UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

8089637897

BIOLOGY **0610/32**

Paper 3 Extended **October/November 2012**

1 hour 15 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

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 a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

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	
1	
2	
3	
4	
5	
6	
Total	

This document consists of **19** printed pages and **1** blank page.

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1 The fungus, *Trichophyton violaceum*, reproduces asexually by releasing spores.

A single spore was placed in the centre of a Petri dish containing an agar medium with starch and protein.

Fig. 1.1 shows the fungus that grew from the spore.

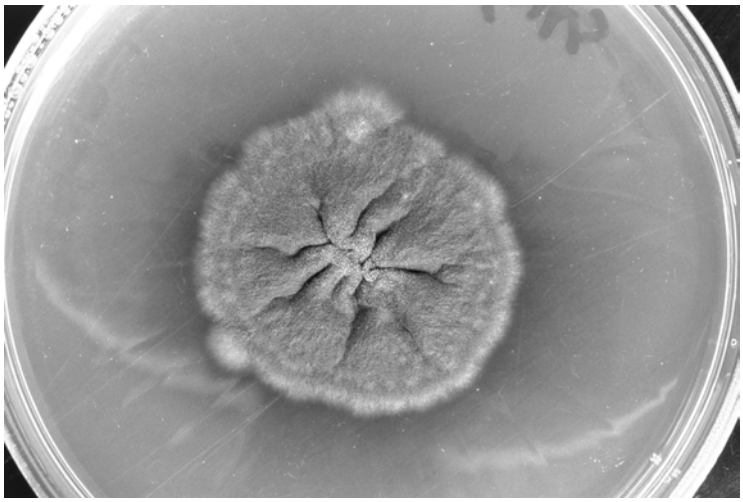


Fig. 1.1

(a) State the name given to

(i) the body of the fungus that grows from a single spore

..... [1]

(ii) the thin threads that make up the body of the fungus.

..... [1]

(b) Describe how a fungus, such as *T. violaceum*, obtains nutrients from the agar medium.

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..... [4]

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Streptomyces, a soil bacterium, is a major source of antibiotics that are produced by pharmaceutical companies. An antibiotic sensitivity test can be carried out to help doctors decide which antibiotic should be used to treat a specific disease, such as gonorrhoea.

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Gonorrhoea bacteria isolated from a person are grown on an agar medium. A ring with eight different antibiotics (**1** to **8**) is placed on the agar medium and left for 24 hours at 35 °C.

Fig. 1.2 shows the growth of bacteria on the agar medium after 24 hours.

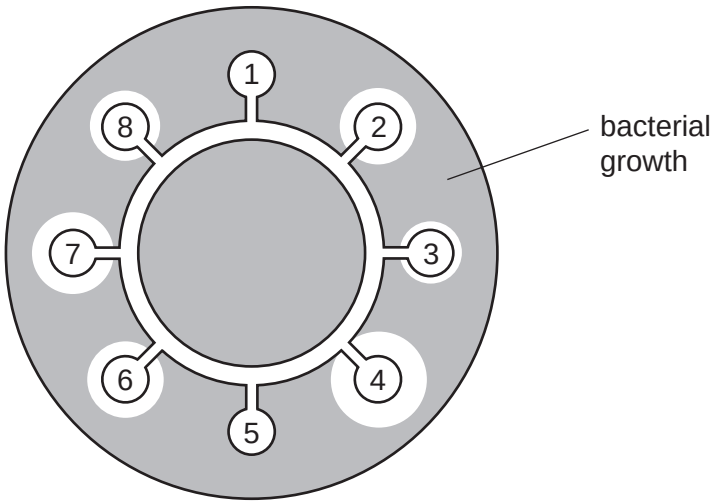


Fig. 1.2

(c) (i) Suggest why there is a clear area around some of the antibiotics.

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..... [2]

(ii) Explain why antibiotics **1** and **5** would **not** be chosen to treat the gonorrhoea infection.

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..... [2]

(iii) People who take antibiotics should always be told to complete the treatment rather than stop taking the antibiotics when they feel better.

Suggest why people are given this advice.

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..... [2]

[Total: 12]

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Question 2 begins on page 6.

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2 The glucose concentration of the blood is maintained within the range 80 – 90 mg per 100 cm^3 blood.

