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AGRICULTURE

5038/11

Paper 1

October/November 2015

1 hour 45 minutes

Candidates answer Section A on the Question Paper.

Additional Materials: Answer Booklet/Paper

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO NOT WRITE IN ANY BARCODES.

Section A

Answer **all** questions.
Electronic calculators may be used.
Write your answers in the spaces provided on the Question Paper.
You are advised to spend no longer than 1 hour on Section A.

Section B

Answer any **two** questions.
Write your answers on the Answer Booklet/Paper provided.
Enter the numbers of the Section B questions you have answered in the grid.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [] at the end of each question or part question.

| For Examiner's Use | |
|--------------------|---|
| Section A | |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| Section B | / |
| | |
| | |
| Total | |

This document consists of **18** printed pages and **2** blank pages.

Section A

Answer **all** the questions.

1 Fig. 1.1 shows a farm in a valley.



Fig. 1.1

(a) The hillside labelled **B** is uncultivated.
Suggest **two** environmental factors that make cultivation of crops difficult on this hillside.

- 1
- 2 [2]

(b) The hillside labelled **A** is covered with trees and bushes.

(i) Describe how this hillside could be cleared for cultivation.

-
-
-
- [3]

(ii) Suggest **two** ways this slope could be cultivated to reduce erosion of soil and crops.

- 1
- 2 [2]

(iii) Before planting a crop, the farmer tested the soil and found it was high in potassium.
Explain how the process of clearing the hillside might have caused this.

-
- [2]

[Total: 9]

2 (a) Fig. 2.1 is a diagram of the digestive system of a pig (non-ruminant).

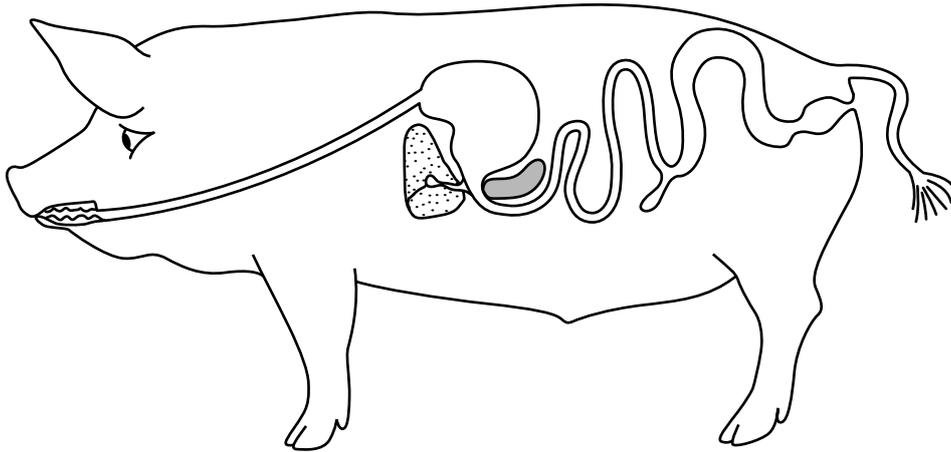


Fig. 2.1

Label on Fig. 2.1, using a line and the letters shown, the following:

S, where digestion begins

C, the caecum

M, the position of a sphincter muscle

[3]

(b) (i) Name an internal parasite.

.....

Label on Fig. 2.1, with a **P**, where the parasite you named would be found in the pig. [2]

(ii) Suggest a symptom that may indicate the pig was infected with this parasite.

.....

.....[1]

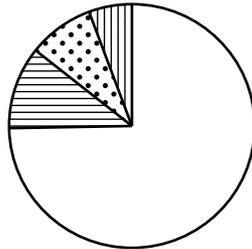
(iii) Suggest how to prevent the pig from being infected with this parasite.

.....

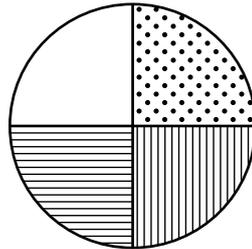
.....[1]

[Total: 7]

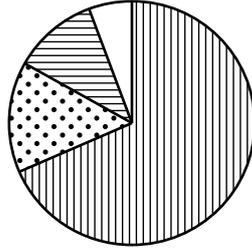
3 (a) The pie charts below show the composition of four soils.



