



**Western Cape
Government**

Education

Directorate: Curriculum FET

LIFE SCIENCES

Grade 11

REVISION 2021

TERMS 3 AND 4

SUGGESTED ANSWERS

LIFE SCIENCES

GRADE 11

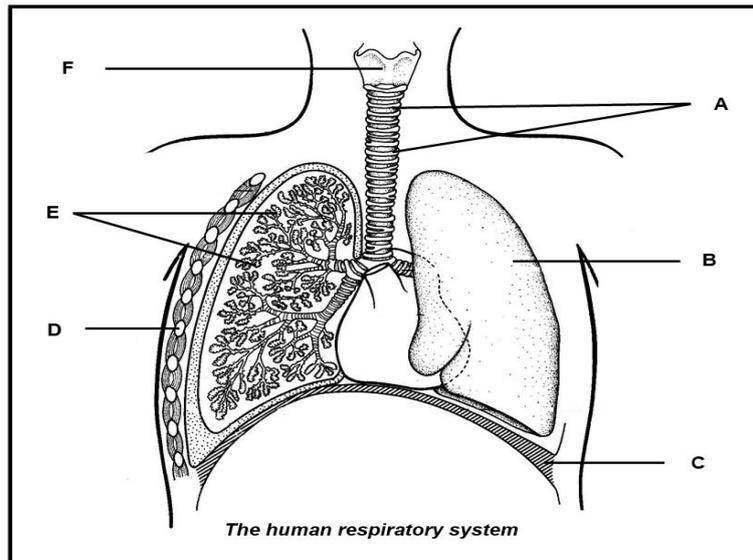
ANSWERS TO TERM 3 REVISION QUESTIONS

REVISION QUESTIONS:

- Work through and answer the questions below.
- Please note that **HIGHER ORDER questions** are in **BOLD** and marked with a (*)

A. QUESTIONS ON GASEOUS EXCHANGE:

1. Study the diagram below and answer the questions that follow.



- 1.1.1 Name the parts labelled **C** and **F**. (2)
C – Diaphragm✓
F - Larynx✓
- 1.1.2 Give the **letter** of the parts that are responsible for the following: (1)
- (a) Protecting the lungs (1)
D✓
- (b) Increasing the surface area for gaseous exchange (1)
E✓
- (c) Preventing the trachea from collapsing (1)
A✓
- 1.1.3 List **THREE** requirements for an efficient gaseous exchange surface. (3)
- moist✓
- thin✓
- large✓
- adequate protection✓
- sufficient ventilation✓
- efficient transport system✓
- diffusion gradient✓

1.1.4* Explain ONE way in which the nose is better suited for breathing than the mouth. (2)

- Ciliated mucus membrane✓ that lines the nasal cavity prevents the spread of germs✓ / traps any bacteria or foreign particles
- Cilia of mucus membrane ✓filters incoming air ✓
- Mucus✓ secreted by the ciliated membrane moistens the incoming air ✓
- Ciliated mucus membrane✓ sweeps trapped dust✓ / bacteria /foreign particles through the pharynx or nasal passages
- Hairs✓ lining the nostrils trap dust and foreign particles✓
- The turbinate bones✓ warms/slows/increases the surface area for the incoming air✓
- The nose has cartilage/which keeps the nostrils always open✓and so air flows continually✓

1.2 Answer the questions below based on human gaseous exchange.

1.2.1* State ONE similarity and ONE difference between the terms breathing and gaseous exchange. (3)

Similarity: Both processes involve movement/in and/or out of gases/oxygen and carbon dioxide✓

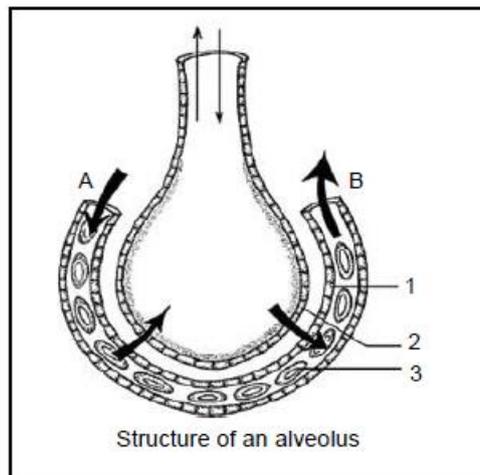
Difference:

Breathing	Gaseous exchange
Is concerned with the movement of air between the lungs and the atmosphere✓	Is concerned with movement of gases between alveoli and blood/blood and cells✓

1.2.2 Describe the mechanism of exhalation. (6)

- The external intercostal muscles relax✓
- Causing the ribs to move downwards and inwards✓
- The diaphragm relaxes✓ and become dome-shaped✓
- The volume of the thoracic cavity is decreased✓
- The abdominal muscles contract✓ and force the abdominal content upwards against the diaphragm
- The pressure in the thoracic cavity and lungs increase✓
- The elastic lungs are compressed ✓
- Air pressure in the lungs is higher than in the atmosphere✓
- Air rich with carbon dioxide (CO₂) flows out of the lungs✓