Fig. 2.1 is a flow chart showing how the body responds to changes in the glucose concentration of the blood after the absorption of a carbohydrate-rich meal and during strenuous exercise.

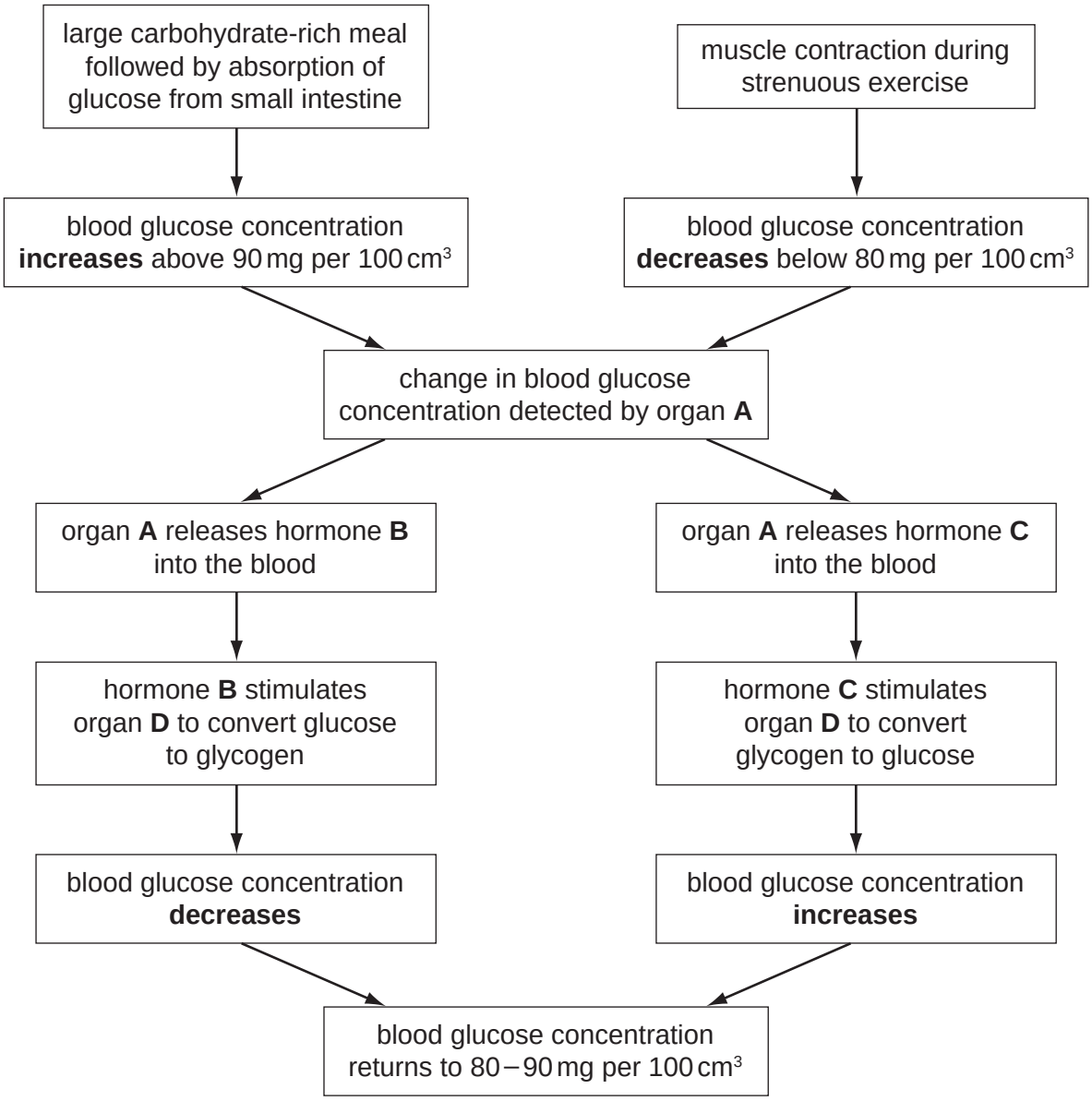


Fig. 2.1

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(a) Name organ **A** and hormones **B** and **C**.

A .....

B .....

