AQA GCSE Biology | 8461

SPECIFICATION POINT 4.6.1.2

Meiosis

Past-paper questions

Tier	**Higher**
Question groups	**7**
Available paper years	**2010–2025**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

4.6.1.2 Meiosis

Question 01

June 2019 | BLY2H | Original Q7 | Legacy

7 The table shows the number of chromosomes found in each body cell of some different organisms.

Animals		Plants	
Species	**Number of chromosomes in each body cell**	**Species**	**Number of chromosomes in each body cell**
Fruit fly	8	Tomato	24
Goat	60	Potato	44
Human	46	Rice	24

7 (a) Nearly every organism on earth has an even number of chromosomes in its body cells.

Suggest why.

.....

.....

(1 mark)

7 (b) Chromosomes contain DNA molecules.

Describe the function of DNA.

.....

.....

.....

.....

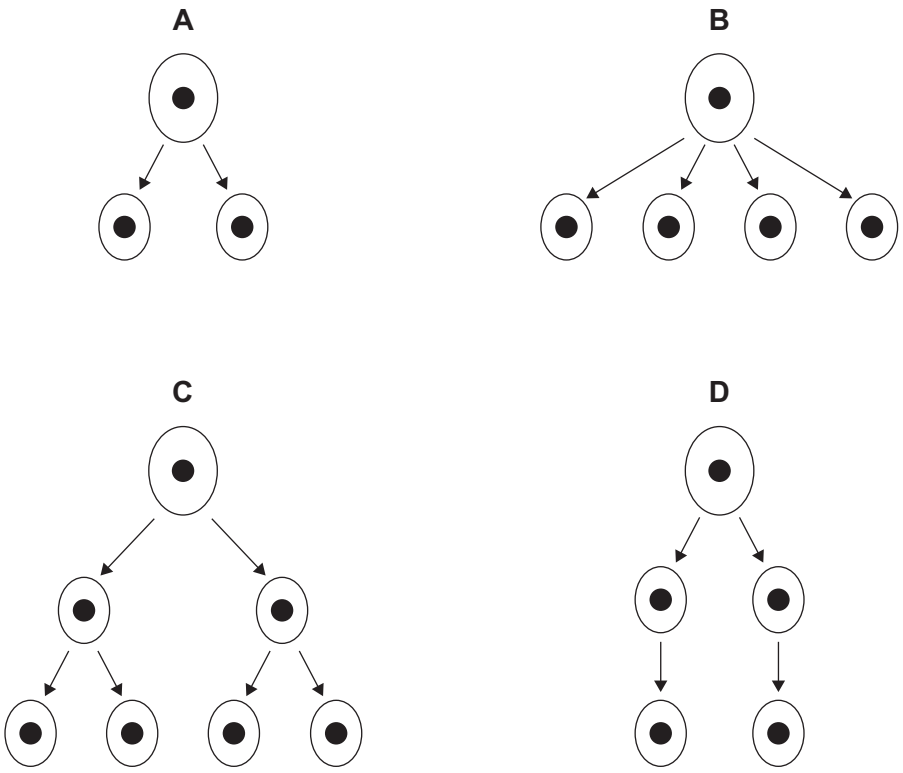
(2 marks)

4.6.1.2 Meiosis

Question 01 · continued

7 (c) Gametes are made in the testes by meiosis.

7 (c) (i) Look at the diagrams.



Which diagram, **A**, **B**, **C** or **D**, represents how cell division by meiosis produces gametes in the testes? ☐

(1 mark)

7 (c) (ii) How many chromosomes will each goat gamete contain?

.....

(1 mark)

Question 7 continues on the next page

4.6.1.2 Meiosis

Question 01 · continued

7 (d) Body cells divide by mitosis.

7 (d) (i) Why is the ability of body cells to divide important?

.....

.....

(1 mark)

7 (d) (ii) When a body cell of a potato plant divides, how many chromosomes will each of the new cells contain?

.....

(1 mark)

7

4.6.1.2 Meiosis

Question 02

June 2013 | BL2HP | Original Q8 | Legacy

8 The photographs show the flowers of two closely-related species of plant.

Species A



Species B



The drawings show chromosomes from one cell in the root of each plant during cell division.

Species A



One chromosome

Species B



One chromosome

8 (a) The drawings show that each chromosome has two strands of genetic material.

8 (a) (i) How does a chromosome become two strands?

.....

.....

(1 mark)

4.6.1.2 Meiosis

Question 02 · continued

8 (a) (ii) Explain why each chromosome must become two strands before the cell divides.

.....

.....

.....

.....

(2 marks)

8 (b) For sexual reproduction, the plants produce gametes.

8 (b) (i) Name the type of cell division that produces gametes. .....

(1 mark)

8 (b) (ii) How many chromosomes would there be in a gamete from each of these two plant species?

