |                     |                            |             |
|----|---------------------|----------------------------|-------------|
| Lu | Lutecium            | [lju: 'ti:ʃiəm]            | Лютецій     |
| Md | Mendelevium         | [,mendə 'li:viəm]          | Менделевій  |
| Mg | Magnesium           | [,mæg 'ni:zjəm]            | Магній      |
| Mn | Manganese           | [,mæŋdʒə 'ni:z]            | Марганець   |
| Mo | Molybdenum          | [mə 'libdinəm]             | Молібден    |
| N  | Nitrogen            | ['naitridʒən]              | Азот        |
| Na | Natrium =<br>Sodium | ['neitriəm],<br>['soudjəm] | Натрій      |
| Nb | Niobium             | [nai 'oubiəm]              | Ніобій      |
| Nd | Neodymium           | [,ni:ou 'dimiəm]           | Неодим      |
| Ne | Neon                | ['ni:ən]                   | Неон        |
| Ni | Nickel              | ['nikl]                    | Нікель      |
| No | Nobelium            | [,nou 'bi:liəm]            | Нобелій     |
| Np | Neptunium           | [nep 'tju:niəm]            | Нептуній    |
| O  | Oxygen              | ['ɒksidʒən]                | Кисень      |
| Os | Osmium              | ['ɒzmiəm]                  | Осмій       |
| P  | Phosphorus          | ['fɒsfərəs]                | Фосфор      |
| Pa | Prot(o)actinium     | [,proutæk 'tiniəm]         | Протактиній |
| Pb | Plumbum = Lead      | ['plʌmbəm], [led]          | Свинець     |
| Pd | Palladium           | [pə 'leidjəm]              | Паладій     |
| Pm | Promethium          | [prə 'mi:əjəm]             | Прометій    |
| Pr | Praseodymium        | [,prezi:ou 'dimiəm]        | Празеодимій |
| Pt | Platinum            | ['plætɪnəm]                | Платина     |
| Pu | Plutonium           | [plu: 'tounJəm]            | Плутоній    |
| Ra | Radium              | ['reidjəm]                 | Радій       |
| Re | Rhenium             | ['ri:niəm]                 | Реній       |
| Rh | Rhodium             | [roudiəm]                  | Родій       |
| Rn | Radon               | ['reidən]                  | Радон       |

|            |                           |                  |          |
|------------|---------------------------|------------------|----------|
| Rz         | Ruthenium                 | [ru:'əjniəm]     | Рутеній  |
| S          | Sulphur                   | ['sʌlfə]         | Сірка    |
| Sb         | Stibium = Antimony        | ['stibjəm]       | Сурьма   |
| Sc         | Scandium                  | ['skændjəm]      | Скандій  |
| Se         | Selenium                  | [si'li:niəm]     | Селен    |
| Si         | Silicon                   | ['silikən]       | Кремній  |
| Sm,<br>Sa  | Samarium                  | [sə'meiriəm]     | Самарій  |
| Sn         | Stannium-Tin              | ['stænəm], [tin] | Олово    |
| Sr         | Strontium                 | ['strɒŋjəm]      | Стронцій |
| Ta         | Tantalum                  | ['tæntələm]      | Тантал   |
| Tb         | Terbium                   | ['tə:biəm]       | Тербій   |
| Tc         | Technetium                | [tek'niʃiəm]     | Технецій |
| Te         | Tellurium                 | [te'lju:riəm]    | Телур    |
| Th         | Thorium                   | ['θlriəm]        | Торій    |
| Ti         | Titanium                  | [tai'teinjəm]    | Титан    |
| TI         | Thallium                  | ['θæliəm]        | Талій    |
| Th,<br>Tt. | Thullium                  | ['əju:liəm]      | Тулій    |
| U          | Uranium                   | [juə'reinjəm]    | Уран     |
| V          | Vanadium                  | [və'nəidjəm]     | Ванадій  |
| W          | Wolfram(ium)<br>=Tungsten | ['wulfrəm]       | Вольфрам |
| Xe         | Xenon                     | ['zenən]         | Ксенон   |
| Y, Yt      | Yttrium                   | ['itriəm]        | Ітрій    |
| Yb         | Ytterbium                 | [i'tə:biəm]      | Ітербій  |
| Zn         | Zinc(um), Zink            | ['ziŋk]          | Цинк     |
| Zr         | Zirconium                 | [zə:'kounjəm]    | Цирконій |

