



L-Università
ta' Malta

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE
EXAMINATIONS BOARD

**INTERMEDIATE MATRICULATION LEVEL
2020 SECOND SESSION**

SUBJECT: **Environmental Science**
DATE: 12th December 2020
TIME: 4:00 p.m. to 7:05 p.m.

Answer **ALL** questions in Section A and any **TWO** questions from Section B.

Section A carries 80 marks and Section B carries 40 marks. You are advised to spend about two hours on Section A and one hour on Section B.

SECTION A: Answer ALL questions from this section.

1. (a) In the space below, draw a labelled diagram showing the layers of the Maltese rock profile.

(5)

(b) Explain how rainwater which infiltrates through the Maltese rock layers finds itself in freshwater springs in valleys in certain parts of Malta.

(4)

(Total: 9 marks)

2. (a) (i) How many planets are found in our solar system? _____ (1)

(ii) What is the Earth's place relative to the sun in our solar system?

_____ (1)

This question continues on next page.

(b) In the space below, draw a labelled diagram showing the main features of the internal structure of the Earth.

(4)

(Total: 6 marks)

3. State whether each of the following statements about the ozone layer is **TRUE** or **FALSE** by ticking the appropriate box. Give **ONE** reason for your answer.

(a) Condensation is the primary mechanism moving water from the surface of the Earth to the atmosphere. True False

Reason: _____

_____ (2)

(b) The greenhouse effect is essential for life on our planet. True False

Reason: _____

_____ (2)

(c) Global warming occurs because solar heat enters the atmosphere through the 'hole' in the ozone layer. True False

Reason: _____

_____ (2)

(d) Volcanoes may form when magma (lava) leaks from cracks in the crust. True False

Reason: _____

_____ (2)

(e) Igneous rock is formed as a result of accumulation and compression of rock debris. True False

Reason: _____

_____ (2)

(f) The zone of the sea where photosynthesis occurs is known as the abyssal zone.
 True False

Reason: _____

_____ (2)

(Total: 12 marks)

4. Complete the following passage on the use of biofuels by choosing the appropriate term from the list below. Each term must only be used **once**.

- | | | |
|----------|-----------|-------------|
| biomass | compounds | solvents |
| carbon | living | synthesized |
| chemical | nature | vapours |
| cleaning | petroleum | volatile |

All organic chemical substances contain the element _____. Such substances are commonly found in _____ organisms and in products derived from them, such as coal, _____ and _____. Many of these organic substances are not found in _____, but others are _____ in laboratories or by the _____ industry. Those substances that readily produce _____ at room temperature and pressure are described as _____ organic _____. These include chemicals such as gasoline, _____ and _____ agents.

(Total: 12 marks)

Please turn the page.

5. Choose the correct term from the following list which best fits the description. Each term must only be used **once**.

- | | | |
|---------------------|---------------------|--------------------|
| acid rain | carbon dioxide | oxides of nitrogen |
| carbon monoxide | chlorofluorocarbons | stationary source |
| combustion of fuels | fossil fuels | oxides of sulfur |
| greenhouse gases | ozone | hydrocarbons |

Term	Description
	The burning process which produces a number of oxygen-containing pollutants and water vapour.
	A number of gases that are responsible for heating the earth and may result in global warming.
	Substances composed of different combinations of two elements (excluding oxygen), which are emitted in air by natural sources and by using fossil fuels and solvents.
	Non-renewable sources of energy originating from the remains of ancient plant and animal life.
	Substances composed of different combinations of three elements (excluding oxygen), which have been used in the past in great quantities for refrigeration, air-conditioning and sprays, which damage the ozone layer.
	A colourless, odourless, non-toxic gas that occurs naturally in the atmosphere, but is also emitted in large quantities during complete burning of coal, petrol, wood and natural gas.
	Gases produced from burning of coal and petroleum products, which react with organic pollutants to form photochemical smog.
	Gases produced by burning of coal and untreated diesel, which play an important role in the production of acid rain.
	A fixed place or object which releases atmospheric pollution generated on site.
	A gas that is a powerful oxidant that when present at ground-level can irritate and harm the respiratory, cardiovascular and central nervous system.
	Air pollution resulting from chemical reactions of certain gaseous pollutants and water contained in rain, snow, fog or mist, which can damage human health and the environment.
	A colourless, odourless, poisonous gas produced by burning traditional fuels in a limited supply of air.

(Total: 12 marks)

6. Biotic and abiotic factors have a direct impact on what kind of fauna and flora will thrive in a particular biome. They also influence competition between organisms to drive biological evolution.

(a) Distinguish between each of the following terms:

(i) co-existence and competitive exclusion;

(2)

(ii) intraspecific and interspecific competition.

(2)

(b) Name the type of biome that characterises the Maltese Islands.

(1)

(c) (i) List **THREE** characteristics of the biome mentioned in part (b).