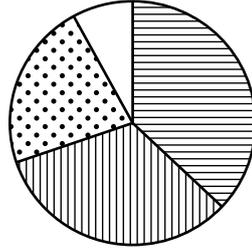
A



B



C



D

Key



clay



silt



fine sand



coarse sand

Which chart represents a sandy loam soil?

Answer **A, B, C** or **D** [1]

(b) Different types of soil have different characteristics.

Put ticks in the boxes next to **two** true statements about clay soil.

It does not swell or shrink.

It feels sticky when wet.

It retains nutrients.

Its particles do not stick together.

It tends to be acidic.

It warms up quickly in spring.

Water runs through it easily.

[2]

(c) State **one** effect of adding lime to a clay soil.

.....[1]

- (d) Table 3.1 shows the recommended amounts of lime needed to grow crops and grass in different soils at varying pH.

Table 3.1

| soil pH | lime applied/tonnes per hectare | | | |
|---------|---------------------------------|-------|-----------|-------|
| | sandy loam | | clay loam | |
| | crops | grass | crops | grass |
| 7.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 6.5 | 3.0 | 0.0 | 4.0 | 0.0 |
| 6.0 | 6.0 | 2.0 | 8.0 | 3.0 |
| 5.5 | 9.0 | 5.0 | 12.0 | 6.0 |
| 5.0 | 12.0 | 7.0 | 16.0 | 7.0 |
| 4.5 | 15.0 | 7.0 | 20.0 | 7.0 |

- (i) State how much lime to add to a clay loam soil for growing grass at pH 6.0.
 tonnes per hectare [1]

- (ii) A farmer needed to apply 5 tonnes per hectare of lime to grow grass on a field of sandy loam.
 State the pH of the soil in this field.
[1]

- (iii) A farmer growing grass on a clay loam soil of pH 5.5 needs to apply 6 tonnes of lime per hectare.
 When else does the farmer need to apply 6 tonnes of lime per hectare?
[1]

- (iv) With reference to Table 3.1, state a general conclusion that can be made about the requirement for lime by crops and grass.

[1]

- (e) Explain why the pH of soil becomes acidic in an intensely grazed pasture that is not limed.

[2]

[Total: 10]

4 (a) Fig. 4.1 shows a garden plot in a school.



Fig. 4.1

The boys are removing plants in each row.

This is called thinning.

State **two** reasons for thinning the plants.

1

2[2]

(b) Chemicals can be used to improve the yield from crops.

If these chemicals are not used carefully they can cause harm.

Draw **three** lines to connect each chemical to the harm it can cause.

| | |
|------------|--|
| fertiliser | builds up in food chains, so harming predators |
| herbicide | causes excessive plant growth in streams and rivers, reducing light levels |
| pesticide | kills some plants needed by animals, so reducing biodiversity |
| | prevents sunlight reaching the leaves, so reducing photosynthesis |

[2]

(c) The school wants to produce crops organically.

State how the plot could be managed organically

to provide fertiliser,

.....

to control weeds,

.....

to control pests.

.....[3]

[Total: 7]

5 (a) Which equation correctly represents photosynthesis?

- A $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow 6\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$
- B $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow 6\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O}$
- C $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$
- D $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O}$

Answer **A, B, C** or **D** [1]

(b) Fig. 5.1 shows a cross-section of a leaf.