Species A ☐ **Species B** ☐

(1 mark)

8 (b) (iii) It is possible for gametes from **Species A** to combine with gametes from **Species B** to produce healthy offspring plants.

How many chromosomes would there be in each cell of one of the offspring plants?

☐

(1 mark)

Question 8 continues on the next page

Question 02 · continued

8 (c) (i) Look back at the information at the start of the question and the information from part **(b)**.

What evidence from these two pieces of information supports the belief that **Species A** and **Species B** evolved from a common ancestor?

.....

.....

.....

.....

(2 marks)

8 (c) (ii) For successful gamete production to take place, chromosomes that contain the same genes must pair up.

The drawings showing the chromosomes of **Species A** and of **Species B** are repeated below.

Species A



One chromosome

Species B



One chromosome

The offspring plants cannot reproduce sexually.

Suggest an explanation for this.

.....

.....

.....

.....

.....

.....

(2 marks)

10

4.6.1.2 Meiosis

Question 03

0 5 Cell division is needed for growth and for reproduction.

0 5 . 1 **Table 3** contains three statements about cell division.

Complete **Table 3**.

[2 marks]

Tick **one** box for each statement.

Table 3

Statement	Statement is true for		
	Mitosis only	**Meiosis only**	**Both mitosis and meiosis**
All cells produced are genetically identical			
In humans, at the end of cell division each cell contains 23 chromosomes			
Involves DNA replication			

4.6.1.2 Meiosis

Question 03 · continued

Bluebell plants grow in woodlands in the UK.

- Bluebells can reproduce sexually by producing seeds.
- Bluebells can also reproduce asexually by making new bulbs.

0 5 . 2 One advantage of asexual reproduction for bluebells is that only **one** parent is needed.

Suggest **two** other advantages of asexual reproduction for bluebells.

[2 marks]

1

2

0 5 . 3 Explain why sexual reproduction is an advantage for bluebells.

[4 marks]

8

4.6.1.2 Meiosis

Question 04

November 2020 | 8461/2H | Original Q5

0 5 There are two types of cell division: mitosis and meiosis.

0 5 . 1 Describe **three** differences between the processes of mitosis and meiosis.

[3 marks]

1 _____

_____

_____

2 _____

_____

_____

3 _____

_____

_____

0 5 . 2 Describe **one** similarity between the processes of mitosis and meiosis.

[1 mark]

_____

_____

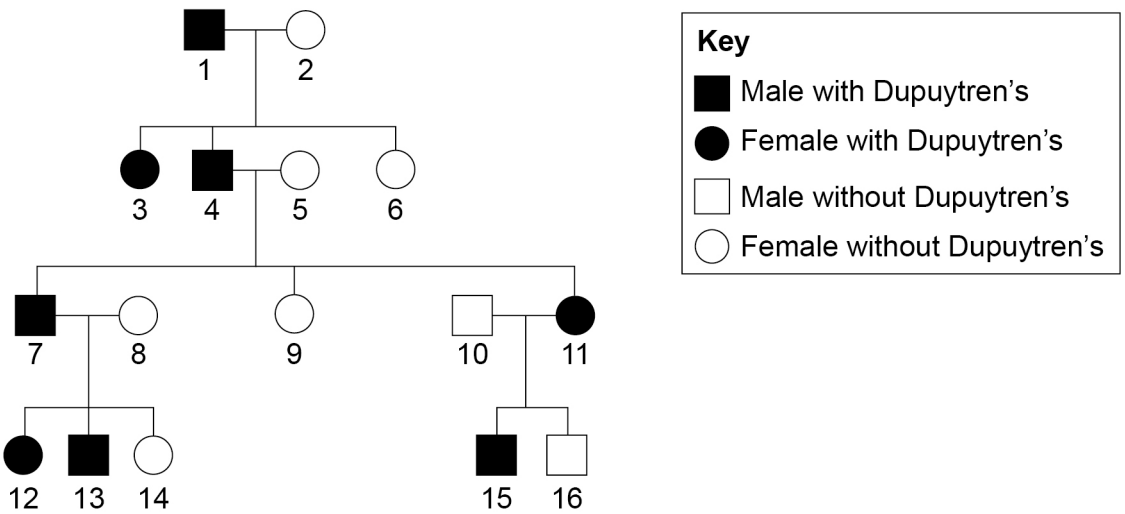
Question 5 continues on the next page

Question 04 · continued

Dupuytren's is a disorder that affects the hands.

Figure 6 shows the inheritance of Dupuytren's in one family.

Figure 6



Dupuytren's is caused by a dominant allele in this family.

D = dominant allele

d = recessive allele

0 5 . 3 Give the genotype of person **1**.

Explain your answer.