1.3 The diagram below represents a section through an alveolus and a surrounding blood capillary in the human body.



1.3.1 Identify the type of epithelial tissue numbered **1** and **2**. (2)

1 - endothelium ✓
2 - squamous epithelium ✓

1.3.2 Identify the blood cell labelled **3**. (1)

Erythrocyte ✓

1.3.3 What pigment is found in the cell mentioned in QUESTION 1.3.2? (1)

Haemoglobin ✓

1.3.4 Which type of blood:

a) enters the blood capillary at **A**? Deoxygenated blood ✓ (1)

b) leaves the blood capillary at **B**? Oxygenated blood ✓ (1)

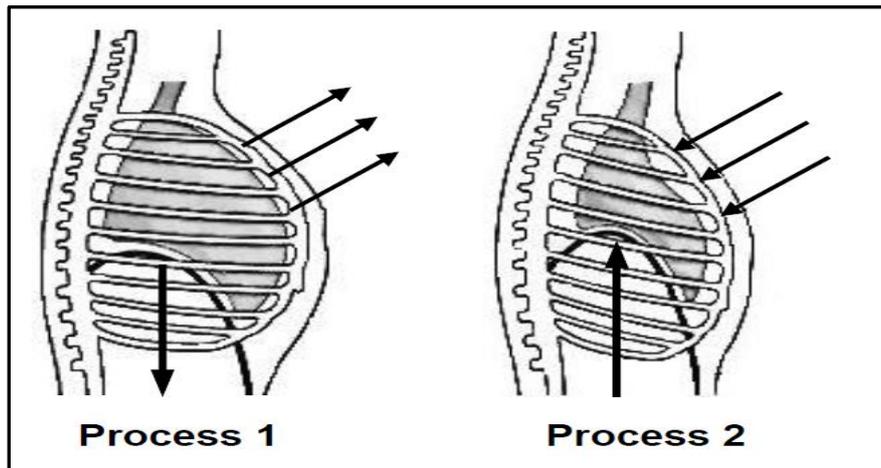
1.3.5 In which form is most oxygen carried in the blood? (1)

Oxyhaemoglobin ✓

1.3.5* State TWO structural features of the alveolus which makes it efficient for gaseous exchange in humans. (2)

- Many alveoli provide large surface area for gaseous exchange. ✓
- The inner surface is kept moist by film of moisture, to facilitate diffusion of oxygen and carbon dioxide in dissolved states. ✓
- The lining of the alveolus is thin; only one cell layer thick for rapid diffusion of gases. ✓
- Are in close contact with blood capillaries; blood contains haemoglobin which acts as an oxygen carrier. ✓

1.4 Study the diagrams below showing some parts of the human respiratory system. Answer the questions that follow.



1.4.1 Which process in the above diagram illustrates inhalation (Process 1 or Process 2)? (1)

Process 1 ✓

1.4.2* Give three reasons from the diagrams to support your answer to QUESTION 1.4.1. (3)

- Ribs are lifted / chest cavity expands / moves outwards ✓
- Thoracic cavity enlarges / lungs are larger ✓
- Diaphragm contracts / flattens / moves downwards ✓

1.4.3 Give the LETTERS and the NAMES of the muscles shown in the diagram that are involved in inhalation. (4)

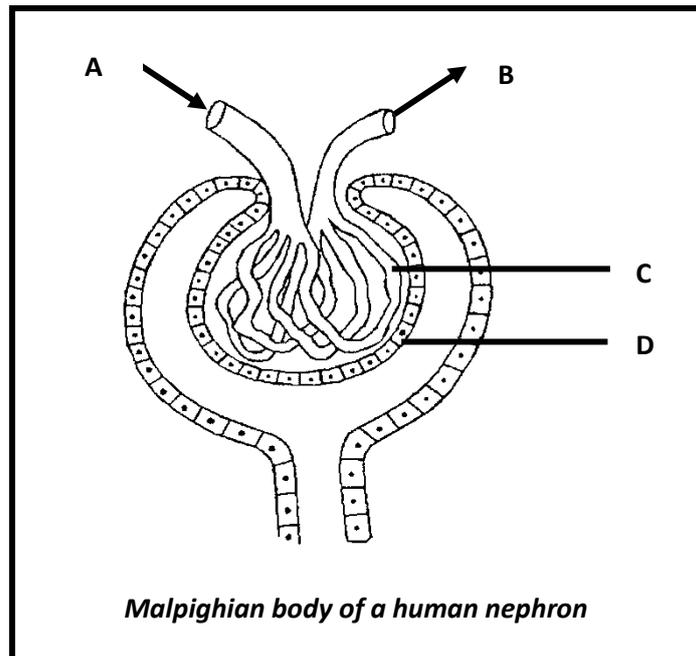
- D ✓ – intercostal muscles ✓
- E ✓ – diaphragm ✓

