



SUBJECT: **Environmental Science**
DATE: 5th September 2019
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) List **TWO** negative environmental impacts of mineral and non-mineral extraction.

(i) _____

(ii) _____ (2)

(b) Although nuclear power stations produce little pollution when working properly, many people disapprove of them. Give **TWO** main arguments against using nuclear power.

_____ (2)

(c) Describe how the following use of biotic resources can be managed sustainably:

(i) Logging: _____
_____ (1)

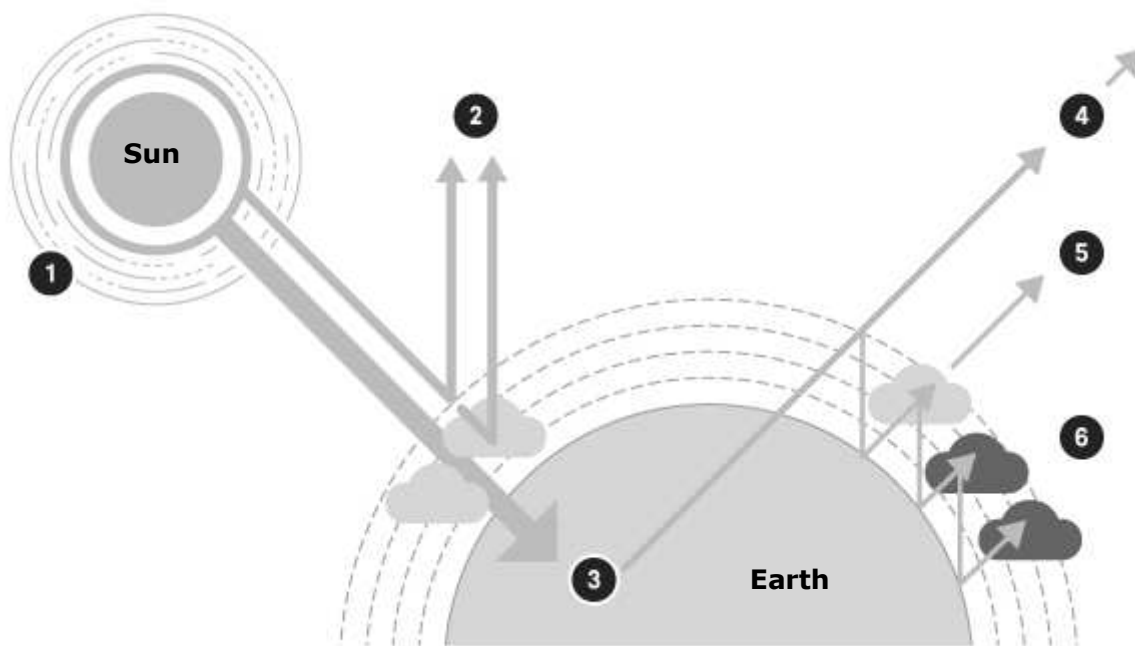
(ii) Grazing: _____
_____ (1)

(iii) Hunting: _____
_____ (1)

(Total: 7 marks)

Please turn the page.

2. (a) The numbers in the diagram below represent steps in the greenhouse effect. Give an explanation of the greenhouse effect by completing the table below with a description next to its appropriate number. (*The first one is done for you.*)



<https://world101.cfr.org/climate-change/greenhouse-effect>

Number on diagram	Description
1	The sun’s radiation travels toward the earth.
2	
3	
4	
5	
6	

(5)

(b) In the stratosphere temperatures increase with altitude. This increase is due to the ozone present in the air.

(i) How does ozone bring about this increase in temperature in the stratosphere?

(2)

(ii) In the stratosphere, Ozone (O_3) is produced by photochemical reactions of oxygen (O_2). Write the equations for these reactions.

(2)

(Total: 9 marks)

3. (a) State **ONE** advantage and **ONE** disadvantage of using pesticides in agriculture.

Advantage: _____

_____ (1)

Disadvantage: _____

_____ (1)

(b) Give **TWO** alternatives to using pesticides.

Alternative 1: _____ (1)

Alternative 2: _____ (1)

(c) State **ONE** advantage and **ONE** disadvantage of using natural fertilisers.

