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0600/12

October/November 2023

1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

- Section A: answer **all** questions.
- Section B: answer **two** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

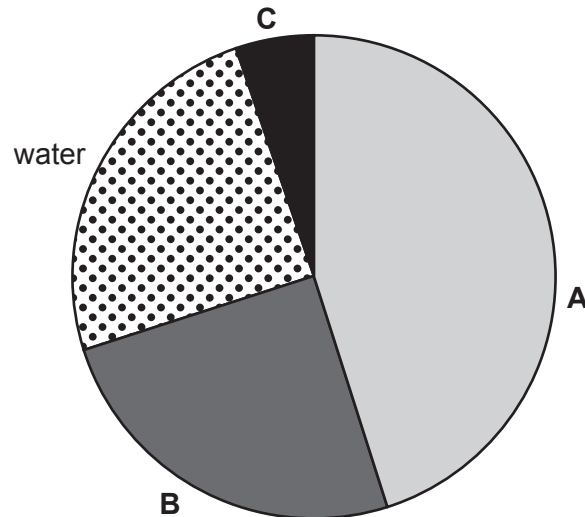
- The total mark for this paper is 100.
- The number of marks for each question or part question is shown in brackets [].

This document has **24** pages. Any blank pages are indicated.

Section A

Answer **all** the questions in the spaces provided.

- 1 (a) The pie chart shows the main constituents of a typical soil.



- (i) Identify **A**, **B** and **C** using the following terms.

air

organic matter

mineral matter

A

B

C

[2]

- (ii) Suggest why it is important to maintain the level of organic matter in soils.

.....

.....

.....

..... [2]

(b) Soil pans can cause poor soil drainage.

(i) Suggest **two** methods that a farmer could use to improve drainage.

1

.....

2

.....

[2]

(ii) Explain **two** ways that waterlogged soils affect crop yield.

1

.....

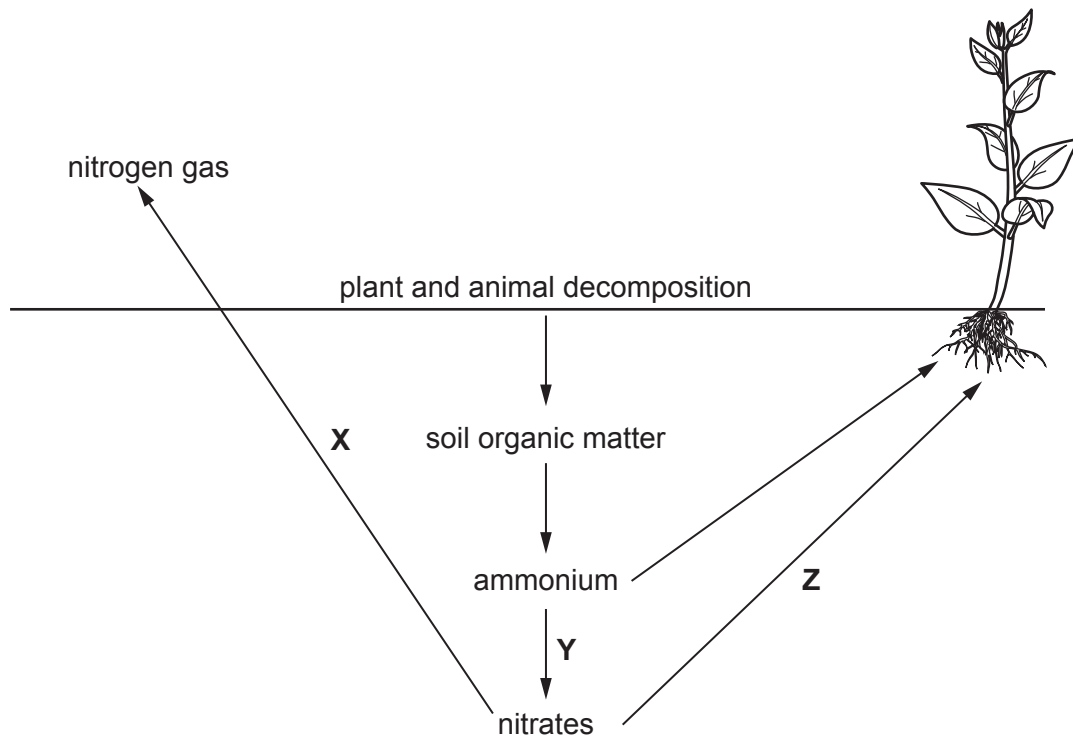
2

.....

[2]

[Total: 8]

- 2 (a) The diagram shows part of the nitrogen cycle.



- (i) Use the following terms to state the processes taking place at **X**, **Y** and **Z**.

denitrification

plant nutrient uptake

nitrification

X

Y

Z

[2]

- (ii) The diagram shows nitrates being converted to nitrogen gas.

