

1. Figure 1.1 shows the structure of the atmosphere.

(a) State the name of the atmospheric layer where the ozone layer is located.

(b) Outline the role of the ozone layer.

(c) State two effects of ozone depletion on human health.

(d) Name the zone labeled A in the figure.

(e) Using Fig. 1.1 describe how temperature changes with altitude.

(d) Greenhouse gases are concentrated in the atmosphere. Name one greenhouse gas and explain how it contributes to global warming.

Carbon dioxide



(i) Sunlight is a source of energy used in photosynthesis.

(ii) State one biotic and one abiotic factor that affect the rate of photosynthesis.

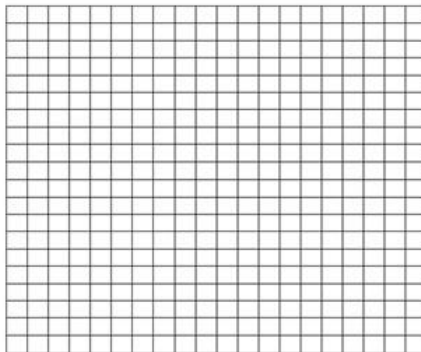
Abiotic _____

Biotic _____

(iii) The GPP of an ecosystem is 6.6 kg C/m²/year. Respiration is 1.2 kg C/m²/year. Calculate the Net Ecosystem Exchange (NEE) with units.

2. The diversity of ground cover vegetation in a given area is tested using sampling with random quadrats. The number of plant species in each quadrat, as well as the number of individuals of each species, is recorded in the data table below.

Species	Number of individuals
A	5
B	8
C	1
D	7
E	3



(a) Graph this data.

[4]

(b) Fill in the table with the missing values for "species D" and "species E".

[3]

Using this data in the data table and the Simpson's Index formula calculate the biodiversity of this ecosystem.

$$D = 1 - \left(\sum \left(\frac{n}{N} \right)^2 \right)$$

D = diversity
Σ = sum of (total)
n = the number of individuals of each type present;
N = total number of individuals of all types present in the sample

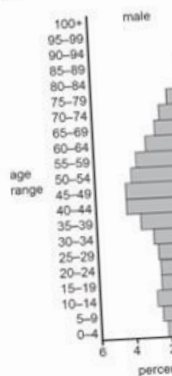
Species	n = number of individuals	$\frac{n}{N}$	$\left(\frac{n}{N} \right)^2$
A	5	0.20	0.043
B	8	0.33	0.111
C	1	0.04	0.002
D	7		
E	3		
N = total number of all individuals	24		

The midterm exam is designed with AICE-style questions, providing students with a realistic experience of what they'll encounter on the actual AICE Environmental Management exam.

This helps them familiarize themselves with the format, question types, and level of rigor expected.

(c) The biodiversity of a river was calculated using the Compare the river ecosystem's biodiversity ($D = 0.35$ question 2 (b).

3. The diagram shows the population pyramid for Italy.



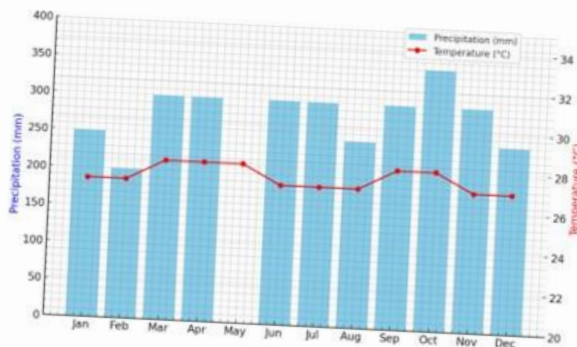
(a) Describe and explain the shape of the population pyramid.

(b) Explain how a national population policy might affect the population of Italy.

(c) The dependency ratio shows the relationship between the non-working population. Calculate the dependency ratio.

8,759,600
19,315,600
1,617,600

4. The graph below represents the average temperature and average precipitation for tropical rainforest biome, measured from January to December 2020.



(a) Use the data in the data table below to complete the graph with the missing value. [2]

Month	Temperature (°C)	Precipitation (mm)
Jan	27	250
Feb	27	200
Mar	28	300
Apr	28	300
May	28	350
Jun	27	300
Jul	27	300
Aug	27	250
Sep	28	300
Oct	28	350
Nov	27	300
Dec	27	250

(b) Calculate the average annual precipitation for this biome.

(c) Calculate the temperature range for this biome.

(d) Biodiversity of tropical rainforest is declining because of human activity. Describe one human activity that causes biodiversity loss.

(e) Describe two management strategies that could be used to conserve biodiversity in tropical rainforest ecosystems.

- Establishing protected areas like national parks and reserves helps conserve biodiversity by prohibiting deforestation, hunting, and other harmful activities.
- Promoting agroforestry, sustainable logging, and eco-friendly agriculture reduces the pressure on rainforests. For example, growing crops alongside native trees can maintain biodiversity while providing economic benefits to local communities. [4]

3. Food insecurity can cause undernourishment.

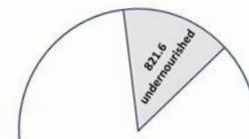
(a) Define food security.

Food security is when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. [2]

(b) Explain two causes of food insecurity.

- Human population growth causes an increase in the demand. The supply didn't grow as fast as population.
- Climate change causes droughts. Water is necessary for plant growth, and the absence of it limits food production. [4]

(c) Figure below shows the number of people undernourished in the world. Use the data in this figure to calculate the percent of people being undernourished.



Number of people in

821.6

311.2
100/1 =

12.06 % [2]

Includes 25 AICE Style Questions testing concepts from

Unit 1 Introduction to environmental management
Unit 2 Environmental research and data collection
Unit 3 Managing human population
Unit 4 Managing ecosystems and biodiversity
Unit 5 – section 5.1 Food security