## Математичні знаки, символи, їх читання та значення

|         |                              |                                         |
|---------|------------------------------|-----------------------------------------|
| +       | addition, plus, positive     | знак додавання або позитивної величини  |
| –       | subtraction, minus, negative | знак віднімання або негативної величини |
| ±       | plus or minus                | плюс мінус                              |
| ∓       | minus or plus                | мінус плюс                              |
| ×       | multiplication sign,         | знак множення,                          |
| ·       | multiplied by, times         | множити на ...                          |
| ÷, /, — | division, divided by         | знак ділення, ділити на ...             |
| :       | is to, divided by            | знак відношення, ділений на ...         |
| =       | equals, (is) equal to        | дорівнює                                |
| ≠       | not equal to                 | не дорівнює                             |
| ≈       | approximately equals         | приблизно дорівнює                      |
| →       | approaches                   | досягає значення                        |
| >       | greater than                 | більше                                  |
| <       | less than                    | менше                                   |
| ≥       | equal to or greater than     | більше або дорівнює                     |
| ≤       | equal to or less than        | менше або дорівнює                      |
| ∞       | infinity                     | безкінечність                           |
|         | square root of $a$           | корінь квадратний з « $a$ »             |
|         | cube root of $a$             | корінь кубічний з « $a$ »               |
|         | parallel to                  | паралельно                              |
| ⊥       | perpendicular to             | перпендикулярно                         |
| ∴       | therefore                    | тому, отже                              |

|                      |                                                |
|----------------------|------------------------------------------------|
| $6^4$ читається:     | six to the fourth power, six to the power four |
| $a^b$ читається:     | $a$ to the power $b$                           |
| power степінь (мат.) |                                                |
| raise to power       | підносити до степеня                           |
| exponent             | показник                                       |
| square               | квадрат; квадратний; підносити до квадрата     |
| cube                 | куб; кубічний; підносити до куба               |

### Evolution (Витяг кореня)

|                               |                                        |
|-------------------------------|----------------------------------------|
| $\sqrt{4} = 2$ читається:     | the square root of four is two         |
| $\sqrt[3]{27} = 3$ читається: | the cube root of twenty seven is three |
| radical sign                  | знак кореня                            |
| root                          | корінь                                 |
| extract                       | добувати                               |
| extract the root of           | добути корінь із                       |
| index (indices)               | показник(и) (мат.)                     |

### Fractions (Дроби)

|                           |                   |
|---------------------------|-------------------|
| $S$ читається:            | one half, a half  |
| $1/3$ читається:          | one third         |
| $4/7$ читається:          | four sevenths     |
| $3\frac{1}{3}$ читається: | three and a third |
| numerator                 | чисельник         |
| denominator               | знаменник         |
| integer, whole number     | ціле число (мат.) |

### Decimal Fractions (Десяткові дроби)

У десятикових дробах в англійській мові ставиться крапка (point) замість коми.