Suggest why farmers would **not** want nitrates to be converted to nitrogen gas.

.....
 [1]

- (b) The table shows the average yield of tomatoes produced from plants grown using different methods over three years.

	average yield per plant/kg		
	outdoor field soil	glasshouse soil	glasshouse hydroponic
year 1	8	10	15
year 2	6	9	19
year 3	4	6	26
average yield over three years	6	A	20

- (i) Calculate the missing value (**A**) for the average yield of tomatoes grown in glasshouse soil over the three years.

..... kg [1]

- (ii) Suggest **one** possible reason why the yield of the outdoor field soil tomatoes was lower in year 3 than in years 1 and 2.

.....
 [1]

- (iii) Suggest why the yield of glasshouse hydroponic tomatoes is higher than the yield of the other two methods.

.....

 [2]

[Total: 7]

- 3 (a) The photograph shows a sprayer used to apply pesticides. The sprayer is carried on the back and used by hand.



- (i) Describe what needs to be done to maintain this sprayer after applying a pesticide.

.....

.....

.....

.....

.....

..... [3]

- (ii) Describe how pesticides should be stored when not in use.

.....

.....

.....

.....

.....

.....

..... [4]

- (b) The table shows information from one herbicide label.

crop	weeds controlled	herbicide application rate /litres per hectare
maize	couch grass, nut grass	1.0
	fat hen, thorn apple, sorrel	1.3
sugar cane	couch grass, fat hen, wild oat	2.3
Irish potato	cleavers, wild oat, sorrel	2.5

- (i) A farmer is growing a crop of maize and wants to control the weed fat hen.

Calculate the volume of this herbicide required to treat 5 hectares.

..... litres [1]

- (ii) Suggest why some weeds need a higher herbicide application rate than others.

.....

..... [1]

(c) Viruses can be transferred between plants by insects.

(i) Describe other ways viruses could be transferred between plants.

.....

.....

.....

..... [2]

(ii) Tomato Mosaic Virus (TMV) is a plant disease that can reduce the levels of chlorophyll in leaves.

Explain why crop plants infected with TMV may show stunted growth.

.....

..... [1]

(d) Aphids are often found feeding on the underside of leaves.

A farmer has decided to control aphids using a systemic pesticide rather than a contact pesticide.

Suggest why.

.....

.....

.....

..... [2]

[Total: 14]

- 4 (a) The diagram shows a maize plant with flowers.



Describe **three** adaptations of maize flowers that help pollination.

- 1
- 2
- 3

[3]

(b) The diagram shows a newly germinated common bean plant.

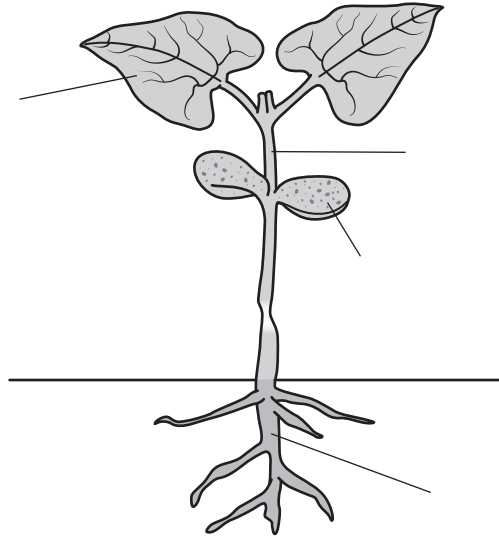
(i) Complete the labels on the diagram using the following terms.

epicotyl

cotyledon

true leaf

root



[3]

(ii) State **two** conditions required for the germination of most crop seeds.

1

2 [2]

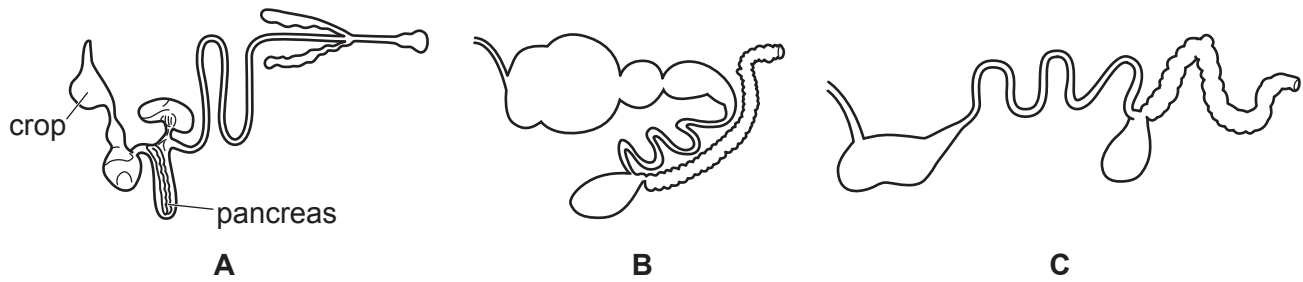
(iii) State **two** ways that developing crop seedlings in a small plot can be protected from extreme weather conditions.