[2 marks]

Genotype _____

4.6.1.2 Meiosis

Question 04 · continued

0 5 . 4 Person **7** and person **8** in **Figure 6** are expecting a fourth child.

What is the probability of the child having Dupuytren's?

You should:

- draw a Punnett square diagram
- identify which offspring have Dupuytren's

[5 marks]

Probability = _____

0 5 . 5 Explain how **Figure 6** shows the allele for Dupuytren's is **not** on the Y chromosome.

[2 marks]

_____

_____

_____

_____

13

4.6.1.2 Meiosis

Question 05

0 1 There are two types of reproduction:

- sexual reproduction
- asexual reproduction.

0 1 . 1 Complete **Table 1** to compare sexual reproduction with asexual reproduction.

Write a tick (✓) in the box if the statement is true.

The first row has been completed for you.

[2 marks]

Table 1

	Sexual reproduction	Asexual reproduction
Cell division occurs	✓	✓
Fertilisation occurs		
Genes are passed on from parent to offspring		
Offspring are genetically identical to each other		

0 1 . 2 Gametes are formed in sexual reproduction.

Name the male gamete formed in flowering plants.

[1 mark]

_____

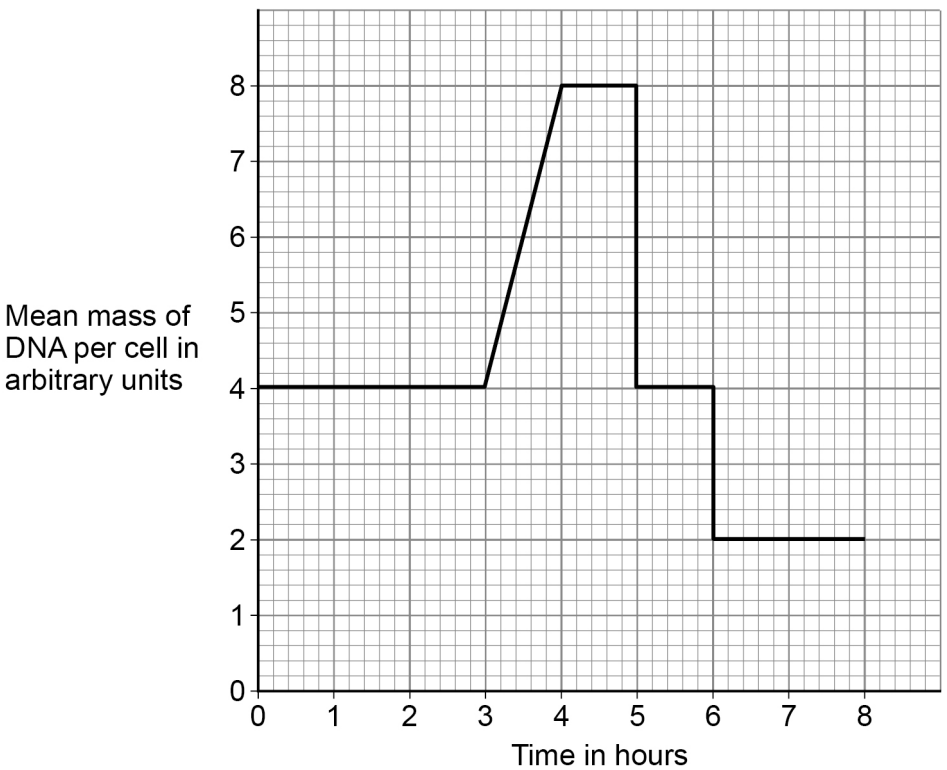
Question 1 continues on the next page

Question 05 · continued

Cell division by meiosis forms gametes.

Figure 1 shows the mean mass of DNA per cell before, during and after meiosis.

Figure 1



Use information from **Figure 1** to answer questions **01.3** to **01.6**.

0 1 . 3 When is the DNA in the chromosomes being copied?

[1 mark]

Tick (✓) **one** box.

- Between 0 and 3 hours ☐
- Between 3 and 4 hours ☐
- Between 4 and 5 hours ☐
- Between 5 and 6 hours ☐

4.6.1.2 Meiosis

Question 05 · continued

0 1 . 4 Cells divide twice during meiosis.

Which **two** times in **Figure 1** show one cell dividing into two cells?

[2 marks]

Tick (✓) **two** boxes.

3 hours ☐

4 hours ☐

5 hours ☐

6 hours ☐

8 hours ☐

0 1 . 5 What is the mean mass of DNA in arbitrary units in a sperm cell?

[1 mark]

Tick (✓) **one** box.

2 ☐ 4 ☐ 8 ☐ 16 ☐

0 1 . 6 What is the mean mass of DNA in arbitrary units in each cell in an embryo?

[1 mark]

Tick (✓) **one** box.