1.4.4* A person's thoracic wall is punctured in an accident. Explain how this injury will affect the breathing process. (2)

- Cannot breathe / inhale / exhale / lungs collapse ✓
- No pressure difference between exterior and thoracic cavity ✓

B. QUESTIONS ON EXCRETION

1.5 Study the diagram below.



1.5.1 In which region of the kidney would you find this structure? (1)
In the cortex✓

1.5.2 Name the process of urine formation that occurs in this structure. (1)
Glomerular filtration✓

1.5.3 Identify part C. (1)
Glomerulus✓

1.5.4* Explain TWO structural adaptations of part C for the process mentioned in QUESTION 1.5.3 above. (4)

- *Walls made of a single/thin layer✓ to facilitate diffusion✓ of substances.*
- *Many tiny pores ✓ act as micro-filters restricting large substances such as proteins/blood corpuscles to move through✓*
- *Lots of capillaries✓ to ensure large surface area✓*

1.5.5* Part A is wider than part B. State why this important. (1)
To create a high pressure✓ in C

1.5.6 Name the type of specialised cells found in part D. (1)
Podocytes ✓

1.5.7 Name the hormone secreted when there is a shortage of water in A. (1)
ADH✓

1.5.8* Describe how the hormone named in QUESTION 1.5.7 plays its role under such conditions. (2)
Makes collecting duct✓/distal convoluted tubule more permeable to water✓

1.6 The table below shows the flow rate and concentration of certain substances taken at regions **A**, **B**, **C** and **D** of the nephron in the human kidney.

Part of the nephron	Flow rate (cm ³ /min)	Solute concentrations (g/100 cm ³)				
		Proteins	Glucose	Sodium ions	Ammonium ions	Urea
A	4	0,0	0,0	0,6	0,04	1,80
B	200	0,0	0,10	0,72	0,0	0,05
C	40	0,0	0,0	0,3	0,0	0,15
D	2 000	7,0	0,10	0,72	0,0	0,05

1.6.1 State, with a reason, which of the parts (**A**, **B**, **C** or **D**) of the nephron represent the following:

(a) Afferent arteriole (2)

D✓ – contains proteins✓/highest flow rate

(b) Bowman's capsule cavity (2)

B✓ – High concentration of glucose, but no proteins✓

(c) Loop of Henlé (2)

C✓ – No glucose, and lower sodium ion concentration than D✓

(d) Duct of Bellini (2)

A✓ – has the highest concentration of urea✓

1.6.2* Explain the difference in the flow rate between **B** and **D**. (4)

- High flow rate in D because of heart beat✓/arterial blood
- flow rate decreased in glomerulus✓
- because of smaller diameter of capillaries✓/ flow divided into many capillaries
- Also flow rate is decreased as the fluid passes through membranes✓
- hence low flow rate when fluid enters capsule
- where pressure of heart beat is absent✓
- also large volume comes in and has to squash out through smaller volume allowed by efferent arteriole✓
- therefore slows it down✓

1.6.3* State ONE reason why there will be no amino acids in **A** in a healthy person. (2)

All amino acids were reabsorbed✓ into the blood✓

1.6.4 Name the inorganic substance, shown in the table, that can pass out against a concentration gradient from the renal tubule into the medulla of the kidney. (2)