1

2 [2]

[Total: 10]

- 5 (a) The diagrams show the digestive systems of three farm animals.



- (i) State which letter represents the digestive system of a ruminant.

..... [1]

- (ii) Describe the purpose of the oesophagus in a ruminant.

.....
 [1]

- (iii) State the name of the part of the digestive system in **C** that is most suited to absorbing nutrients. Suggest how this part is adapted to absorb nutrients.

part

how adapted

..... [2]

- (b) Outline **two** digestive processes that occur in a ruminant animal but do **not** occur in a non-ruminant animal.

1

2

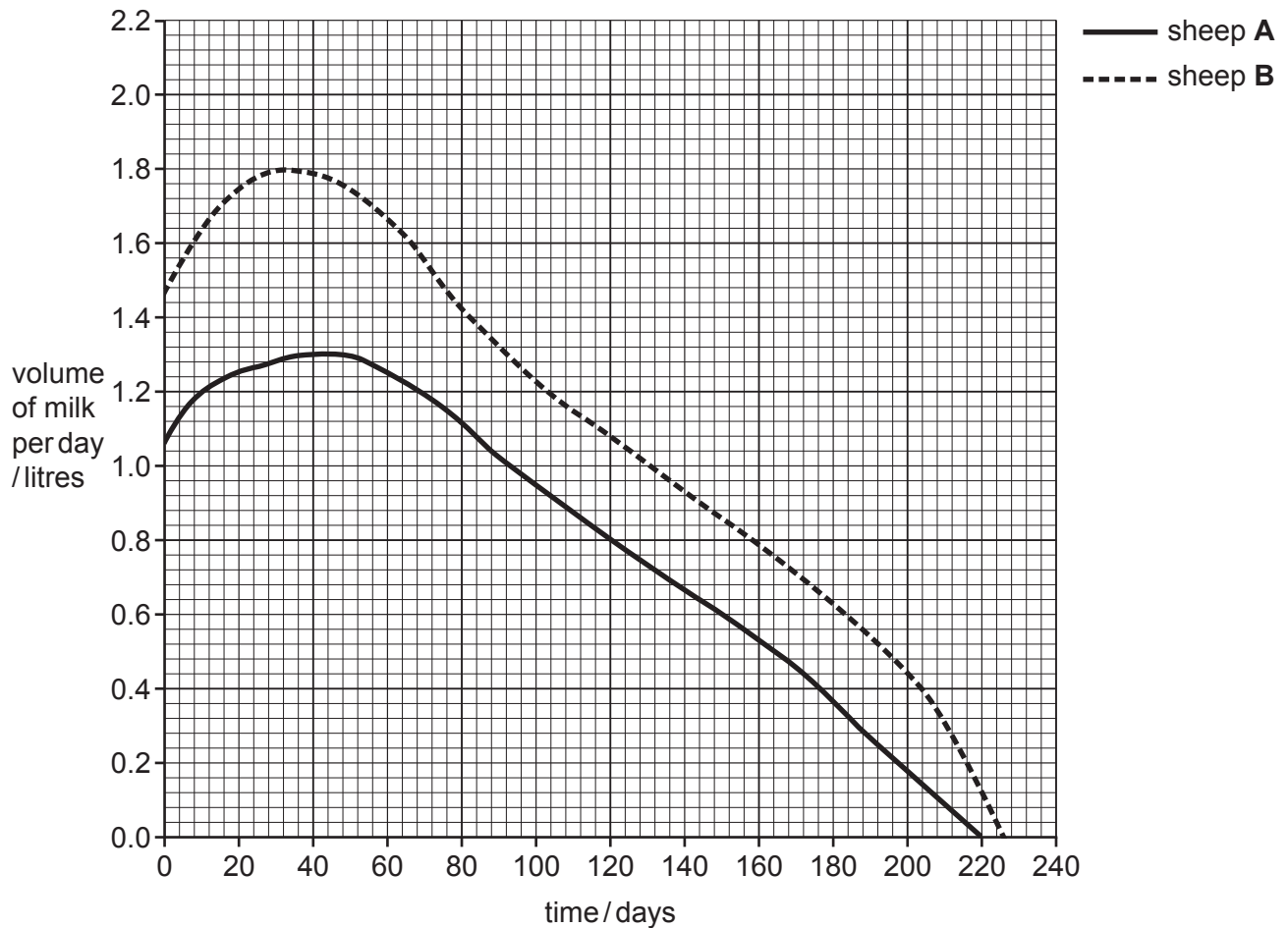
[2]

[Total: 6]

- 6 (a) Describe what is meant by weaning.

