

**MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD**  
**UNIVERSITY OF MALTA, MSIDA**  
**MATRICULATION EXAMINATION**  
**INTERMEDIATE LEVEL**  
**SEPTEMBER 2015**

---

<b>SUBJECT:</b>	ENVIRONMENTAL SCIENCE
<b>DATE:</b>	4th September 2015
<b>TIME:</b>	4.00 p.m. to 7.00 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) Give **one** advantage and **one** disadvantage for the use of pesticides in agriculture.

Advantage: \_\_\_\_\_

\_\_\_\_\_

Disadvantage: \_\_\_\_\_

\_\_\_\_\_

**(2, 2 marks)**

- (b) Give **one** advantage and **one** disadvantage for the use of biological pest control in agriculture.

Advantage: \_\_\_\_\_

\_\_\_\_\_

Disadvantage: \_\_\_\_\_

\_\_\_\_\_

**(2, 2 marks)**

- (c) Give **one** advantage and **one** disadvantage for the use of chemical fertilizers in agriculture.

Advantage: \_\_\_\_\_

\_\_\_\_\_

Disadvantage: \_\_\_\_\_

\_\_\_\_\_

**(2, 2 marks)**

**DO NOT WRITE ABOVE THIS LINE**

---

(d) Give **one** reason why farmers should choose natural fertilizers over chemical fertilizers.

---

---

**(2 marks)**  
**(Total: 14 marks)**

2. (a) Distinguish between weather and climate.

---

---

---

---

**(2 marks)**

(b) (i) Draw a simple diagram to show the principal vertical layers making up the atmosphere. (*In your diagram make sure that you label ground level.*)

**(2 marks)**

(ii) Name the atmospheric layer in which most clouds and weather form:

\_\_\_\_\_ **(1 mark)**

(iii) Name the atmospheric layer in which temperatures can be as high as thousands of degrees: \_\_\_\_\_ **(1 mark)**

(iv) Name the atmospheric layer which absorbs most of the harmful ultraviolet radiation from the Sun: \_\_\_\_\_ **(1 mark)**

(v) Name the atmospheric layer that is thinner at the poles and thicker at the equator: \_\_\_\_\_ **(1 mark)**

**DO NOT WRITE ABOVE THIS LINE**

- 
- (c) Explain what happens during temperature (or thermal) inversion and how this phenomenon can have an impact on human health.

---

---

---

---

---

**(4 marks)**  
**(Total: 12 marks)**

3. Explain, as briefly as possible, each of the following statements on solid waste management.

- (a) There are at least **two** benefits associated with recycling of plastics.

---

---

---

**(3 marks)**

- (b) Producing a new aluminium can from recycled aluminium cans is cheaper than producing one made directly from bauxite (aluminium ore).

---

---

---

**(3 marks)**

- (c) An engineered landfill site can be used to generate electricity.

---

---

---

**(3 marks)**

**DO NOT WRITE ABOVE THIS LINE**

- (d) Non-recyclable plastics are usually incinerated to produce free 'energy-from-waste', but this may create a problem.

---



---



---

**(3 marks)**

- (e) Hazardous waste leachate from landfill sites must be treated before being digested by microorganisms.

---



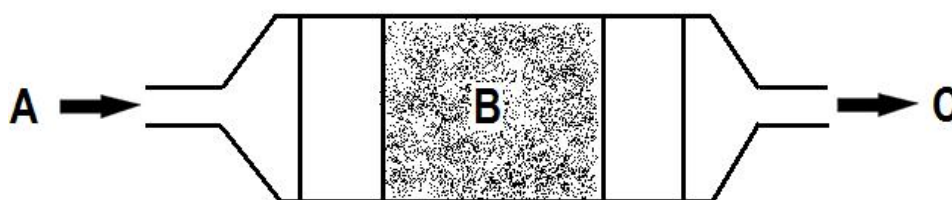
---



---

**(3 marks)****(Total: 15 marks)**

4. The following simplified diagram shows the basic structure of a typical catalytic converter.



Place each of the following substances in the region where it is likely to be found when the catalytic converter is operating.

**carbon dioxide****carbon monoxide****hexane (a hydrocarbon)****metal catalysts****nitrogen dioxide****nitrogen monoxide****nitrogen****water vapour**

- (i) Substance/s in region A: \_\_\_\_\_

- (ii) Substance/s in region B: \_\_\_\_\_

- (iii) Substance/s in region C: \_\_\_\_\_

**(Total: 8 marks)**

**DO NOT WRITE ABOVE THIS LINE**

---

5. (a) Define the following terms:

(i) Biome: \_\_\_\_\_

---

*(2 marks)*

(ii) Ecosystem: \_\_\_\_\_

---

*(2 marks)*

(iii) Ecotone: \_\_\_\_\_

---

*(2 marks)*

(iv) Community: \_\_\_\_\_

---

*(2 marks)*

(v) Ecological niche: \_\_\_\_\_

---

*(2 marks)*

(vi) Succession: \_\_\_\_\_

---

*(2 marks)*

(b) Distinguish between **interspecific** and **intraspecific** competition. Give an example to illustrate each type of competition.