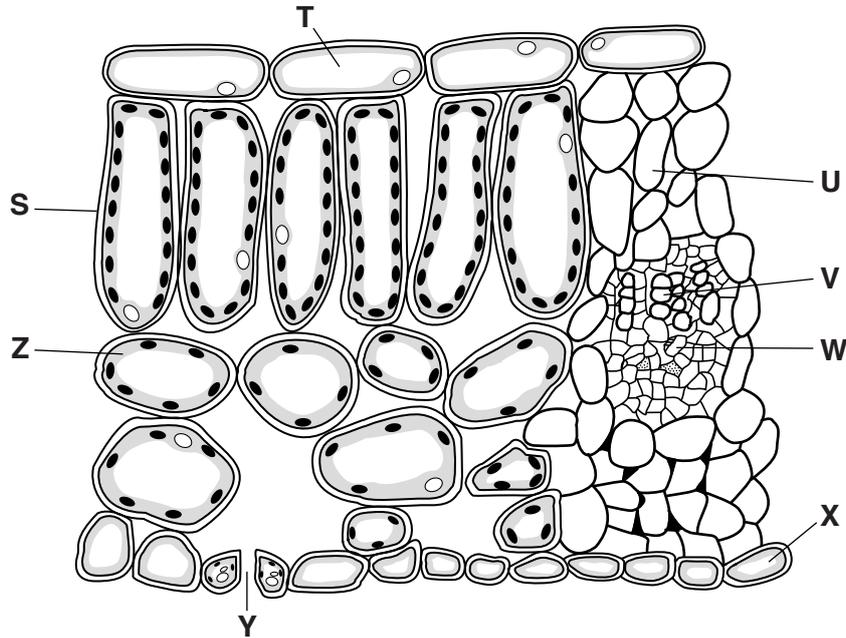


Fig. 5.1

Give the letter from Fig. 5.1 which represents

- (i) the cell where most photosynthesis takes place, [1]
- (ii) the most likely point of entry for a fungal disease, [1]
- (iii) the most likely tissue into which a virus would be introduced by an aphid.
..... [1]

(c) Fig. 5.2 shows a damaged leaf.



Fig. 5.2

(i) Name a pest that could have caused this damage.

.....[1]

(ii) Suggest **two** reasons why this damage would reduce the growth of the plant.

1

.....

2

.....[2]

[Total: 7]

6 (a) Table 6.1 lists food groups and their use in animals.

Table 6.1

| food group | use in animal |
|--------------|-------------------|
| carbohydrate | energy production |
| protein | |
| | energy storage |
| vitamins | health |
| minerals | health |

(i) Complete the missing details in Table 6.1. [2]

(ii) For a **named** mineral, give **one** reason why it is needed by animals.

mineral

why needed[1]

(b) (i) One part of an animal's diet not listed in Table 6.1 is fibre.

State **one** function of fibre in a non-ruminant animal.

.....[1]

(ii) Explain how fibre is broken down in poultry.

.....

.....[2]

(c) Fig. 6.1 shows young turkeys in an intensive rearing house.



Fig. 6.1

Stocking density affects the growth of turkeys housed indoors.

In an experiment, young turkeys were put into houses with different stocking densities.

Table 6.2 shows the results after 82 days.

Table 6.2

| stocking density/ number per 10m ² | mean body mass after 82 days/g per turkey | mean gain in body mass after 82 days/g per turkey | mass of food eaten/g per turkey | food conversion ratio | mortality (%) |
|---|---|---|---------------------------------------|-----------------------------|------------------|
| 30 | 3162 | 3116 | 5641 | 1.81 | 3.6 |
| 35 | 3096 | 3050 | 5536 | 1.82 | 7.8 |
| 40 | 3046 | 3000 | 5549 | 1.85 | 7.5 |
| 45 | 2966 | 2920 | 5392 | 1.85 | 7.5 |
| 50 | 2842 | 2796 | 5200 | 1.86 | 7.6 |

The food conversion ratio relates the amount of food eaten to the weight gained by an animal.

(i) State the stocking density at which the turkeys had the most efficient food conversion ratio.

.....[1]

(ii) State the mean mass of the turkeys at the **start** of the experiment for a stocking density of 40.

.....[1]

(iii) Explain the relationship between stocking density and the mean gain in body mass in this experiment.

.....
[2]

(iv) What conclusion can be made from this data about stocking density and mortality rate?

.....
[1]

[Total: 11]

- 7 (a) A tomato plant with green, round fruit was crossed with a tomato plant with red, oval fruit.



green, round fruit

X



red, oval fruit

All the F_1 offspring had red, round fruit.



red, round fruit

Characteristics such as fruit shape and colour are controlled by genes.
Genes exist in different forms called alleles.
Alleles can be dominant or recessive.

Which **two** statements below are correct on the evidence of these results?