C ..... [3]

(b) **(i)** Name organ **D** that stores glucose as glycogen.

..... [1]

(ii) Suggest why glucose is converted to glycogen rather than kept as glucose inside the cells.

.....

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..... [2]

(c) Name the type of control system used in homeostasis that returns the blood glucose concentration to 80 – 90 mg per 100 cm^3.

..... [1]

(d) Animal hormones are used in the production of milk and meat. Bovine somatotrophin (BST) is used to increase milk production by cows. The hormone is produced by genetically modified bacteria that contain the cattle gene for making BST. It is used in the United States but is banned for use in the European Union.

(i) Outline how genes, such as the one for BST, are transferred from the cells of cattle (cows) to bacteria.

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..... [3]

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(ii) Suggest advantages **and** disadvantages of using hormones, such as BST, in the production of milk and meat.

advantages .....

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.....

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disadvantages .....

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..... [3]

[Total: 13]

3 **(a)** Explain the meaning of the term *transpiration*.

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..... [2]

(b) Root hair cells provide a large surface area for the absorption of water from the soil.

Explain, using the term **water potential**, how water is absorbed from the soil into root hair cells.

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..... [3]

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Some plants are adapted for life in dry habitats where it can be very hot during the day and very cold at night.

Fig. 3.1 shows some saguaro cacti from the Sonoran desert in Arizona and Mexico.

Fig. 3.2 shows the surface of the stem of a saguaro cactus.



Fig. 3.1

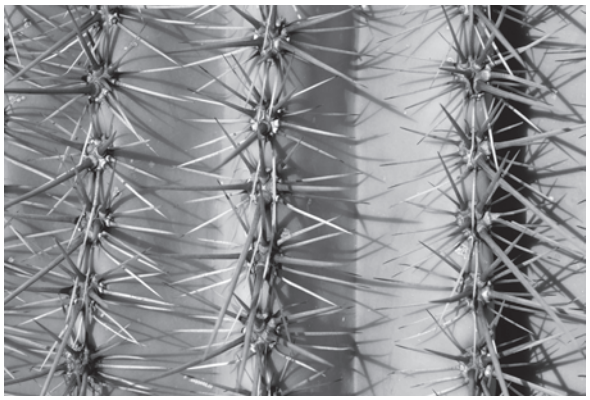


Fig. 3.2

(c) Explain how two features, **visible in Fig. 3.1 or Fig. 3.2**, are adaptations to the conditions in the Sonoran desert.

feature 1 .....

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feature 2 .....

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..... [4]

(d) The stomata of some desert plants, such as the saguaro cactus, open at night and close during the day.

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Explain how this allows the cacti to survive in the desert, but limits their growth rate.

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..... [4]

[Total: 13]

Question 4 begins on page 12.

For Examiner's Use

4 Enzymes are biological catalysts.

(a) Define the term *catalyst*.

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..... [2]

Urease is an enzyme found in bacteria and in the seeds of some species of bean.

The enzyme catalyses the reaction:

urea + water ⟶ carbon dioxide + ammonia

The production of ammonia increases the pH of the area around the bacteria. The formation of ammonia can be used to study the progress of the reaction by testing the pH of the surrounding medium with a pH indicator, such as Universal Indicator solution.

Some students carried out an investigation to find out if there was urease in the seeds of four different species of bean.

- The germinating seeds were ground up in water and filtered to give an extract containing proteins.
- Each extract was added to a urea solution and kept at 30 °C for 30 minutes (tubes **1** to **4**).
- Two more tubes (**5** and **6**) were included in the investigation.
- Samples were taken from the reaction mixture at five-minute intervals and tested with Universal Indicator solution.

The results are shown in Table 4.1.

Table 4.1

test-tube	bean species	urea solution	water	presence of alkaline pH at intervals of 5 minutes						
				0	5	10	15	20	25	30
1	soya	yes	no	×	×	×	×	✓	✓	✓
2	mung	yes	no	×	×	×	×	×	×	×
3	jack	yes	no	×	×	×	✓	✓	✓	✓
4	broad	yes	no	×	×	×	×	×	×	×
5	soya	no	yes	×	×	×	×	×	×	×
6	no beans	yes	yes	×	×	×	×	×	×	×

✓ = alkaline pH × = not alkaline pH

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(b) (i) Explain why the test-tubes were kept at 30 °C.