|                   |                                       |                             |
|-------------------|---------------------------------------|-----------------------------|
| · ·               | since, because                        | оскільки                    |
| $AB\bar{I}$       | length of line from $A$ to $B$        | довжина лінії $AB$          |
| $\sphericalangle$ | angle                                 | кут                         |
| $\perp$           | right angle                           | прямий кут                  |
| $\square$         | square                                | квадрат, квадратний         |
| $\circ$           | round; circle                         | коло, круглий               |
| ( )               | parentheses                           | круглі дужки                |
| [ ]               | brackets                              | квадратні (або прямі) дужки |
| { }               | braces                                | фігурні дужки               |
| $\mu$             | micron                                | мікрон (0,001 мм)           |
| $^{\circ}$        | degree(s)                             | градус(и)                   |
| %                 | per cent                              | відсоток                    |
| '                 | minute(s); foot, feet                 | хвилина(и); фут(и)          |
| "                 | second(s); inch(cs)                   | секунда(и); дюйм(и)         |
| $A'$              | A prime                               |                             |
| $A''$             | A second                              |                             |
| $B^1$             | B sub one                             |                             |
| $B^2$             | B sub two                             |                             |
| $C_b$             | C sub b                               |                             |
| $N^b$             | number                                | число, цифра, сума (мат.)   |
| No(s)             | number(s)                             | номер(и)                    |
| $dx$              | differential of $x$                   | диференціал $x$ (ікса)      |
| $dy/dx$           | derivative of $y$ with respect to $x$ | похідна $y$                 |
| $\int$            | integral of                           | інтеграл від                |

|              |                                                                      |                                                                                                               |
|--------------|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| $\int_a^b$   | integral between the limits $a$ and $b$                              | інтеграл у межах від $a$ до $b$                                                                               |
| $f(x), F(x)$ | function of $x$                                                      | функція від $x$                                                                                               |
| $4!$         | factorial 4 або the factorial of 4                                   | факторіал 4                                                                                                   |
| $ x $        | absolute value of $x$                                                | абсолютне значення $x$                                                                                        |
| &            | and                                                                  | і, та                                                                                                         |
| &c           | et cetera; and so on, and so forth                                   | і так далі, і тому подібне                                                                                    |
| .            | full stop                                                            | крапка (розділовий знак)                                                                                      |
| :            | colon                                                                | двокрапка (розділовий знак)                                                                                   |
| $a-b=c$      | <i>читається:</i><br>subtract<br>minuend<br>subtrahend<br>difference | $a$ minus $b$ is equal to $c$ і т. д.<br>віднімати<br>зменшуване (мат.)<br>від'ємник (мат.)<br>різниця (мат.) |

### Multiplication (Множення)

|                    |                                         |
|--------------------|-----------------------------------------|
| $1 \times 1 = 1$   | once one is one                         |
| $2 \times 2 = 4$   | twice two is four                       |
| $3 \times 3 = 9$   | three times three is nine               |
| $11 \times 7 = 77$ | 11 multiplied by 7 equals seventy seven |
| $a * b = c$        | $a$ multiplied by $b$ equals $c$        |
| multiply           | множити                                 |
| multiplicand       | множення (мат.)                         |
| multiplier         | множник                                 |
| factor             | множитель (мат.)                        |
| times              | раз(а)                                  |

### Division (Ділення)

|             |                                      |
|-------------|--------------------------------------|
| $15:3=5$    | fifteen divided by three equals five |
| $a : b = c$ | $a$ divided by $b$ is equal to $c$   |
| divide      | ділити                               |
| dividend    | ділене (мат.)                        |
| divisor     | дільник (мат.)                       |
| quotient    | частка (мат.)                        |
| divided by  | ділимий на...                        |

### Involution (Зведення до степеня)

|                  |                     |                          |
|------------------|---------------------|--------------------------|
| $2^2$ читається: | two squared         |                          |
| $4^3$ читається: | four cubed          |                          |
| ,                | comma               | кома (розділовий знак)   |
| ;                | semicolon           | крапка з комою           |
| '                | apostrophe          | апостроф                 |
| —                | dash                | тире                     |
| —                | nyphen              | дефіс                    |
| “ ”              | inverted commas     | дужки                    |
|                  | або quotation marks |                          |
| *                | asterisk            | зірочка (знак посилання) |
| ?                | interrogation point | знак питання             |
| !                | note of exclamation | знак оклику              |

### Addition (Додавання)

|                  |                                 |
|------------------|---------------------------------|
| $2+3=5$          | two plus three equals five      |
|                  | two plus three is equal to five |
|                  | two and three is (are) five     |
|                  | two added to three makes five   |
| $a + b = c$      | $a$ plus $b$ equals $c$ і т. д. |
| quantity         | кількість; величина             |
| unknown quantity | невідоме (мат.)                 |
| add              | додавати                        |
| item             | доданок (мат.)                  |
| sum              | сума; підсумовувати             |

|       |                       |
|-------|-----------------------|
| total | ціле; сума; результат |
| equal | який дорівнює         |