..... [1]

- (b) The graph shows part of the lactation period of two sheep.



- (i) At peak production for each sheep, determine how much more milk was being produced by sheep B than sheep A.

volume of milk per day = litres [1]

- (ii) State the length of the part of the lactation period shown on the graph for sheep A.

..... days [1]

(iii) Suggest **three** reasons why sheep **B** produces more milk than sheep **A**.

1

.....

2

.....

3

.....

[3]

[Total: 6]

7 The diagram shows a cross-section of part of a farm animal.

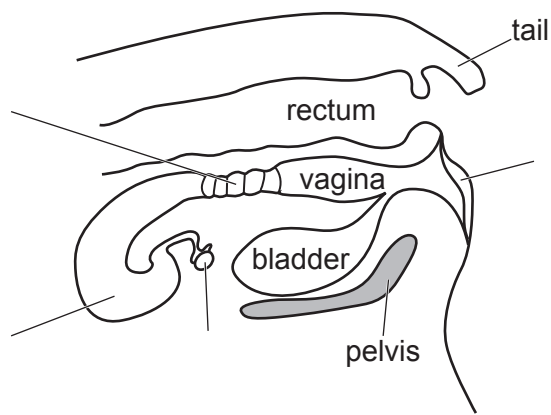
(a) Complete the labels using the following words.

ovary

vulva

uterine horn

cervix



[3]

(b) Describe the signs that a female farm animal is about to give birth.

.....

.....

.....

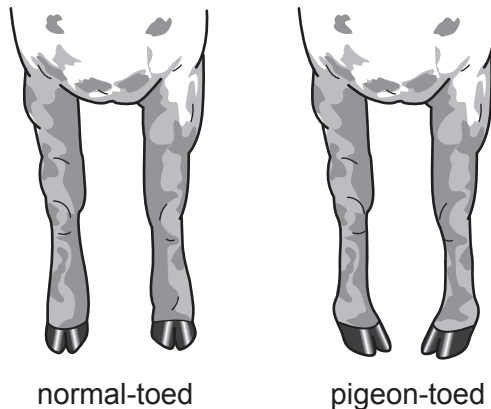
.....

.....

..... [3]

[Total: 6]

- 8 Pigeon toe is a disorder of some farm animals and is shown in the diagram. Assume that this disorder is caused by a single gene and the recessive allele **d**.



- (a) (i) State what is meant by an allele.

.....
 [1]

- (ii) Determine the expected ratio of pigeon-toed offspring to normal-toed offspring produced from crossing two heterozygous parents. Use a diagram to show your working.

ratio [2]

- (b) Explain how farmers could breed this disorder out of their farm animals.

.....

 [3]

[Total: 6]

- 9 (a) State **two** different sources of water suitable for livestock production.

1

2 [2]

- (b) The diagram shows a cross-section through two pipes of different sizes and a system used to join them.

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- (i) Describe the steps needed to join the pipes using the system shown in the diagram.

.....
.....
.....
.....
.....
..... [3]

- (ii) State the purpose of the compression washer shown in the diagram.

.....
..... [1]

- (iii) Suggest a reason why a farmer may need to join two pipes together.

.....
..... [1]

[Total: 7]

Section B

Answer any **two** questions.

Write the question numbers you have chosen here:

- 10** (a) Suggest how environmental damage can be caused by farmers using farm chemicals. [5]
(b) Describe the life cycle of a named biting and chewing pest. [4]
(c) Explain how a farmer can control pests using organic methods. [6]

[Total: 15]

- 11** (a) Suggest the benefits of having mixed vegetation in grazing land. [4]
(b) Describe the effects that overstocking may have on grassland pasture. [5]
(c) Explain how farmers can increase the carrying capacity of grassland. [6]

[Total: 15]

- 12** (a) Describe what is meant by mixed farming. [3]
(b) Discuss the benefits and problems of using genetically modified (GM) crops. [7]
(c) Suggest the benefits of mechanisation for a farmer. [5]

[Total: 15]

- 13** (a) Describe the problems caused by parasites to farm livestock. [4]
(b) Outline the ways farm animals can become infected by disease. [5]
(c) Explain how good stockmanship can reduce the risk of parasites in livestock. [6]

[Total: 15]

- 14** (a) (i) Describe the soil preparation for a named crop. [5]
(ii) Following the planting of this crop, outline the methods a farmer can use to maintain the health and productivity of the crop. [5]
(b) Suggest the factors that can affect the profitability of a crop after it is harvested. [5]

[Total: 15]

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