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..... [2]

(ii) Explain why test-tubes **5** and **6** were included in the investigation.

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..... [2]

(iii) State the conclusions that the students would make from the results of test-tubes **1** to **4**.

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..... [3]

It is thought that some bean seeds produce ammonia as a protection against infection by microorganisms in the soil.

(c) Suggest what would happen to any ammonia that passes into the soil.

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..... [2]

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[Turn over

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(d) *Helicobacter pylori* is a bacterium that infects the stomach and causes ulcers.

The bacteria secrete urease that helps them to colonise the stomach lining.

(i) Explain why bacteria do not usually grow inside the stomach.

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..... [2]

(ii) Suggest how urease helps the bacteria to colonise the stomach.

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..... [2]

(iii) Explain how the immune system protects against infection by bacteria such as *H. pylori*.

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..... [2]

[Total: 17]

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5 Fig. 5.1 shows the changes in carbon emissions from the burning of three fossil fuels between 1800 and 2000.

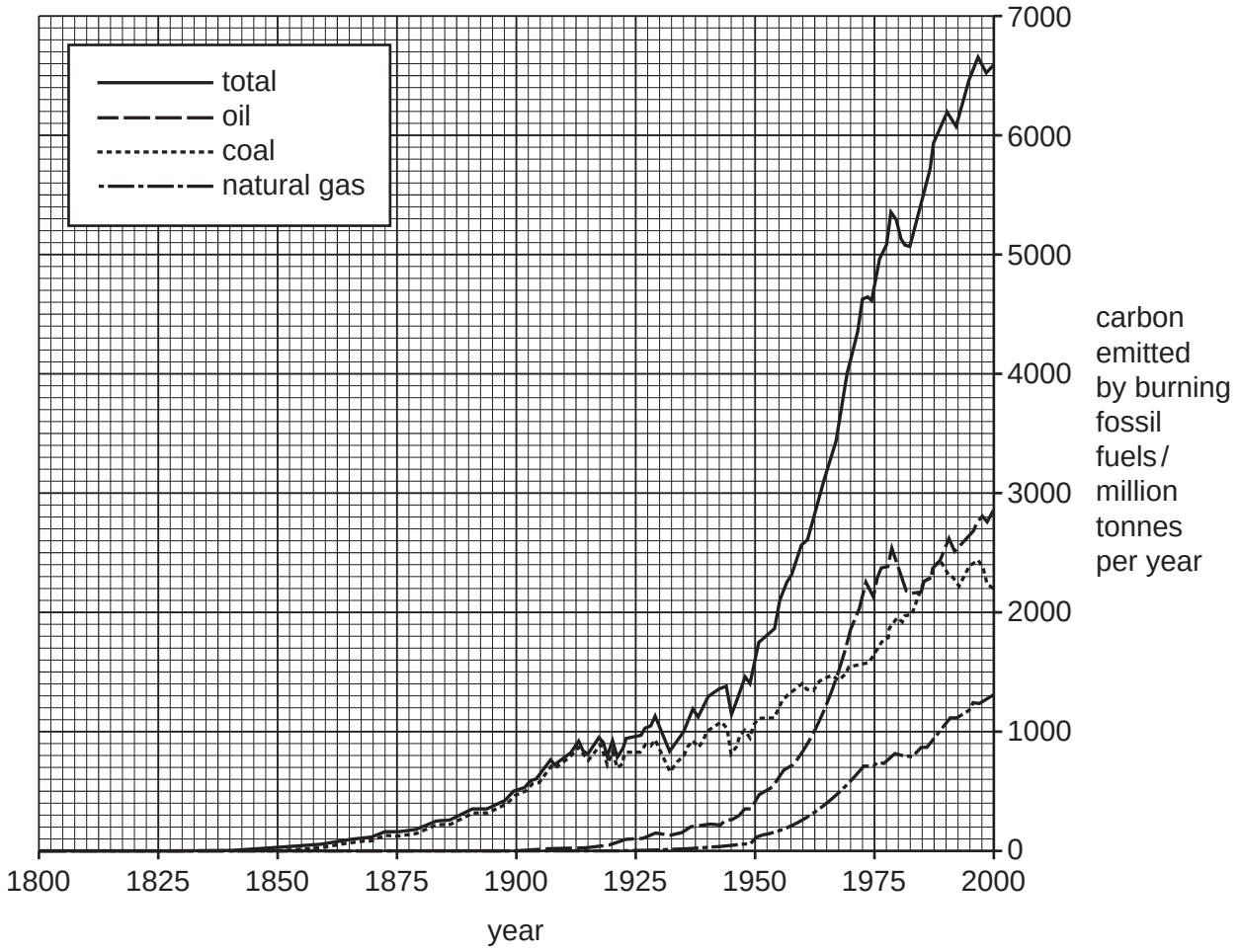


Fig. 5.1

(a) Use the information in Fig. 5.1 to describe the changes in carbon emissions from the burning of fossil fuels between 1800 and 2000.

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..... [5]

All fossil fuels contain hydrocarbons and some also contain compounds of sulfur.