(3)

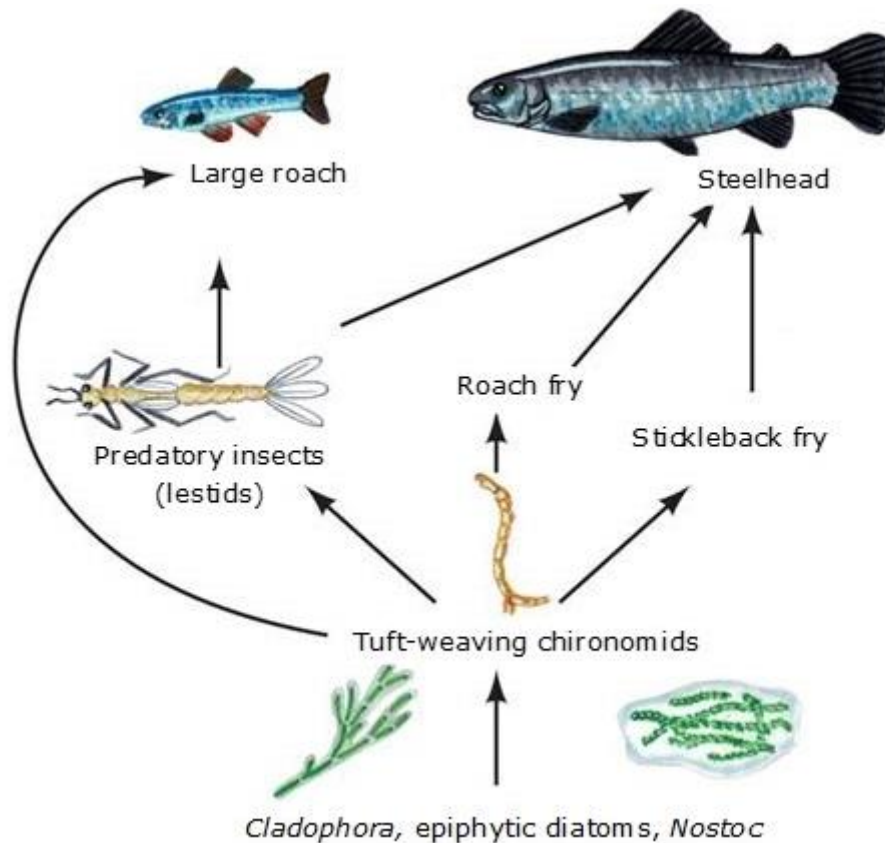
(ii) Mention **THREE** anthropogenic disturbances that threaten the biome mentioned in part (b).

(3)

(Total: 11 marks)

Please turn the page.

7. This question is about the following food web.



Adapted from: <https://slideplayer.com/slide/3621736/>

(a) Why are plants always at the base of a food chain?

_____ (2)

(b) If pesticides cause insect toxicity, killing off predatory insects, what effect would you expect on the population of Large Roach? Give a reason why.

 _____ (2)

(c) From the food web above, identify:

(i) an organism found on the third trophic level: _____ (1)

(ii) a primary consumer: _____ (1)

(d) Steelhead fish are described as keystone species in the above ecosystem. Explain the meaning of keystone species.

 _____ (1)

(e) How does the food web show that steelhead fish is a generalist species?

_____ (1)

(f) (i) Apart from a decline in the steelhead fish population, list **ONE** other disadvantage that is caused by over-fishing.

_____ (1)

(ii) In 2018, 35.5% of Maltese waters have been designated as marine protected areas. Name **ONE** local marine area where fishing is restricted.

_____ (1)

(Total: 10 marks)

8. Complete the table below by filling in the correct term that fits best with the definition in the left-hand column.

Definition	Term
A feeding relationship in which one organism benefits whilst causing harm to its host.	
Species only found in one part of the world.	
The maximum number of organisms that an environment can support without causing a decrease in population numbers.	
A species newly introduced in an environment where it has never been.	
A count of the different species present in an ecological region, without taking into account the abundance of species.	
The first types of species that colonise bare rock and appear in a successional series.	
The full range of an environmental niche that a population of a species can occupy and use when no other limiting factors are present.	
Using natural microorganisms to consume and break down environmental pollutants used during agricultural procedures.	

(Total: 8 marks)

SECTION B: Answer any TWO questions from this section.

Write your answers in the space provided in this booklet. If you need more space to continue your answers you may request another booklet from your invigilator.

1. (a) Describe **FOUR** negative environmental impacts of fossil fuel extraction. (8)
- (b) List **THREE** advantages related to the use of renewable energy sources. (3)
- (c) Name **THREE** different renewable energy sources and for each source list the disadvantages related to its use. (6)
- (d) Describe **THREE** ways how we can conserve energy individually or collectively. (3)

(Total: 20 marks)

2. (a) Describe the negative impacts of unsustainable agricultural practices on:
 - (i) the soil; (5)
 - (ii) water; (2)
 - (iii) air; and (2)
 - (iv) biodiversity. (3)
- (b) Describe **FOUR** sustainable agricultural practices. (8)

(Total: 20 marks)

3. (a) List **THREE** anthropogenic activities that lead to water pollution. (3)
- (b) Describe the origin and impact of the following water pollutants on human health and the environment:
 - (i) pathogens; (2)
 - (ii) organic waste; (2)
 - (iii) heavy metals; (2)
 - (iv) nitrates and phosphates. (2)
- (c) Explain what is meant by 'water having a high BOD value'. (3)
- (d) Outline **THREE** measures which can be applied to control water pollution and improve the quality of water resources. (6)

(Total: 20 marks)

4. The modern approach to sustainable waste management is often based on a waste management hierarchy which includes the concept of the Three Rs, namely reduce, reuse and recycle.

- (a) Explain briefly the concept of waste management hierarchy, illustrating your answer with a labelled diagram. (4)
- (b) Distinguish between the terms reduce, reuse and recycle, giving **ONE** example of each. (9)
- (c) Outline **TWO** benefits of recycling, compared to other traditional techniques of waste disposal. (2)
- (d) Describe **THREE** stages that are required to recycle plastic waste material. (3)
- (e) Mention **TWO** reasons why recycling is not necessarily the best option to be considered to dispose of solid waste. (2)

(Total: 20 marks)

