

Academic English

English for Students of Mathematics and Mechanics

Supplementary Exercises

Part I

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Unit 1

Task 7

Fill in the missing letters in the words which denote various branches of mathematics.

m _ t _ m _ th _ m _ t _ cs

_ lg _ br _

c _ lc _ l _ s

st _ t _ st _ cs

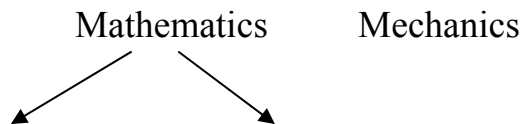
_ r _ thm _ t _ c

g _ _ m _ tr _

Now read the first part of the text (pp. 19-21) and put the branches in the same order as they are mentioned in the text. With what does each one deal?

Read the remaining parts of the text. Of what branches do applied mathematics and mechanics consist?

Using the text, draw a diagram which starts as follows:



Unit 3

Self-study

Read the paragraph in Task 24 p.40. Find the sentence that expresses its main idea. Try to restate it using your own words as far as possible. Put it down.

Unit 4

Paragraph structure (self-study)

Study the following information and answer the questions:

1. What is a topic sentence?
2. What makes a good topic sentence?
3. Where is it found in a paragraph?
4. What are the characteristics of a topic sentence?

Then do Task 26 p.46.

(Source: http://englishforuniversity.com/?page_id=1126)

The most important point to make here is that of having a strong first sentence which presents the main idea of your paragraph. This sentence is often called your topic sentence.

Example essay title: “The government’s relaxed approach to immigration is storing up problems for the future.” How far do you agree with this view?

Example paragraph with a topic sentence at the start:

One of the strongest arguments in favour of a relaxed approach to immigration is that the UK benefits economically from immigrant labour. Research shows that countries with high levels of immigration are economically successful and that there is a correlation between a mobile labour force and economic prosperity. Immigration serves as an important source of both skilled and unskilled labour in the UK which has come to depend on migrants to plug gaps in its skilled professions and to do jobs that the local population are unwilling to do.

This is a **good topic sentence** because it:

1. **puts forward an argument**
2. **it uses some words from the title (which means you are hopefully answering the question!)**
3. **it tells you what the rest of the sentence is going to be about.**

After this sentence you need to support what you have said. That means giving evidence which justifies what you said in your topic sentence. Often this is when you will bring in your sources from your wider reading.

More example paragraphs with topic sentences:

Online learning has its problems. Although student surveys always show students like to have access to materials online, the take up of purely online courses is low. When questioned, students find that studying online can be a lonely and unsatisfying experience. Not only do students miss the human interaction with other students, they also find the time lag in getting answers to their questions very frustrating.

One of the most important factors leading to the outbreak of World War One was the arms race between Britain and Germany. Britain had an empire at this time and Germany wanted a similar role in the world. This meant having a strong navy so the Germans spent a considerable amount of time and effort building up its naval force. Britain responded to this threat to its dominance by strengthening its navy even further. This ‘naval race’ contributed to the increase in tension between the two countries.

Margaret Thatcher’s policies were dominated by the philosophy of individual freedom and self-reliance. During the years of the Thatcher governments Britons experienced cuts in welfare payments and drastic legal restrictions on trade unions. Public industries were sold off to private investors in the belief that the free market would deliver prosperity to all

Generally speaking, topic sentences are:

- Short
- Simple
- Clear
- Give a strong idea
- Often use phrases such as:

One of the main reasons for

One of the major factors in is

Generally speaking,

One of the strongest arguments against/ in favour of.....is

One of the main advantages / disadvantages ofis

For more reading on topic sentences see:

Andy Gillett’s UEfAP site: <http://uefap.com/writing/>

The OWL at Purdue: <http://owl.english.purdue.edu/owl/resource/606/01/>

Unit 5

Text p.47

Read the first part of the text “Mechanics of Buildings, Machines and Motion” or listen to it twice. Match the following paragraph headings to the paragraphs.

1. Universal principles
2. The subject of mechanics
3. Increasing our capabilities
4. Our physical power is limited

Task 18 p.53

Express the main idea of each paragraph in your own words.

Unit 6

Text p.56

Listen to the following text twice (if necessary) and choose the best answer to the questions, A, B or C. Justify your choice.

1. The one who contributed most to the development of modern physics was
 - A. Evangelista Torricelli
 - B. Galileo Galilei
 - C. Aristotle
2. Galileo:
 - A. challenged Copernican theory
 - B. devised a barometer
 - C. developed the law of falling bodies and formulated the principle of inertia
3. Before Galileo’s principle of inertia, everyone followed
 - A. Aristotle’s theory
 - B. Copernican’s theory
 - C. medieval theory

4. According to Galileo, when a freely moving body changes its speed or direction,
- A. it means that the “essences” are no longer influencing it
 - B. it is influenced by a disturbing force
 - C. it is on one of Jupiter’s satellites

Unit 7

Text p.62

Listen to the text once and choose the title that best fits it. Justify your choice.

- A. Hindu-Arabic and Roman Numeral Systems
- B. Roman Numeral System
- C. The Introduction of Hindu-Arabic Numeral System in Europe

Then do Task 13 p.63.

Unit 8

Midterm test. Writing definitions (self-study)

Study the following information about definitions and answer the questions. (Source: <http://owl.english.purdue.edu/owl/resource/622/01/>)

Writing Definitions

A formal definition is based upon a concise, logical pattern that includes as much information as it can within a minimum amount of space. The primary reason to include definitions in your writing is to avoid misunderstanding with your audience. A formal definition consists of three parts.