- A The allele for green fruit is dominant.
- B The allele for round fruit is dominant.
- C The alleles for red and oval fruit are both dominant.
- D The F_1 generation is heterozygous.
- E The alleles for green and round fruit are both recessive.

..... and [2]

(b) A tomato grower wanted to breed plants that only produced green, oval fruit.

Describe how this could be achieved.

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

(c) Scientists have discovered a bacterium which has a gene that causes it to produce a toxin fatal to caterpillars that eat tomato plants.

(i) Use this information to explain how tomato plants could be produced that are protected from caterpillar attack.

.....
.....
.....
.....[2]

(ii) Suggest **one** possible danger of the process you describe.

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

[Total: 8]

8 (a) Fig. 8.1 shows cattle grazing on natural pasture.

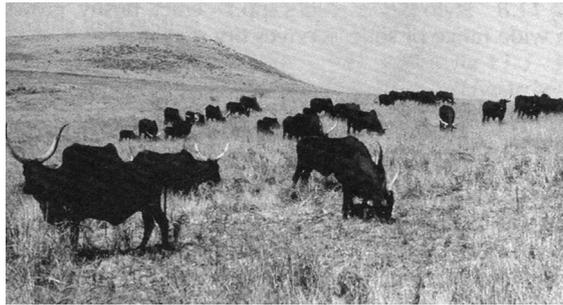


Fig. 8.1

(i) Why are grasses valuable pasture plants?

- A They are resistant to overgrazing.
- B They are suitable for browsing.
- C They grow close to the ground.
- D They improve soil fertility.

Answer **A, B, C** or **D** [1]

(ii) Name a grass planted in pasture to improve grazing.

.....[1]

(iii) Which of the following would **not** increase the carrying capacity of pasture?

- A fertilising the pasture
- B grazing more animals
- C improving the fencing
- D planting a wind break

Answer **A, B, C** or **D** [1]

(b) (i) A wet pasture can be drained using open ditches or underground pipes.

Suggest **two** disadvantages of using ditches to drain a grazed pasture.

- 1
-
- 2
-[2]

Fig. 8.2 shows two types of underground clay pipes used for drainage.

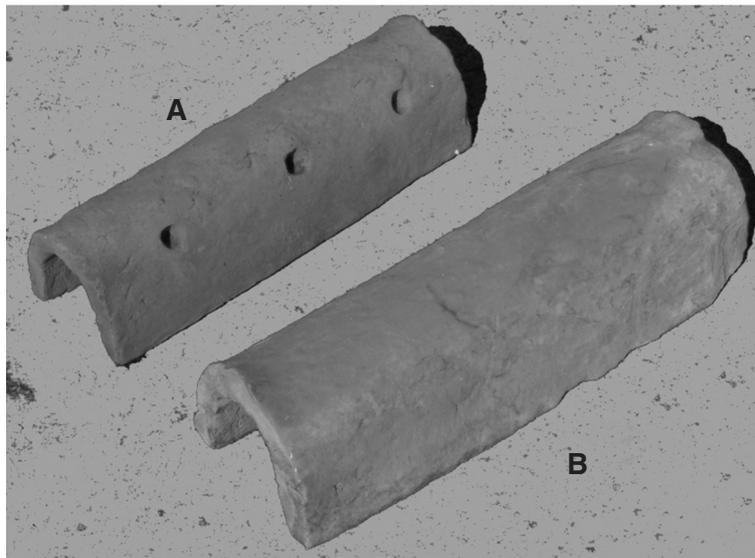


Fig. 8.2

The pipes are laid in rows about 30 cm below the pasture surface.
The clay is porous which allows the water to diffuse into the drainage channel.

(ii) Pipe **A** is used in heavy loam soils and pipe **B** in light sandy soils.

Suggest a reason for this.

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

[Total: 6]

9 (a) Fig. 9.1 shows a farmstead near a river.