(i) Interspecific competition: \_\_\_\_\_

---

Example: \_\_\_\_\_

(ii) Intraspecific competition: \_\_\_\_\_

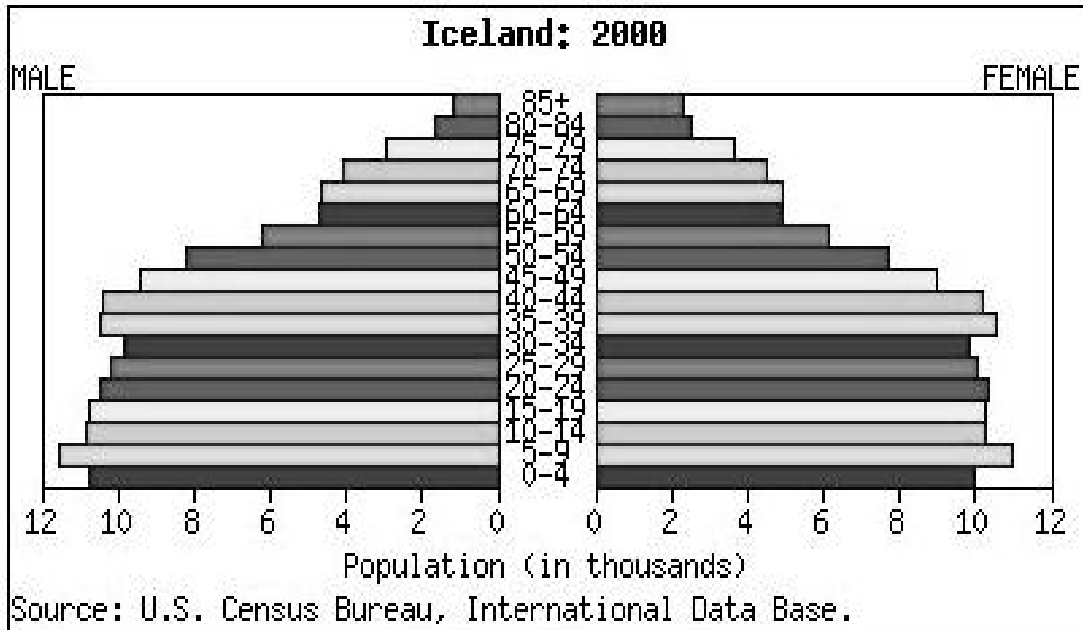
---

Example: \_\_\_\_\_

*(3, 3 marks)*  
**(Total: 18 marks)**

**DO NOT WRITE ABOVE THIS LINE**

6. The diagram below shows an age-structure diagram for Iceland.



(a) What does an age-structure diagram represent?

---



---



---

**(2 marks)**

(b) Is the population shown in the diagram increasing, stable or decreasing?

---

**(1 mark)**

(c) In the space below, write an equation that can be used to calculate the birth rate in a population.

---

**(2 marks)**

(d) List **three** factors that have led to the decrease in the birth rate of humans in many developed countries.

---



---



---

**(3 marks)**

**DO NOT WRITE ABOVE THIS LINE**

---

(e) In the space below, write an equation that can be used to calculate death rate in a population.

*(2 marks)*

(f) List **three** factors that increase the death rate of the human population.

---

---

---

*(3 marks)*

**(Total: 13 marks)**

---

---

**DO NOT WRITE ABOVE THIS LINE**

---

**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) Explain how light and temperature vary the deeper one goes into the water of the ocean. In your answer make sure that you refer to the thermocline and the photic zone. **(10 marks)**

- (b) Copy and complete the table below to describe the different areas of an ocean:

	<i>Temperature (high or low)</i>	<i>Depth (Shallow or deep)</i>	<i>Nutrient rich (Yes or No)</i>	<i>Supports Life (Yes or No)</i>
<i>Coastal Zone</i>				
<i>Abyssal Zone</i>				

**(4 marks)**

- (c) Explain the occurrence of tides in oceans. **(6 marks)**

2. (a) Explain how Surface Water, Aquifer Water and desalination plants can be used to improve water supply in countries where water is scarce. **(6 marks)**

- (b) Describe how sewage is treated and converted into environmentally safe water. **(8 marks)**

- (c) Outline one farming practice that may have contributed to salinity problems in Malta's water reserves. Explain the effects of saline water on the environment. **(6 marks)**

3. (a) Explain why the greenhouse effect is considered a natural phenomenon. **(4 marks)**

- (b) Explain what is meant by the *enhanced greenhouse effect*. In your account:

(i) clearly distinguish between the *greenhouse effect*, *global warming* and *climate change*;

(ii) give at least **two** specific examples of greenhouse gases;

(iii) name **three** human activities that contribute to the enhanced greenhouse effect; and

(iv) name **two** practical steps that can be taken to reduce the human contribution to the enhanced greenhouse effect.

**(16 marks)**



**DO NOT WRITE ABOVE THIS LINE**

---

4. (a) Name **two** sulfur-containing gases that may be present in polluted air. **(2 marks)**
- (b) Explain why the pH of distilled water is 7.0, that of natural rainwater is 5.6 while that of acid rain can reach a low value of 2.0. **(3 marks)**
- (c) Describe how atmospheric nitrogen, which is typically unreactive under ordinary conditions, can be converted into other gases which contribute to the formation of acid rain. **(3 marks)**
- (d) Name **three** effects of acid rain on the environment. **(3 marks)**
- (e) Describe one method of reducing the emissions of sulfur-containing gases and another method which reduces the release of nitrogen-containing pollutants in air. **(4 marks)**
- (f) Name **two** alternative fuels made from renewable resources. **(2 marks)**
- (g) Describe **one** environmental benefit brought about by the increased use of renewable sources of energy. **(3 marks)**
5. (a) Give a description of the ways humans are altering natural communities and the environment. Illustrate your account with examples from the local Maltese context. **(14 marks)**
- (b) Describe **four** conservation tools that could be used to help conserve the environment. **(6 marks)**
6. Give an account on how each of the following factors may affect population growth, and whenever possible, give specific examples to further clarify the points made.
- (a) Environmental resistance; **(5 marks)**
- (b) Density dependent growth factors; **(5 marks)**
- (c) Density independent growth factors; **(5 marks)**
- (d) Carrying capacity. **(5 marks)**













