



L-Università
ta' Malta

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE
EXAMINATIONS BOARD

**INTERMEDIATE MATRICULATION LEVEL
2018 SECOND SESSION**

SUBJECT: **Environmental Science**
DATE: 6th September 2018
TIME: 9:00 a.m. to 12:05 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) What is the atmosphere?

_____ (2)

(b) Name the **TWO** major gases found in the Earth's atmosphere and give their approximate percentage composition.

_____ (4)

(c) (i) Name the **FIVE** major atmospheric layers in order of height from the Earth's surface:

Layer nearest to Earth's surface: _____

Layer furthest from Earth's surface: _____ (5)

(ii) Give **ONE** property for each of the **TWO** layers which are closest to the Earth's surface.

_____ (2)

(Total: 13 marks)

2. Briefly explain the following negative impacts of agriculture:

(a) Habitat destruction: _____

 _____ (2)

(b) Salinisation: _____

 _____ (2)

(c) Leaching: _____

 _____ (2)

(d) Loss of topsoil: _____

 _____ (2)

(Total: 8 marks)

3. Match each statement in the table below to one of the following terms. (Each term may be used once, more than once or not at all).

Plate tectonics	Volcano	Focus	Mercalli Scale
Epicentre	Magnitude	Intensity	Richter scale

	Point in the interior of the earth from which an earthquake originates.
	Point on the surface of the earth directly above the point of origin of an earthquake.
	A number that characterises the size of an earthquake by indirectly measuring the energy released.
	Indicates the local effects and potential for damage on the Earth's surface produced by an earthquake.
	An opening in the Earth's crust that allows molten rock, gases, and debris to escape to the surface.
	Movement of huge blocks of the Earth's crust that slide around slowly colliding with, sliding under, or moving past each other.

(Total: 6 marks)

4. (a) Explain why the pH value of pure water is 7.0 while the pH of natural unpolluted rainwater is about 5.6.

(2)

(b) (i) Explain how lightning contributes to the acidity of rainwater.

(3)

(ii) Write a chemical or word equation to show one of the reactions occurring during lightning storms, and which results in the formation of acidic rainwater.

(2)

(c) (i) Name a gas containing sulfur that is mainly responsible for acid precipitation.

(1)

(ii) State **ONE** way how this gas is released into the atmosphere.

(1)

(iii) Write a chemical or word equation to show how the gas mentioned in part (c)(i) reacts with water to form an acid.

(2)

(iv) Explain why the pH value of acid precipitation is less than 5.0.

(1)

This question continues on next page.

(d) Explain how acid precipitation affects marble statues and buildings made of limestone.

(2)

(Total: 14 marks)

5. Use a suitable term (which may include more than one word) which best fits each of the following descriptions.

(a) A chemical process which removes sulfur and sulfur compounds from fuels.

(2)

(b) Burning of fuel in a limited supply of air.

(2)

(c) Rain, mist, snow, hail or any other moisture that falls on earth.

(2)

(d) The amount of oxygen required by aerobic bacteria to oxidise organic matter into carbon dioxide and water.

(2)

(e) Long chain molecules that can be decomposed by microorganisms.

(2)

(f) The increase in the amount of stable chemicals (such as pesticides or heavy metals) on moving up to a higher trophic level in a food chain.

(2)

(g) A measure of the capacity of water to consume oxygen during the decomposition of organic matter and the oxidation of inorganic chemicals such as ammonia and nitrite.

(2)

(Total: 14 marks)

6. The table below was used to prepare a population pyramid for the inhabitants of the town of L-Imġarr, Malta.

Population of the Town of L-Imġarr by Age Group as presented in Malta Census of Population and Housing 2011								
Age Group	0-14	15-24	25-34	35-44	45-54	55-64	65+	Total
Population	579	544	521	482	521	415	387	3,449

Statistics obtained from: <https://nso.gov.mt/en/>

(a) Write **TWO** observations about the population structure of this town.

(2)

(b) How is population size affected if the majority of the members are past the reproductive age?

(1)

(c) List **TWO** factors that affect the rate of population growth.

(2)

(d) Population density refers to the number of individuals within a given area. By the end of March 2014, L-Imġarr was found to have 3,629 inhabitants living in an area of 16.1km². On the other hand 22,247 inhabitants were found to inhabit Birkirkara which has an area of 2.4km². Using the formula below calculate the population density of each town and determine which town has the highest population density.

$$\text{Population density} = \frac{\text{Population size}}{\text{Area inhabited by population}}$$

(3)

This question continues on next page.

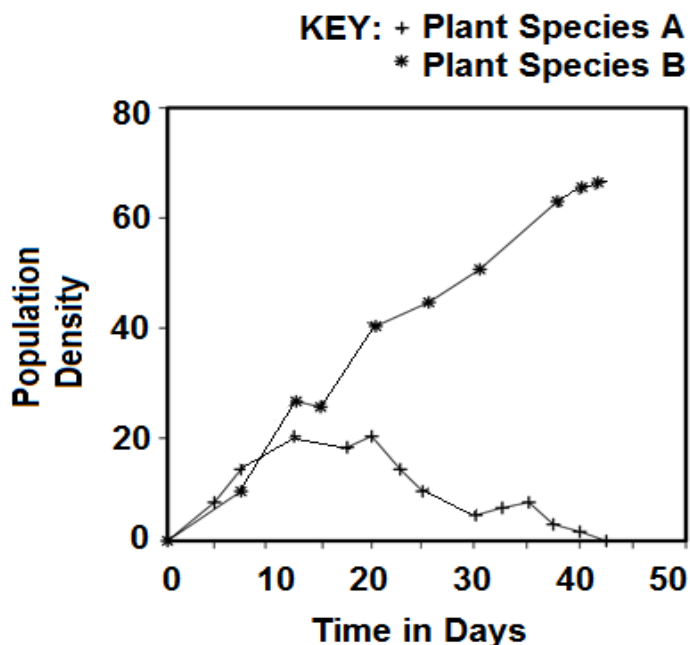
(e) In the animal kingdom various organisms prefer living in high-density populations. Give an advantage and a disadvantage of living in such a population.