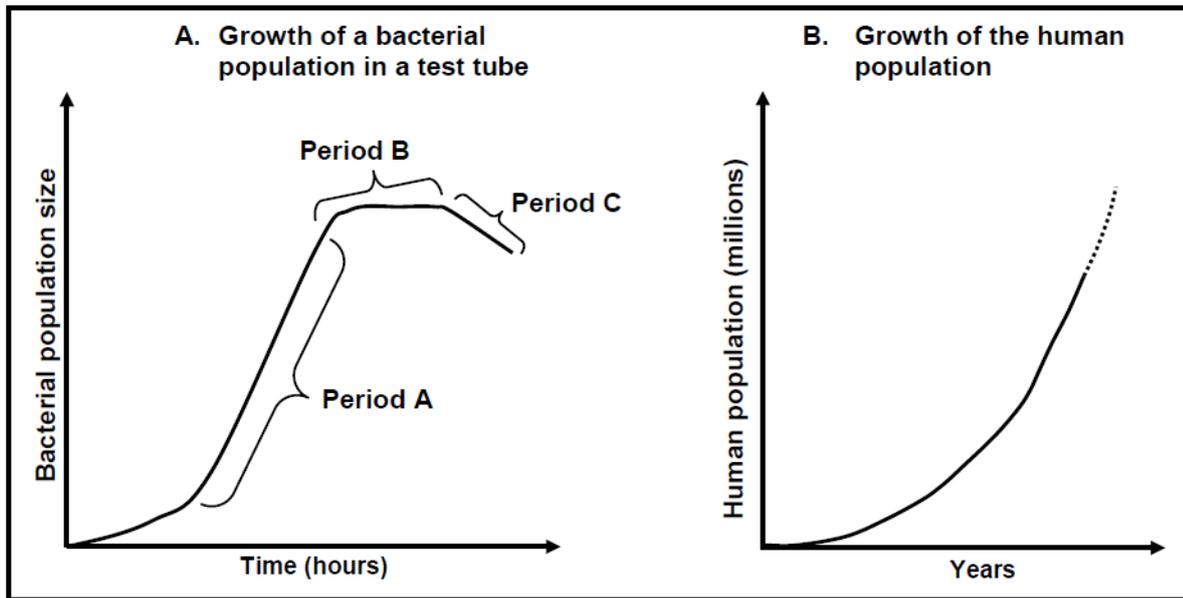
Sodium✓✓

1.6.5* Explain TWO ways in which the Bowman's capsule is structurally suited for its function. (4)

Cup-shaped✓ creating a large surface area✓ available for filtration
Podocytes✓ with slits to filter✓ the tissue fluid

C. QUESTIONS ON POPULATION ECOLOGY

1.7 GRAPH A below represents the number of bacteria in a growth culture over a period of time. GRAPH B shows changes in the human population size over a period of time.



Use GRAPH A to answer the following questions.

1.7.1 During which period (A, B or C) did natality exceed mortality for many hours? (1)

A✓

1.7.2 Account for the pattern of growth during Period B. (3)

Growth slowed down and became constant✓
 since the population reached carrying capacity✓
 due to environmental resistance✓/available resources.

Use GRAPH B to answer the following questions.

1.7.3 In what way is the growth of the human population similar to that of the bacterial population? (1)

Starts slowly and then increases rapidly✓

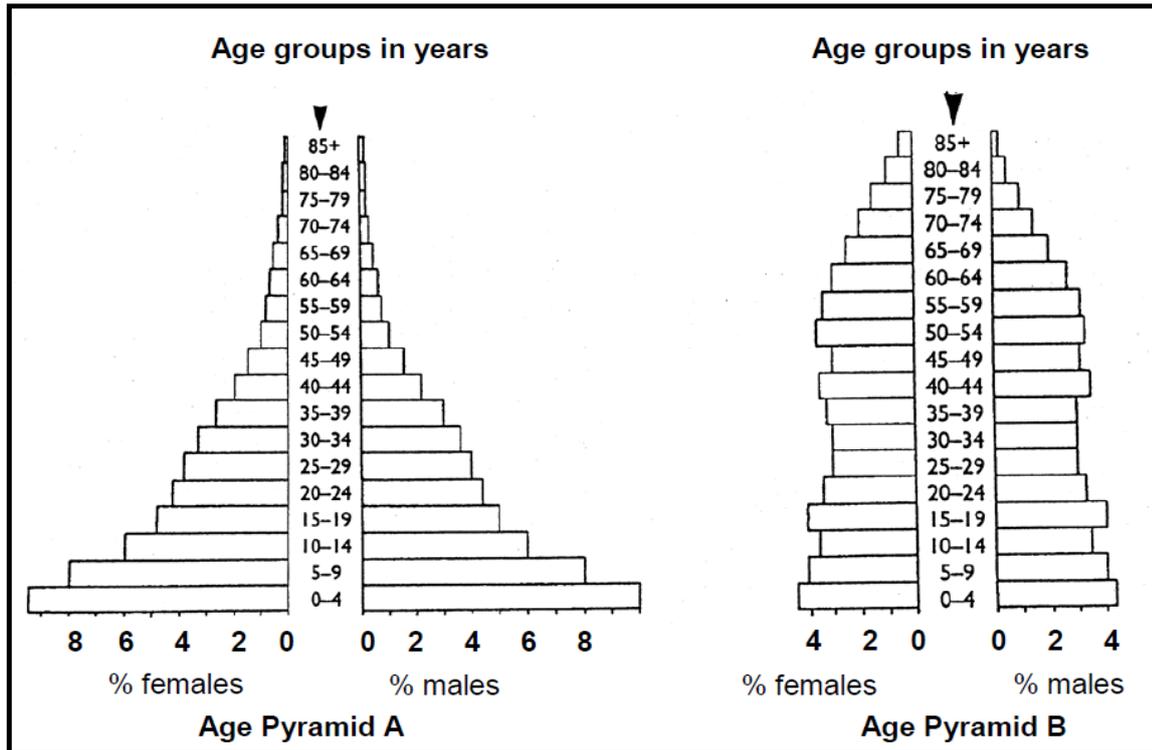
1.7.4* Explain why it may take the human population longer to reach the type of growth shown by the bacteria population in Period B. (4)

Human population has not reached the carrying capacity✓yet due to attempts to increase availability of resources such as food✓using agricultural technology ✓and the production of GMO's ✓ using biotechnology✓

1.7.5* State TWO precautionary measures which may be implemented in South Africa to slow down the growth in the population. (2)

Regulation of population growth by proper family planning✓
 Allocation of subsidies to people that have small families✓

1.8 The diagrams below represent the age distribution of the human population of a developed country and a developing country in one year at a certain time.