Advantage: _____

_____ (1)

Disadvantage: _____

_____ (1)

(d) State **ONE** advantage and **ONE** disadvantage of using artificial fertilisers.

Advantage: _____

_____ (1)

Disadvantage: _____

_____ (1)

This question continues on next page.

(e) A soil profile is the vertical section of soil from the ground surface to the bedrock.

(i) Which soil horizon is the most fertile?

_____ (1)

(ii) Which soil horizon contains partially weathered parent material and mineral particles?

_____ (1)

(Total: 10 marks)

4. Describe **ONE** possible source and **ONE** effect on human health or the environment, for each of the following atmospheric pollutants.

(a) Carbon monoxide

Source: _____

_____ (1)

Effect: _____

_____ (1)

(b) Nitrogen dioxide

Source: _____

_____ (1)

Effect: _____

_____ (1)

(c) Sulfur dioxide

Source: _____

_____ (1)

Effect: _____

_____ (1)

(d) Ozone

Source: _____

_____ (1)

Effect: _____

_____ (1)

(Total: 8 marks)

5. Explain each of the following statements related to acid rain.

(a) Rainwater is naturally slightly acidic.

(2)

(b) Some gaseous pollutants released by chimneys and transport vehicles react with water and produce a solution which is even more acidic than unpolluted rainwater.

(2)

(c) Acid rain damages buildings and statues and creates problems to the environment.

(2)

(d) One way of reducing acidic emissions is by treating waste gases produced by coal-fired power stations before releasing them from chimneys.

(2)

(e) One other effective measure to reduce acid rain is to install catalytic converters in cars that run on petrol.

(2)

(Total: 10 marks)

6. Give **ONE** reason to support each of the following statements on recycling of solids.

(a) Aluminium is an ideal metal for recycling.

(2)

(b) Recycling of non-biodegradable plastic is not considered as a sustainable process.

(2)

(c) Recycled paper is often off-colour and of lower quality compared to paper made from wood pulp.

(2)

This question continues on next page.

(d) Recycling glass is sustainable and cost-effective.

(2)

(e) It is better to recycle metals than to extract them from their ores.

(2)

(Total: 10 marks)

7. Worldwide, people eat four times as much fish today as they did in 1950. To keep up with the demand, humans have resorted to fish farming to increase fish productivity.

(a) Give **TWO** advantages of fish farming.

(2)

(b) Give **TWO** disadvantages of fish farming.

(2)

(c) Catching too many fish can reduce biodiversity. Give **TWO** practices that protect fish biodiversity.

(2)

(d) Suggest **TWO** reasons for the decline in the populations of various sea turtles.

(2)

(e) Protecting the marine environment and its living organisms is on the agenda of various NGOs and, national and international governments.

(i) Mention a local NGO that strives to protect marine biodiversity.

(1)

(ii) Mention a legislative tool aimed at protecting the natural environment.

(1)

(Total: 10 marks)

8. Complete the following passage on population growth in developed and developing countries by choosing the correct word from the following list. Each term may be used once, more than once or none at all.

high	adulthood	aging	education	youthful
inflation	family-planning	socially	diseases	rise
economically	life expectancy	expansion	youths	low
accelerated	income	balanced diet	health care	war