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(b) Explain how the combustion of these compounds contributes to pollution.

hydrocarbons .....

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.....

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compounds of sulfur .....

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..... [4]

(c) Explain the need to conserve fossil fuels, such as coal, oil and natural gas.

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..... [2]

[Total: 11]

Question 6 begins on page 18.

For Examiner's Use

6 The field mustard plant, *Brassica rapa*, is cross-pollinated by insects.

(a) Describe the advantages of cross-pollination to plants.

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..... [3]

Fig. 6.1 shows the events that follow pollination in *B. rapa*.

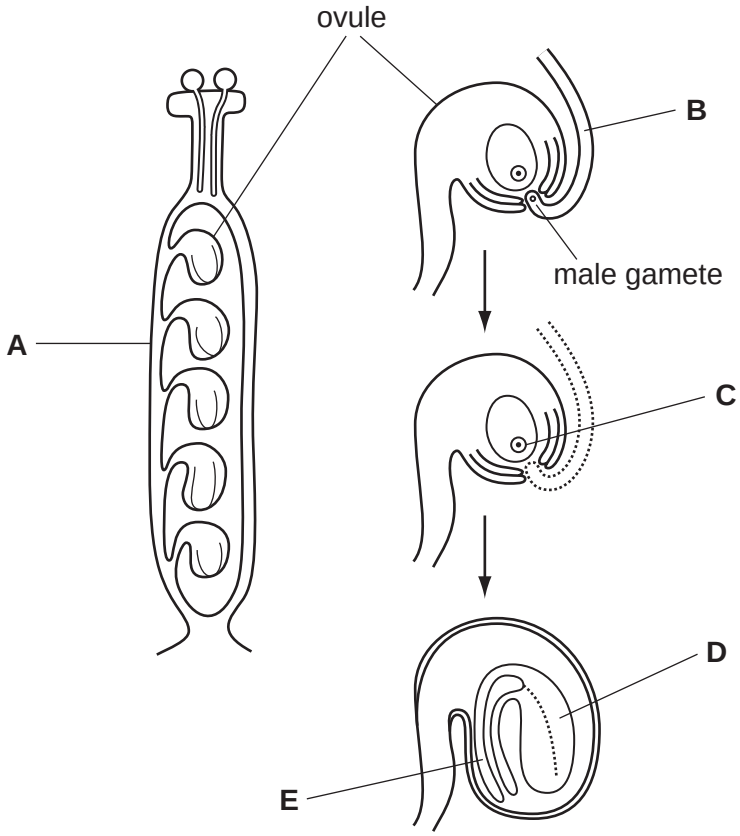


Fig. 6.1

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(b) Name

(i) structures **A** to **E**.

A .....

B .....

C .....

D .....

E ..... [5]

(ii) the type of nuclear division that occurs to produce the new cells as the seed grows.

..... [1]

(c) Explain why the genotypes of the seeds are not all the same.

.....

.....

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..... [2]

When ripe, the seed pod breaks open and the seeds are scattered. Some of the seeds germinate and grow into adult plants, but many do not.

(d) Explain why many seeds released by *B. rapa* do **not** germinate and grow into adult plants.

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..... [3]

[Total: 14]

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Question 3 Figure 3.1 Photographs © References A1K57J, A533DG; Alamy Ltd

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