(i) Advantage: _____
_____ (1)

(ii) Disadvantage: _____
_____ (1)

(Total: 10 marks)

7. A farmer tried growing Plant species A (Soybean) in her fields. Plant species B (Yellow Nutsedge) is a weed that grew concurrently with the Soybean in the same area. The graph below shows the population density in the fields over a number of days.



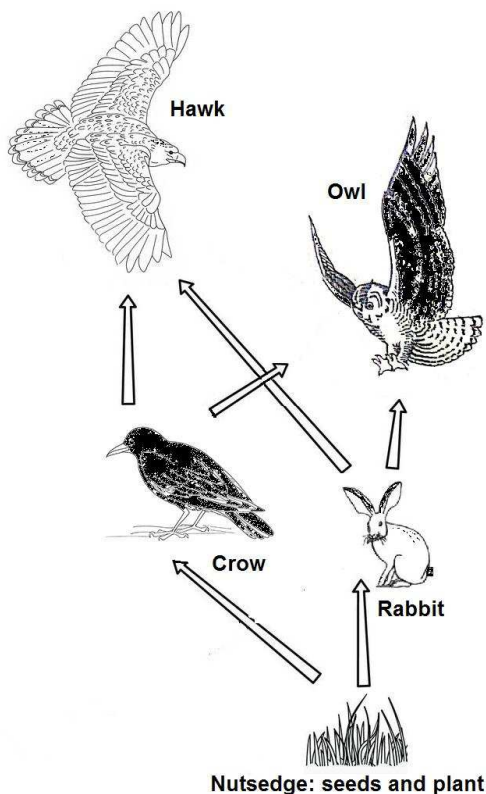
(a) Briefly explain the pattern observed in the two plant populations at the end of the 42 day period.

_____ (4)

(b) List **TWO** ways in which the Yellow Nutsedge could cause such an effect on the Soybean.

(2)

The farmer sprayed weed-killer to remove the Yellow Nutsedge. As a result, she realised that the presence of rabbits in her fields also started to decrease as she unintentionally affected the local food web. Analyse the food web below and answer the following related questions.



(c) Explain why the crow population is affected once the rabbit population starts to decrease.

(2)

(d) From the food web above identify:

- (i) a predator: _____
- (ii) a herbivore: _____
- (iii) an organism on the second trophic level: _____ (3)

(Total: 11 marks)

Please turn the page.

8. Provide explanations for the following statements:

(a) Photosynthesis is a process essential for food webs in an ecosystem.

_____ (2)

(b) Higher trophic levels always have less energy than lower ones.

_____ (2)

(Total: 4 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) Rocks can be igneous, sedimentary or metamorphic. Describe how each type of rock is formed and give **ONE** example of each. (6)
- (b) (i) Name and explain **TWO** negative environmental impacts of mineral and non-mineral extraction. (6)
- (ii) What can be done to minimise or reverse negative impacts arising from extraction and purification of minerals and non-minerals? (8)

(Total: 20 marks)

2. (a) Soil forms through the process of weathering and the decomposition of products and remains of organisms. Explain the above statement by describing the **THREE** main types of weathering of rock and how soil is formed through these. (8)
- (b) List and explain **THREE** ways how soil is eroded. (6)
- (c) Draw a simple illustration of the nitrogen cycle, to show how nitrogen from the atmosphere can be consumed by animals and how it is returned back to the atmosphere. (6)

(Total: 20 marks)

3. (a) Describe briefly the principles or processes involved in the **THREE** main stages of sewage treatment. (9)
- (b) Water is often found to be contaminated by toxic metals such as lead, mercury and arsenic.
- (i) Describe **TWO** potential sources of toxic metals in water. (4)
- (ii) Discuss the impact of such pollutants on human health and the environment. (2)
- (c) Although important plant nutrients, nitrates and phosphates create problems if present in excessive amounts in water. Explain the origin of such contaminants in water and their impact on the quality of water. Describe **ONE** way of reducing this form of water pollution. (5)

(Total: 20 marks)

4. (a) Distinguish between the terms fossil fuel and biofuel. (4)
- (b) List **TWO** examples of fossil fuels and **TWO** examples of biofuels. (4)
- (c) Outline **TWO** advantages and **TWO** disadvantages of using fossil fuels as main sources of energy. (4)
- (d) Name **TWO** environmental benefits and **TWO** concerns created by replacing fossil fuels with biofuels. (4)
- (e) Discuss **TWO** ways by which the Maltese consumer would benefit by installing photovoltaic cells to convert solar energy to electricity. (4)

(Total: 20 marks)

5. (a) What is a Terrestrial Biome? (4)
- (b) Briefly describe the type of climate (temperature and precipitation), soil type, and characteristics of flora and fauna inhabiting each of the following biomes:
- (i) desert; (4)
- (ii) tundra; (5)
- (iii) grasslands. (4)

(Total: 20 marks)

6. (a) What is the Crude Birth Rate? (4)
- (b) Compare and explain the growth rate patterns of populations in Less Developed Countries (LDCs) and More Developed Countries (MDCs). (8)
- (c) Why does it make more sense for a nation with insufficient food supplies to use its land to grow crops rather than to allow animals to graze? (4)
- (d) Intensive agricultural practices make food webs less diverse. Suggest **FOUR** ways on how natural systems damaged by agriculture can be restored to their original state. (4)

(Total: 20 marks)

Please turn the page.