- 1.8.1 What percentage of the female population is aged between 5 and 9 years in Pyramid A? (1)
8%✓
- 1.8.2 Which age group makes up exactly 5% percent of the male population in Pyramid A? (1)
15-19✓ years
- 1.8.3 What percentage of the female population are aged 65 to 69 years in Pyramid B? (1)
3%✓
- 1.8.4 Which group (male or female) has the larger percentage reaching old age in Pyramid B? (1)
Females✓
- 1.8.5 Which pyramid represents the population distribution of a developed country? (1)
Pyramid B✓
- 1.8.6* Give TWO reasons for your answer to QUESTION 1.8.5. (2)
Low birth rate✓
Low death rate✓/higher life expectancy

1.9 The Umfolozi Game Reserve in Zululand can support a maximum of 300 impala buck. Fifty (50) were captured, marked and released. Seventy-five (75) impala were recaptured and of these fifteen (15) were found to be marked.

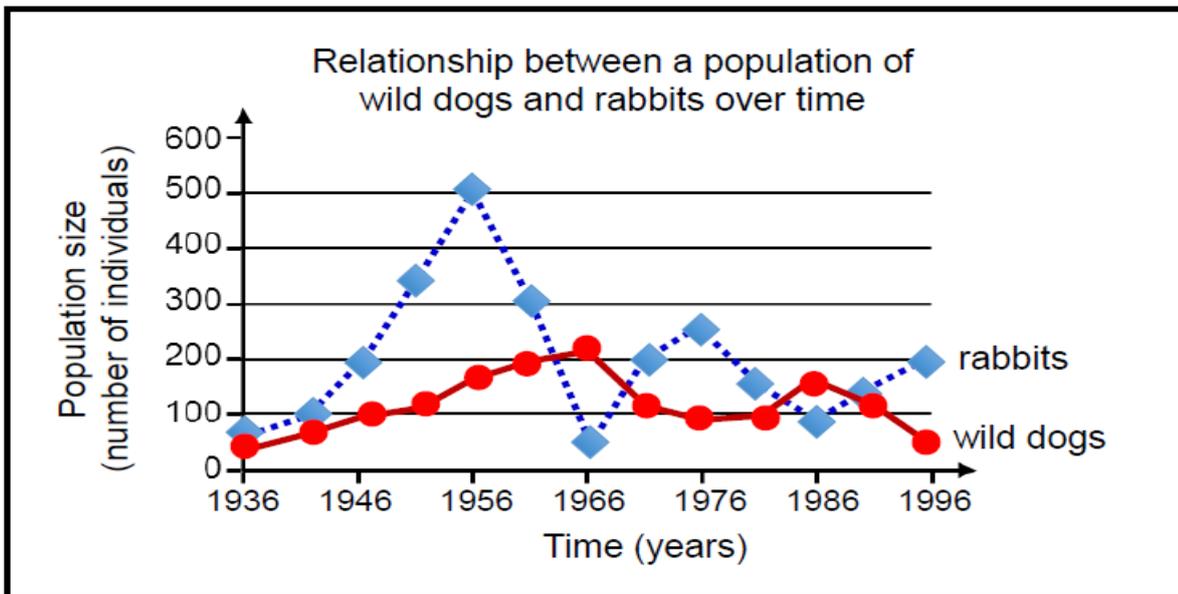
1.9.1* Calculate the size of the impala population. Show your working. (4)

$$\begin{aligned} \text{Total population: } P &= \frac{M \times S}{T} \\ N &= \frac{50 \checkmark \times 75 \checkmark}{15 \checkmark} \\ &= 250 \checkmark \text{ impala} \end{aligned}$$

1.9.2* A hunting club asked permission to shoot impala in the Umfolozi Game Reserve. If you were the conservationist officer, would you allow the club to hunt and shoot impala buck? Provide reasons for your decision. (4)

No. the carrying capacity is 300 impala ✓ and the estimate is 250 which is 50 below ✓ the carrying capacity. This is a healthy number for the size of the reserve. ✓ The food and water supply ✓ as well as the space ✓ is adequate to support ✓ 250 impala.