### Subtraction (Віднімання)

|             |                                                                                                              |
|-------------|--------------------------------------------------------------------------------------------------------------|
| $8 - 4 = 4$ | eight minus four equals four<br>four from eight leaves four<br>the difference between four and eight is four |
| 0.2         | nought (zero) point two                                                                                      |
| .2          | point two                                                                                                    |
| 2.4         | two point four                                                                                               |

### Ratio (Відношення)

|       |                                        |
|-------|----------------------------------------|
| 4:2   | the ratio of <i>four</i> to <i>two</i> |
| $a:b$ | the ratio of $a$ to $b$                |

### Proportion (Пропорція)

|                   |                                                                                                                                                        |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| $2 : 3 = 4 : 0$   | <i>two</i> is to <i>three</i> as <i>four</i> is to <i>six</i><br>the ratio of <i>two</i> to <i>three</i> equals the ratio of <i>four</i> to <i>six</i> |
| $a : b = c : d$   | $a$ is to $b$ as $c$ is to $d$                                                                                                                         |
| $x = k / y$       | $x$ varies inversely as $y$<br>$x$ is inversely proportional to $y$                                                                                    |
| constant          | постійна величина; константа                                                                                                                           |
| term              | член; одночлен (мат.)                                                                                                                                  |
| extremes          | крайні члени                                                                                                                                           |
| means             | середні члени                                                                                                                                          |
| proportional      | пропорційний                                                                                                                                           |
| vary directly as  | змінюватися прямо; пропорційно                                                                                                                         |
| vary inversely as | змінюватися пропорційно                                                                                                                                |

### Equations (Рівняння)

Вираз тотожності читається:  $(a + b) \times (a - b) = a^2 - b^2$

The product of the sum and difference of two quantities is equal to the difference of their squares.

|                                           |                                        |
|-------------------------------------------|----------------------------------------|
| tons per square inch $\times 1.575$       | = kilos per square millimeter          |
| pounds per square foot $\times 4.883$     | = kilos per square meter               |
| tons per square foot $\times 10.936$      | = tons per square meter                |
| tons per square yard $\times 1.215$       | = tons per square meter                |
| pounds per cubic yard $\times 0.5933$     | = kilos per cubic meter                |
| pounds per cubic foot $\times 16.018$     | = kilos per cubic meter                |
| tons per cubic yard $\times 1.329$        | = tons per cubic meter                 |
| pounds per gallon $\times 0.09983$        | = kilos per liter                      |
| gallons per square foot $\times 48.93$    | = liters per square metro              |
| foot-pounds $\times 0.1382$               | = kilogram-meters                      |
| fool-tons $\times 0.310$                  | = ton meters                           |
| heat units (B. Th. U.) $\times 0.252$     | = kilogram-calories                    |
| heat units per square foot $\times 2.713$ | = kilogram-calories per quare<br>meter |

### **The Thesaurus of Basic Research Notions**

**Problem:** assumption, hypothesis, proposal, suggestion, theme, topic.

**Study:** investigation, review, survey, work.

**Theory:** concept, conception, doctrine, model, principle, view.

**Science:** area, discipline, domain, field, realm.

**Scientist:** scholar, investigator, researcher, scholar.

**Information:** data, evidence, findings.

**Aim:** goal, objective, task.

**Method:** analysis, methodology, observation, strategy, synthesis, technique.

**Discussion:** criticism, critique, debate, dispute.

**Publication:** article, book, chapter, essay, figure, graph, monograph, paper, quotation, section, table, text.

**Presentation:** conference, panel discussion, round table, seminar, symposium, webinar.

### **The Thesaurus of Basic Engineering Notions**

#### **Change**

*Maximize:* multiply (number), add (number), swell (volume), expand (area), broaden, widen (width), extend, lengthen (length); unite, amplify (energy), rise, heat (temperature), strengthen (force), accelerate (speed), improve (quality, performance);

*Minimize:* shorten (length), narrow (width), contact (area), compress (volume), subtract (number), divide (number); worsen (quality, performance), slow, down (speed), weaken (force), drop, cool, freeze (temperature), abate (energy), separate.