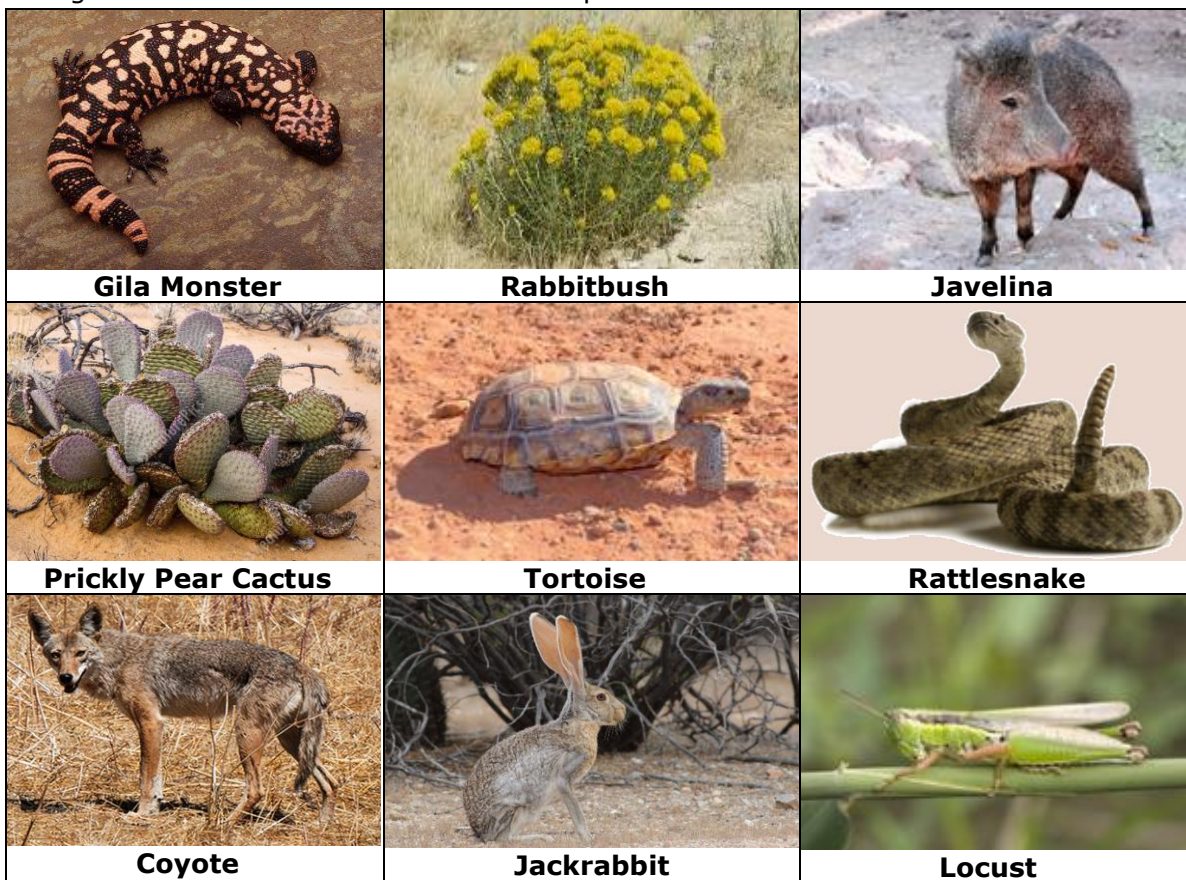
The Human Development Index which is used to determine which countries are well developed and which are poorly developed, takes into account life expectancy, education and income per capita. In less developed countries, fertility rates and birth rates are _____.

This is because of a number of reasons, namely the limited access to _____ services and _____. Besides this fact, children work and bring _____ for a family. It is difficult to ensure that children survive to _____. These countries have a population which is termed as _____. In developed countries, women are no longer _____ or _____ dependent on men since they receive an _____ and earn salaries on par with men. Major characteristics of more developed countries are a _____ birth rate and increased cost of living. More developed countries experience a _____ in life expectancy. This is due to better _____, improved knowledge about the importance of a _____, regular exercise and also improved standards of living. These countries have a population which is termed as _____.

(Total: 7 marks)

Please turn the page.

9. The organisms shown below are found in a specific biome.



Adapted from: <https://thefilesofmrse.com>

(a) Suggest a biome that could support all the organisms shown above.

_____ (1)

(b) Mention **ONE** adaptation shown by flora and **ONE** adaptation shown by fauna living in this biome to help them survive.

Flora: _____

_____ (1)

Fauna: _____

_____ (1)

(c) Complete the table below by placing at least **ONE** organism from the organisms shown above in the trophic level it occupies.

Producer	Primary consumer	Secondary consumer	Tertiary consumer

(4)

This question continues on next page.

- (d) Explain why the population of jackrabbits varies in size due to the effect of its natural predators.