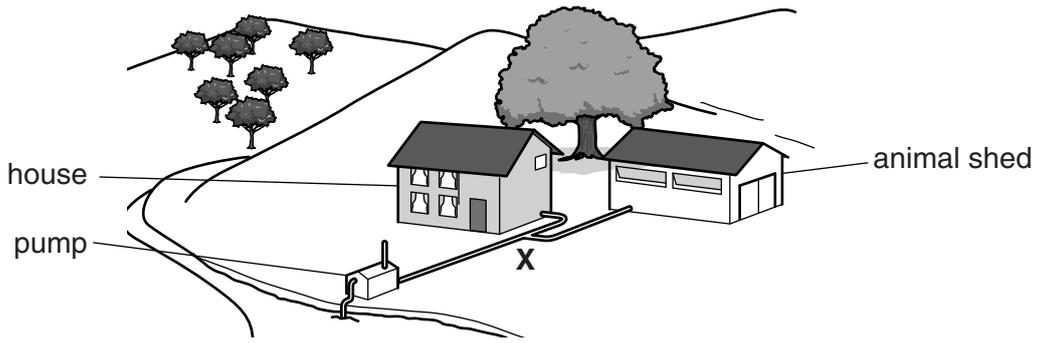


Fig. 9.1

Water is pumped to the farmhouse and animal shed through pipes.

(i) Explain how the pipes could be joined at X.
(A labelled diagram may be used in your answer.)

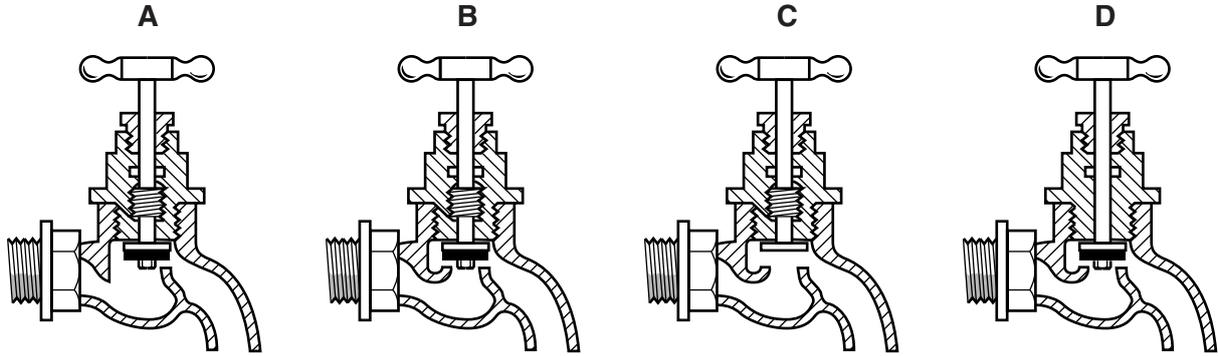
.....
.....
.....
.....[2]

(ii) Suggest how the water supply to the house and animal shed could be improved.
Give a reason for your answer.

.....
.....
.....
.....[2]

(b) Water in the buildings is controlled by taps.

Which diagram shows a tap that would work correctly?



Answer **A**, **B**, **C** or **D** [1]

[Total: 5]

Section B

Answer any **two** questions.

Write your answers on the separate paper provided.

- 10** (a) Explain what is meant by *translocation* in plants. [4]
(b) Describe how systemic pesticides may be used to control a **named** pest. [4]
(c) Discuss the advantages and disadvantages of using chemicals to control pests. [7]
- 11** For a **named** farm animal (not poultry):
(a) draw a labelled diagram to show the structure of the female reproductive system [9]
(b) discuss the advantages of using Artificial Insemination (AI) compared with the natural service of the female animal. [6]
- 12** (a) Explain what is meant by *pollination*. [3]
(b) Compare the characteristics of wind-pollinated flowers with those of insect-pollinated flowers. [7]
(c) Describe the steps involved in propagating plants asexually by stem cuttings in the sweet potato. [5]
- 13** (a) Explain the function of legumes in maintaining soil fertility. [4]
(b) Describe how nitrogen in plant proteins is changed into nitrates in the soil. [7]
(c) Describe how nitrates are leached from the soil and outline **one** method of preventing leaching. [4]
- 14** (a) What factors should be considered when selecting a site for a new farm building? [6]
(b) Describe a suitable building to house a **named** farm animal.
State details of the dimensions of the building and the materials that are used to construct it. [9]

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