### **Matter**

material, substance, element, solid, body, fluid, liquid, property, entity, powder, paste, foil, consistency, nature, feature, behaviour;

physical, chemical, biological, biochemical, gaseous, natural, artificial, available, discrete, pure, elastic, impure, granular, granulated, mobile, stationary, plastic, aggregate, ductile, consistent, porous, perforated, coloured, colourless, transparent, dense; contain, consist of, integrate, disintegrate, be composed of.

### **Measurement**

sum, total, precision, accuracy, approximation, scale, zero, magnitude, correction, quantity, amount, unit, ratio, proportion, increase, increment, decrease, decrement, nothing, rate, convention, symbol, standard, constant, variable, consistency, inconsistency, reading, result, determination, range;

correct, standardize, normalize, measure, record, determine, tabulate, verify;

total, entire, partial, complete, precise, accurate, exact, correct, approximate, acceptable, fine, coarse, imprecise, inaccurate, inexact, quantitative, specific, critical, negligible, positive, negative, uniform, consistent, regular, irregular, steady, average, arbitrary, excessive, ample, adequate, inadequate, deficient, insufficient, scarce, rare.

### **Movement**

motion, stationary, mobile, motionless, divergent, convergent;

impel, propel, activate, turn, conduct, transmit, shift, remove, replace, displace, substitute, exchange, actuate, travel, move, deviate, diverge, incline, decline, deviate, deflect, divert, reflect, transfer, transport, carry, flow.

### **Process**

operation, method, procedure, routine, preparation, production, behaviour, mode, way, manner, action, function, accessory, application, association, condition, factor, feedback, effect, consequence, requirement;

derive, operate, provide, manufacture, prepare, produce, form, maintain, control, regulate, compensate, act as, apply, obtain, attract, repel, use, expend, consume, exploit;

operative, operational, complex, complicated, intricate, straightforward, available.

### **Relationships**

contrast, reference, conformity, accordance, agreement, identity, classification, category, class, specimen;

relate, depend on/upon, correspond, conform, compare, contrast, match, classify, sample, represent;

relative, reciprocal, mutual, proportional, directly proportional, inversely proportional, different, distinct, dissimilar, contrasting, similar, identical, appropriate.

### **Shape**

form, deformation, distortion, deformability, arrangement, structure, system, pattern, hierarchy, network, mesh, defect, flaw, fault, deficiency, disorder, tube, pipe, duct, channel, groove, edge;

distort, deform, restore;

initial, final, intermediate, ultimate, deformed, distorted, perfect, ideal, imperfect, non-ideal, concentric, rectangular, triangular, trapesoidal, circular, annular, cylindrical, tubular.

### **Space**

place, position, point, boundary, limit, extent, path, range, course, spread, scope, surface, area, region, zone, volume, plot, track, location, dislocation, surroundings, environment, isolation, site;

extensive, voluminous, spatial, regular, marginal, isolated, single, sole, solitary, unique, adjacent, interconnected;  
junction, joint, bond, combination, cluster, bunch, clump, blend.

### **Structure/Constitution**

whole, part, portion, detail, component, ingredient, constituent, member, item, aggregate, content, essential, integral; separate, include, comprise; continuous, discontinuous, inclusive, exclusive.

### **Time**

period, duration, interval, event, occasion, age, lifespan, epoch, era, origin, source;  
interrupt, elapse, repeat;  
latent, temporary, permanent, durable, perpetual, sudden, abrupt, instantaneous, rapid, fast, quick, brief, periodic, intermittent, slow, following, successive, consecutive, continuous, continual, simultaneous, preceding, obsolete, modern, up to date.