1.10 Study the graph below and answer the questions that follow.



1.10.1 Which population-regulating factor is illustrated by this graph? (1)

Predation ✓

1.10.2 How many of the following were there in 1966?

(a) Rabbits 50 ✓ (1)

(b) Wild dogs 200 -220 ✓ (1)

1.10.3 What is the maximum number of rabbits that have ever survived in this environment? 500 ✓ (1)

1.10.4* Will the rabbit population increase or decrease when there is a small number of wild dogs? Explain your answer. (2)

Increase ✓ - because there are less wild dogs to prey on the rabbits ✓

D. QUESTIONS ON HUMAN IMPACT ON THE ENVIRONMENT:

1.11 Read the extract below.

Alien plant invasion is only one factor that reduces plant biodiversity. Three broad categories cover the control of invasive plants: mechanical, chemical and biological. Several techniques may be effective in controlling a single species, but there is usually one preferred method – the one that is most resource efficient with the least impact on the environment.

1.11.1 Define the following

(a) Biodiversity (2)

The variety✓ of plant and animal species✓ on earth

(b) Alien plants (2)

Plant species that are not indigenous in an area✓ and that have been introduced to that area✓

1.11.2 Give TWO factors that can reduce biodiversity other than alien plant invasions. (2)

Habitat destruction✓ (OR e.g. farming methods, urbanization, deforestation, mining, loss of wetlands)
Poaching✓

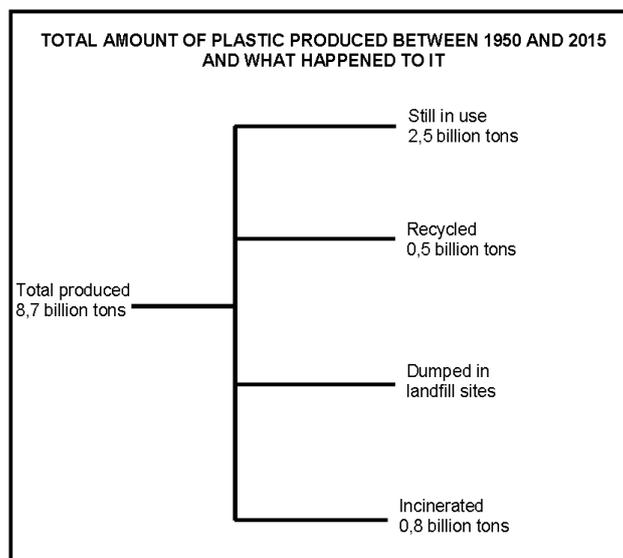
1.11.3* Explain how biological control is applied to control alien plants. (3)

Introducing a natural enemy✓ from the plant's environment allowing it to reproduce✓ and control the numbers of the invasive plant✓

1.11.4 According to the extract list TWO criteria that should be used to control alien plants. (2)

Choose the method that is most resource efficient✓
with the least impact on the environment✓

1.12. The diagram below shows the total amount of plastic produced between 1950 and 2015 and what happened to it.



1.12.1* Calculate how much plastic (in billions of tons) produced between 1950 and 2015 ended up in landfill sites. Show ALL calculations. (2)

$8,7 - 3,8 \checkmark$ OR $8,7 - (2,5 + 0,5 + 0,8)$
 $= 4,9 \checkmark$ billion tons

1.12.2* Describe the impact of incinerating (burning) plastic on global warming. (4)

There would be an increase in global warming \checkmark *
The burning of plastic releases carbon dioxide \checkmark into the atmosphere
leading to the enhanced greenhouse effect \checkmark
increasing the amount of heat trapped in the atmosphere \checkmark
causing an increase in temperature \checkmark

1.12.3* Explain TWO strategies that municipalities could implement to increase the amount of plastic that is recycled by a community. (4)

Supply special bins \checkmark /garbage bags to encourage the collection of plastic \checkmark
Bring recycling stations close to communities \checkmark to increase access \checkmark
Increase campaigns \checkmark / awareness/ education on the benefits of recycling \checkmark
Giving incentives \checkmark for collecting more plastics \checkmark