(2)

(Total: 9 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) Explain how plate movements cause earthquakes. (6)
(b) Define the following terms concerning earthquakes: epicentre; focus; aftershocks; magnitude; intensity. (5)
(c) Distinguish between minerals and rocks. In your answer you should refer to the properties of minerals and the classification of rocks. (9)

(Total: 20 marks)

2. (a) Write an illustrated account of the hydrological cycle. In your account ensure that you make reference to the following terms:
Evaporation; Condensation; Transpiration; Precipitation; Infiltration; Surface runoff; Groundwater. (16)
(b) Describe the energy transformations occurring in the hydrological cycle. (4)

(Total: 20 marks)

3. Water is a natural resource that is highly vulnerable to pollution by human activity.
(a) Distinguish between groundwater and surface water. (4)
(b) Distinguish between point source and non-point source pollution, giving **ONE** example of each type of water pollution. (4)
(c) Discuss briefly the impact of the following water pollutants on human life and / or on aquatic ecosystems: pathogens, inorganic nutrients (e.g. nitrates and phosphates) and heavy metals. (9)
(d) Explain the term thermal pollution and explain why this environmental problem leaves a negative impact on aquatic life. (3)

(Total: 20 marks)

4. Distinguish between the following pairs of terms used in environmental science giving examples where appropriate to support your explanation.
(a) Volatile organic compounds (VOCs) and particulate matter (PM). (4)
(b) Renewable energy resources and non-renewable energy resources. (4)
(c) Hazardous waste and inert waste. (4)
(d) Biological oxygen demand (BOD) and chemical oxygen demand (COD). (4)
(e) Industrial smog and photochemical smog. (4)

(Total: 20 marks)

5. An area of abandoned grassland was studied to observe succession over a period of 80 years. The table below shows the changes that occurred in the plant communities and in the number and density of species of small invertebrate organisms.

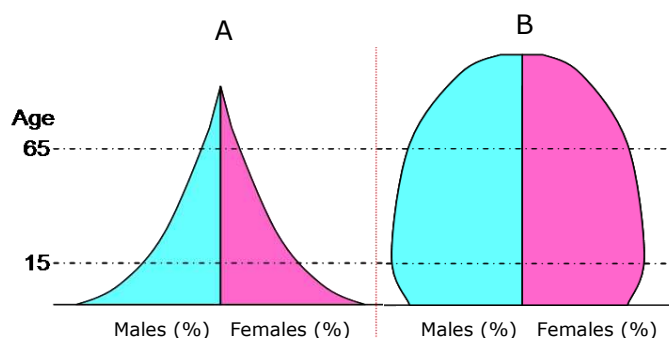
Time since grassland was abandoned (years)	5-10	10-40	40-80	80+
Plant community	Grass	Shrubs	Oak trees	Mixed woodland
No. of invertebrate species	4	21	20	25
Density (no. of invertebrates/m ²)	40	170	154	266

- (a) Describe and explain how succession occurs in an ecosystem. (5)
- (b) Calculate the percentage change in the number of invertebrate species as the plant community changes from shrubs to mixed woodland. Show your working. (2)
- (c) Two invertebrate species with identical niches were competing for a single resource during the period of 80 years and could not coexist. Identify the period of time that this was observed and give a biological explanation for this phenomenon. (3)
- (d) Suggest **ONE** way in which human activities disturb a stable mixed woodland community and discuss how humans can reduce the effect they have on this ecosystem. (2)
- (e) Distinguish between primary succession, secondary succession, autogenic succession and allogenic succession. (8)

(Total: 20 marks)

6. In nature, population sizes are generally in a state of stable equilibrium maintained by the interaction of various factors.

- (a) List and explain the **FOUR** factors that maintain populations in a dynamic equilibrium. (8)
- (b) Discuss the main limitations on the growth of the human population exhibited during the:
 - (i) Palaeolithic period and (3)
 - (ii) Neolithic period. (3)
- (c) The Industrial Revolution was a pivotal point in human history. Mention **TWO** reasons that allowed the human population to boom after the Industrial Revolution. (2)
- (d) In the diagram below, A and B are population pyramids indicative of populations undergoing rapid growth and negative growth.



Adapted from: <http://blackpoolsixthasgeography.pbworks.com>

- (i) What is a population pyramid? (1)
- (ii) Distinguish between pyramid A and B and explain how these pyramids indicate that these populations are in different stages of the demographic transition model. (3)

(Total: 20 marks)

DO NOT WRITE ABOVE THIS LINE