## Glossary Academic Word List

|                   |                                                                                                                                                 |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| abstract          | a shortened form of an arbide, book, giving only the most important facts or arguments, usually printed at the beginning of the book or article |
| abundant          | much, plenty of                                                                                                                                 |
| acknowledge       | to say that they have received it                                                                                                               |
| aim               | what you are <u>hoping to achieve</u> by a plan, action or activity, which is what makes you do it                                              |
| allege (dly)      | seems untrue                                                                                                                                    |
| allocate          | to assign, place                                                                                                                                |
| apparent          | obvious, readily visible                                                                                                                        |
| assert            | state clearly, declare                                                                                                                          |
| assign            | fix (time, place, a task)                                                                                                                       |
| challenge         | smth that tests strength, skill or ability,***esp. in way that is interesting                                                                   |
| compatible        | able to exist successfully together                                                                                                             |
| comprehensive     | complete, full                                                                                                                                  |
| consequence       | result                                                                                                                                          |
| controversy       | a lot of disagreement or argument about smth                                                                                                    |
| convincing        | leaving no doubt                                                                                                                                |
| definition        | to explain important terms to the reader                                                                                                        |
| elucidate         | explain, make clear                                                                                                                             |
| emergency         | process of appearing or starting to exist                                                                                                       |
| enhance           | to improve the quality of                                                                                                                       |
| evidence          | facts, information                                                                                                                              |
| general statement | to introduce the reader to the subject of the essay                                                                                             |
| goal              | what a person, organization or country <u>hopes to achieve</u> in the <u>future</u> even it might take a long time                              |

|                  |                                                                                                                                                                                                     |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| idea (sing.)     | the effect or <u>result</u> that you hope or imagine smth you do will have, <u>although</u> in reality this <u>might not happen</u>                                                                 |
| infer            | form an opinion on the basis of indirect evidence                                                                                                                                                   |
| intrinsic        | extremely important and basic characteristic of it                                                                                                                                                  |
| introduction     | to give an overall view of the essay                                                                                                                                                                |
| judgement        | the forming of an opinion, estimate, notion, conclusion                                                                                                                                             |
| misinterpret     | understand and explain in the wrong way                                                                                                                                                             |
| notable          | important, deserving attention                                                                                                                                                                      |
| object (sing.)   | the <u>intended result</u> of plan..., esp. when this may <u>be difficult</u> to achieve                                                                                                            |
| objective        | esp. in business or politics meaning the <u>result</u> that <u>someone</u> is working (to achieve) towards                                                                                          |
| research paper   | a formal presentation gathered from various sources                                                                                                                                                 |
| point            | esp. when <u>explaining this</u> to someone who <u>does not understand</u> it or does not want to do it                                                                                             |
| précis [preisi:] | a short form of a text which briefly summarises the important parts (restates the essential meaning of a longer piece of writing and should be no longer than one third the length of the original) |
| preliminary      | introductory, preparatory                                                                                                                                                                           |
| presumable       | obviously                                                                                                                                                                                           |
| purpose          | the result that you <u>intend</u> to achieve when you do smth or plan smth                                                                                                                          |
| target           | <u>the exact result</u> , often the amount of money they want to get                                                                                                                                |
| thesis           | to give the opinion of the writer                                                                                                                                                                   |
| thesis statement | a statement of an essay's central theme that makes clear the main idea, the writer's purpose, the focus of the topic and the organizational pattern                                                 |
| sustainable      | causing little or no damage to the environment                                                                                                                                                      |
| tentative        | possible but not certain                                                                                                                                                                            |
| transparent      | obvious, clear                                                                                                                                                                                      |
| validity         | basis in truth or reason                                                                                                                                                                            |

**Check yourself**  
**Academic World Test**

The ..... researchers collect can suggest an interesting conclusion.

- a) validity; b) evidence; c) controversy.

The evidence provides sufficient information because it is reliable and.....

- a) abundant; b) notable; c) comprehensive.

The ..... review (survey) of ... has recently been made in Ukraine.

- a) abundant; b) notable; c) comprehensive.

A ..... information on the river pollution.