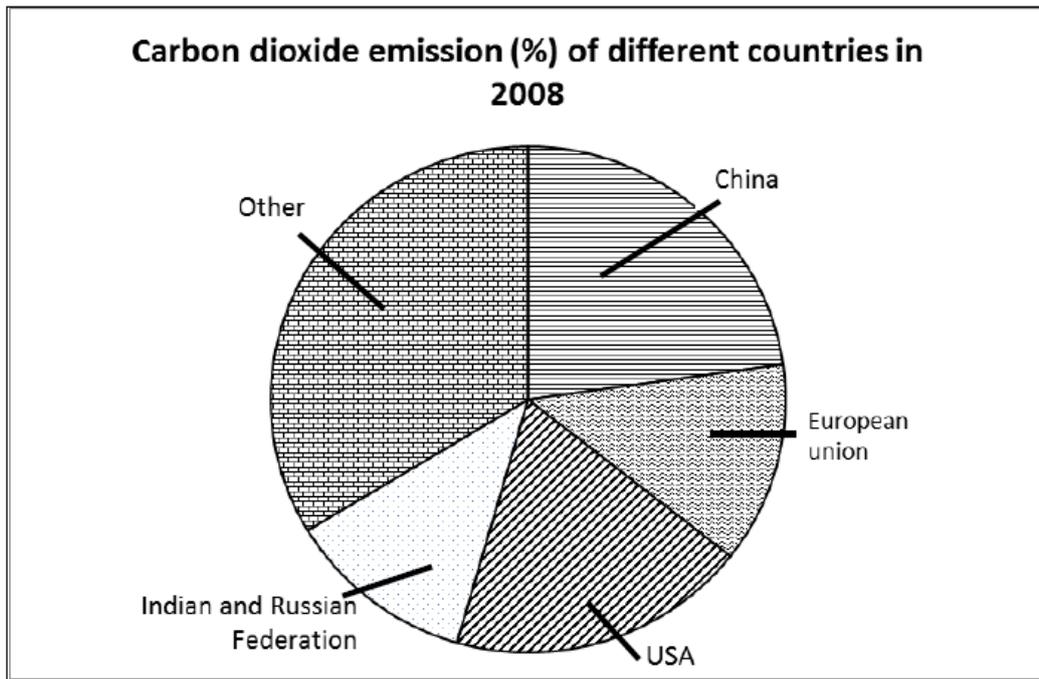
1.13. The table below shows the global carbon dioxide emissions from fossil fuel combustion and some industrial processes in 2008.

COUNTRY	CARBON DIOXIDE EMISSIONS (%)
China	23
European Union	13
USA	19
India and Russian Federation	12
Other	33

[Adapted from www.environmentalprotectionagency.gov/climatechange]

1.13.1 Draw a pie chart to represent the data in the table. (6)

China: $23/100 \times 360^\circ = 82,8^\circ$
European Union: $13/100 \times 360^\circ = 46,8^\circ$
USA: $19/100 \times 360^\circ = 68,4^\circ$
India and Russian Federation: $12/100 \times 360^\circ = 43,2^\circ$
Other: $33/100 \times 360^\circ = 118,8^\circ$



Correct type of graph	1 mark
Caption	1 mark
Correct calculations	1: 1–4 calculations correct 2: All 5 calculations correct
Correct proportion and labelling sectors	1: 1–3 sectors correct 2: 4–5 sectors correct

1.13.2* Explain the impact of the increased carbon dioxide emissions on the environment. (3)

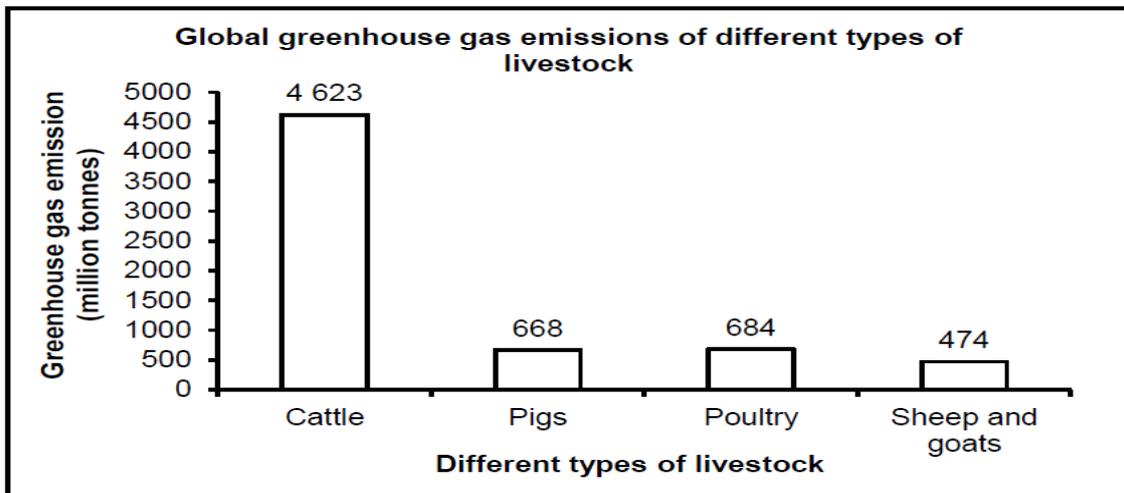
Leads to the enhanced 'greenhouse effect'✓
and thus global warming✓
Global warming influences the weather patterns✓
which can destroy habitats✓
leading to a decrease in biodiversity✓

1.13.3 Each country has been given a mandate to reduce its carbon dioxide emissions to reach a certain target. This is reviewed annually by the Conference of the Parties (COP), a United Nations organisation comprising 195 countries that meets to assess progress in dealing with climate change.