- The term (word or phrase) to be defined
- The class of object or concept to which the term belongs.
- The differentiating characteristics that distinguish it from all others of its class

For example:

Water (*term*) is a liquid (*class*) made up of molecules of hydrogen and oxygen in the ratio of 2 to 1 (*differentiating characteristics*).

Comic books (*term*) are sequential and narrative publications (*class*) consisting of illustrations, captions, dialogue balloons, and often focus on super-powered heroes (*differentiating characteristics*).

Astronomy (*term*) is a branch of scientific study (*class*) primarily concerned with celestial objects inside and outside of the earth's atmosphere (*differentiating characteristics*).

Additional Tips for Writing Definitions

- Avoid defining with "X is when" and "X is where" statements. These introductory adverb phrases should be avoided. Define a noun with a noun, a verb with a verb, and so forth.
- Do not define a word by mere repetition or merely restating the word, for example,
"Rhyming poetry consists of lines that contain end rhymes."
It is better to write: "Rhyming poetry is an art form consisting of lines whose final words consistently contain identical, final stressed vowel sounds."
- Define a word in simple and familiar terms. Your definition of an unfamiliar word should not lead your audience towards looking up more words in order to understand your definition.
- Keep the *class* portion of your definition small but adequate. It should be large enough to include all members of the term you are defining but no larger.
- Avoid adding personal details to definitions. Although you may think the story about your Grandfather will perfectly encapsulate the concept of stinginess, your audience may fail to relate. Offering personal definitions may only increase the likeliness of misinterpretation that you are trying to avoid.

Questions:

1. What is a formal definition?
2. Of what parts does it consist?
3. What are the tips for defining a word?

Now turn to Task 19 on p.69: explain the difference between the terms *number*, *numeral* and *digit*.

Unit 9

Study the following:

Asking for explanations. To do that politely, you should start with *can* or *could*. It's also a good idea to use *just* to show you are not going to speak for a long time¹. After you have received an answer, you should say *thank you*. For example,

- I was just wondering, could you tell me a bit/explain...
- Could you just clarify...
- I just would like to know if...
- (this one is not for the first question) Thank you. Just one more thing/question though.

Read and translate the Text on p.72. Now think of at least one question (they can be text-based or require some general knowledge of mechanics) for each of the three laws (avoid complicated questions). You should be able to answer your question by yourself.

Do Task 21 p.75.

Unit 10

Translate the Text on p.78.

Do Task 22 p.83.

Unit 11

Self-study

Text p.85

Look through the list of words and word combinations. Explain in English what they mean. Then listen to the text twice and tick those words or word combinations which are key for the text. Try to retell the text using your list of key words.

¹ Armer, T. Cambridge English for Scientists, Cambridge, 2011

- rolling\sliding friction
- (smooth) surface
- lubricants
- oiling system
- to stop trains
- to spin around without advancing
- to encounter resistance
- to transmit power
- inertia

Unit 12

Read the text on p.92 and answer the following questions:

1. Why is the gyroscope used to stabilize many mechanisms?
2. What is the 1st gyroscopic principle?
3. What is the 2nd one?
4. When and by whom was the gyroscope invented?
5. What happened in 1911?
6. For what are gyroscopes in large ships and airplanes used?
7. What other uses of the gyroscope are mentioned in the text?

Then turn to Task 20, p.130: complete the text given using suitable linkers.

Now turn to Task 26, p.97: using each sentence as a topic one, write two paragraphs.

Task 20, p.130 contains the description of a gyroscope. What is mentioned in the description?

Using it as a model, write your description of some (preferably modern) device.

Unit 13

Listen to (or read) the text on p.99 twice and single out key words and word combinations from it. Then re-order the following ideas as they appear in the text. There is one extra idea which you do not need to use.

1. Wavelike and particle-like properties of photons and electrons
2. The essence of wave-particle theory
3. The differences between the theory and the examples provided
4. Illustrations for the theory
5. The difference between photons and atoms
6. The debate among scientists

Task 19 p.104. Add specific details to each point.

Unit 14

Text p. 105

Listen to the first part of the text and think of a title for it. Now turn to the text and find other expressions for rendering (Task 21 p.112). Using them, merge the following sentences into one. In some cases you will need to slightly change the sentences to make them grammatically correct.

1. The velocity of a falling body equals gt . Even a small difference in time greatly influences the speed and the force of impact.
2. In a fluid heavy objects fall faster than light ones. The body's mass is not included into the formula.
3. When an object is falling freely in a fluid at a certain point it reaches terminal velocity. The resistance increases with the object's speed and the force of gravity always stays constant.

Unit 16

Read and translate the Text on p. 120 at home.

Now think of one TRUE and one FALSE statement to the text. Write your statements (marked as T or F) and also your names down on a piece of paper. Your teacher will read the statements aloud, and your task is to say if they are true or false and justify your answer. The author should not interfere unless he is asked to

do so. It is only allowed to ask for explanations from the author using the expressions from Unit 9. It is not allowed to copy sentences or large parts of them from the text.

Unit 17

Self-study

Turn to Task 20 from the Unit.

1 (for weaker students) – Add specific details that would support the idea expressed in the first sentence of the text. Write 3 to 6 sentences.

2 (for more advanced students) – Write 2 paragraphs – in the first one add supporting details to the idea expressed in the first sentence of the text. In the second paragraph (which should be linked to the first one by an adequate word or expression) describe the things that would still exist without a wheel.

Suggested answers for self-study units

Unit 3:

It is the second sentence of the paragraph. You can restate it as follows:

We can use a special shorthand, or exponential, notation if in a multiplication the same factor is repeated several times.

Unit 11:

The list of key words:

- rolling\sliding friction
- (smooth) surface
- lubricants
- to encounter resistance
- to transmit power