- a) abundant; b) notable; c) comprehensive.

In his revision the researcher gave the facts which showed his concern about the ..... of his analysis.

- a) validity; b) evidence; c) controversy.

These methods were considered to be ..... for proving the hypothesis.

- a) apparent; b) convincing; c) compatible.

The data collected ..... current approaches to solving the problem.

- a) acknowledge; b) challenged; c) elucidate.

If you use other persons' opinions facts, statistic, you should ..... the source you cite or refer to.

- a) acknowledge; b) challenged; c) elucidate.

..... development relates to eliminating the negative impact of technology on the environment.

- a) tentative; b) sustainable; c) intrinsic.

Science and technology has ..... the quality of people's lives.

- a) enhanced; b) emerged; c) presumably.

The HUN ..... after World war.

- a) enhanced; b) emerged; c) presumably.

Experimenting is an ..... part of doing research.

- a) tentative; b) sustainable; c) intrinsic.

There is a lot of ..... on a number of problems related to raising the efficiency of this engine.

- a) validity; b) evidence; c) controversy.

The conclusion made by the research was rather ..... because he was not certain as to a number of issues.

- a) tentative; b) sustainable; c) intrinsic.

The disadvantages of the method applied were ..... because the results contained inconsistencies.

- a) apparent; b) convincing; c) compatible.

Dean's assertion ..... seems very .....

- a) apparent; b) convincing; c) compatible.

They ..... the experimental tasks and decided to start the experiment at the beginning of September.

- a) misinterpreted; b) assigned; c) inferred.

The impact of the invention seemed to be powerful but the ..... appeared unpredictable.

- a) preliminary; b) transparent; c) consequences.

Mathematical modeling can be applied to ..... the fundamental issues of structural mechanics.

- a) acknowledge; b) challenged; c) elucidate.

The ..... results obtained appeared to be crucial for solving the problem.

- a) preliminary; b) transparent; c) consequences.

The research ..... came to some conclusions.

- a) allegedly; b) transparently; c) presumably.

The definition offered by the author did not seem ..... because of using controversial terms.

- a) preliminary; b) transparent; c) presumable.

Inadequate application of this method ..... the data obtained.

- a) misinterpreted; b) assigned; c) inferred.

Students ..... the meaning of the term though there were no definitions in the text.

a) misinterpreted; b) assigned; c) inferred.

The research ..... leads to the results which can be widely applied.

a) enhanced; b) emerged; c) presumably.

**Keys:** 1b, 2a, 3c, 4b, 5a, 6c, 7b, 8a, 9b, 10a, 11b, 12c, 13c, 14a, 15a, 16b, 17b, 18c, 19c, 20a, 21a, 22b, 23a, 24c, 25c.

## *Appendix 9*

### **Some speaking exam tips**

#### ***When you start answering a question:***

Thanks. You're right It's really interesting / disputable.

It can be helpful.

Sounds reasonable.

Certainly / Definitely / Undoubtedly / Absolutely, I think so /  
I guess so / I suppose so.

#### ***When you don't know that answer.***

That's a good question. I'll find out.

I have the exact same question, but at the moment I'm not  
sure I know the answer.

As far as I know, / As far as I'm concerned,

#### ***When you feel stuck in conversation.***

I'm not sure how to explain it in English. That's rather tricky.

Let me think. It's on the tip of my tongue.

I've had a mental blank and can't remember.

Sorry, could you say it again, please?

Sorry, I haven't quite caught what you mean.

Sorry, I'm a bit lost. I'm struggling to follow.

I'm not sure I understand you. Could you repeat it again?  
What do you mean by...?

#### ***When you want to conclude.***

Finally.

Overall.

All in all.

To make a long story short.

In a nutshell.

## СПИСОК РЕКОМЕНДОВАНОЇ ЛІТЕРАТУРИ

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## НОТАТКИ

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**ФІЛІПОВА Ніна Михайлівна**

**COMPASS  
for Research Students**

Навчальний посібник  
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з англійської мови

*Видання друге, доповнене і перероблене*

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