***Explain TWO reasons why some countries are against reducing the carbon dioxide emissions by their industries. (4)**

It will be expensive✓ to change to machinery that produce less CO₂✓
Too expensive✓ to purchase or develop systems that remove excess CO₂ from outlet gases✓
This will reduce profit✓ that will lead to job losses✓ / have negative effect on the country's economy

- 1.14 Livestock farming contributes to approximately 14,6% of all global greenhouse gas emissions (release into atmosphere).
The graph below shows the global greenhouse gas emissions of different types of livestock.



- 1.14.1 Name the livestock farming that contributes the least to greenhouse gas emissions. (1)

Sheep and goats✓

- 1.14.2 Give ONE advantage of greenhouse gases. (1)

To trap heat energy/keep earth warm enough to sustain life✓

- 1.14.3* Calculate how much more greenhouse gases are emitted by cattle compared to all other types of livestock combined. Show ALL your workings. (2)

$4623 - 1826$ ✓ $(668+684+474)$ million tonnes
= 2797✓ million tonnes

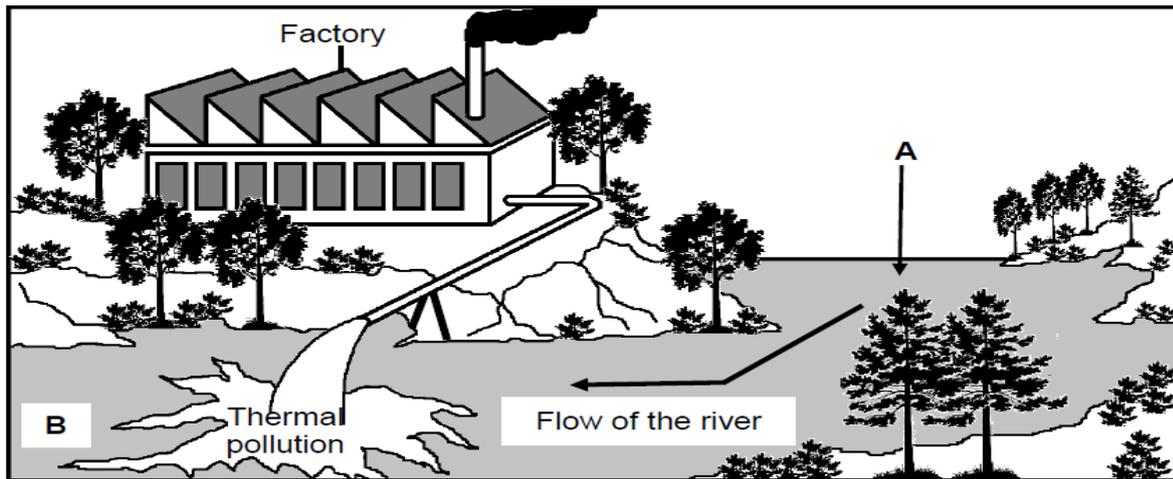
- 1.14.4 One of the greenhouse gases emitted by livestock is methane. Name ONE other source of methane. (1)

Landfills✓, rice paddles✓, waterlogged soil✓/wetlands, mining of coal✓, fossil fuels✓, biofuels✓, fracking✓, sewage✓, decomposition✓, melting of ice in glaciers✓ (any one)

- 1.14.5* Explain why an increase in livestock farming may lead to global warming. (3)

More greenhouse gases ✓/carbon dioxide/methane is released in the atmosphere
Therefore, more heat is trapped✓/causing an enhanced greenhouse effect
Leading to an increase in temperatures✓ hence global warming increases

- 1.15 A factory was built on the banks of a river close to a fishing village. The factory used water from the river to cool down the machinery. The water was then released back into the river causing thermal pollution.



1.15.1 What is *thermal pollution*? (1)

Thermal pollution refers to the change from the normal temperature of an aquatic ecosystem✓

1.15.2*Describe how thermal pollution affects the water quality. (2)

Thermal pollution lowers the oxygen content✓/causes algal bloom/increased number of bacteria in the water which reduces✓ the quality of the water

1.15.3*Suggest ONE way in which the factory can reduce thermal pollution. (1)

The hot water can be stored until it is cooled down✓before it is released into the river. After cooling down the hot water, it can be re-used to cool down the plant again✓. Use fans/other technology to cool down the machinery✓ (any one)

1.15.4*How will thermal pollution affect the fishermen in the village, economically? (2)

The warm water may cause fish to die✓/move away which will cause a loss of income✓ to the fishermen

1.15.5*During the lockdown of the country due to Covid-19 restrictions, the factory was closed for a period of 4 months.

Suggest, with a reason, the impact that this would have had on the biodiversity in area B. (2)

The biodiversity increased✓ because no thermal pollution occurred✓

END OF DOCUMENT