2 ☐ 4 ☐ 8 ☐ 16 ☐

8

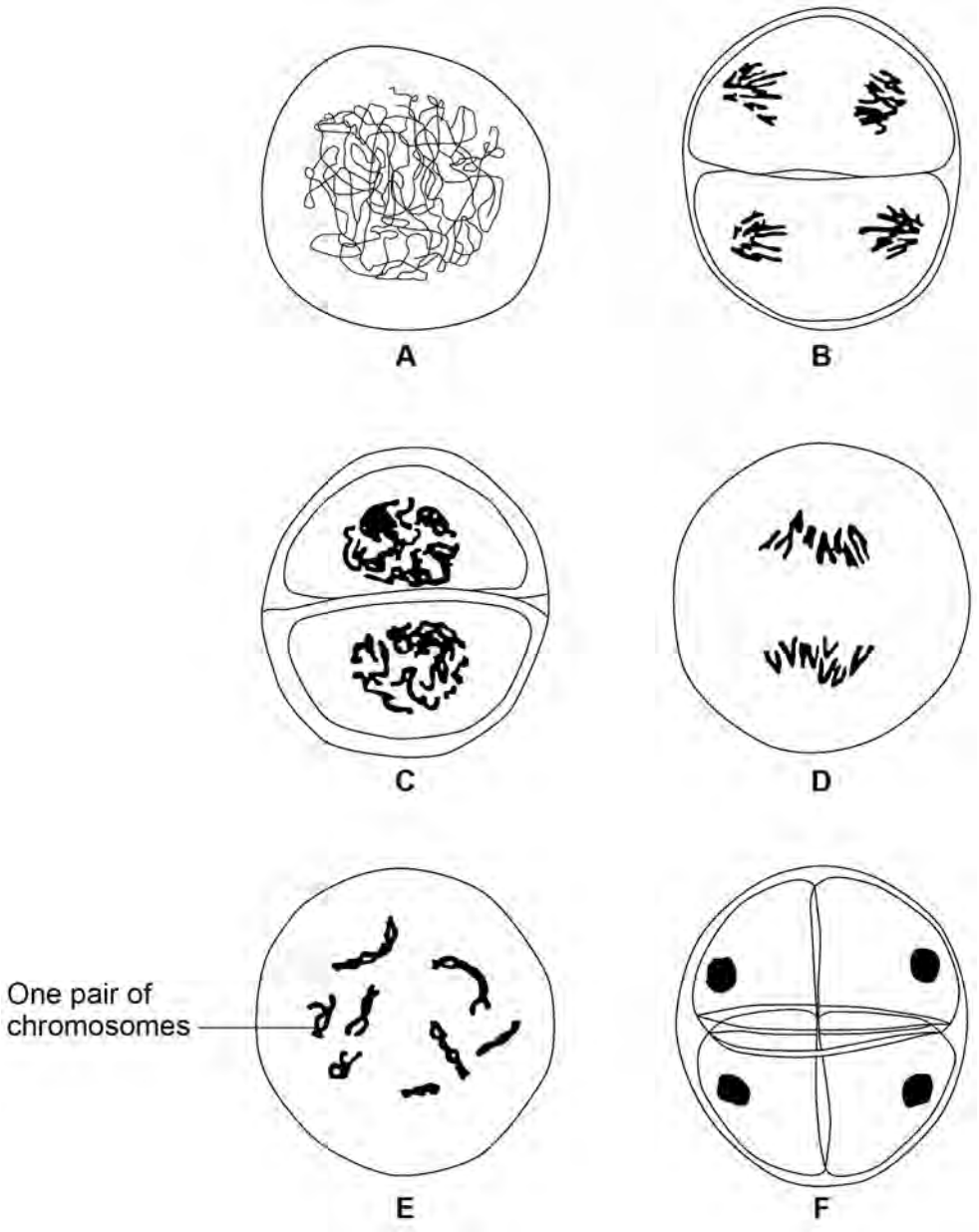
4.6.1.2 Meiosis

Question 06

June 2023 | 8461/2H | Original Q8

0 8 **Figure 13** shows six stages in the process of meiosis.

Figure 13



0 8 . 1 In **Figure 13**, **A** is the first stage and **F** is the final stage.

Stages **B** to **E** are **not** in the correct order.

Give the correct order of stages **A** to **F**.

[1 mark]

A → _____ → _____ → _____ → _____ → **F**

Question 06 · continued

At the end of meiosis the number of chromosomes is different from the number of chromosomes at the start of meiosis.

0 8 . 2 Give the number of chromosomes in **one** cell in **Figure 13**:

- at the start of meiosis
- at the end of meiosis.

[2 marks]

Start _____

End _____

0 8 . 3 Explain why the change in the number of chromosomes is important.

[3 marks]

0 8 . 4 Meiosis produces cells that are genetically different.

Describe how meiosis produces cells that are genetically different.

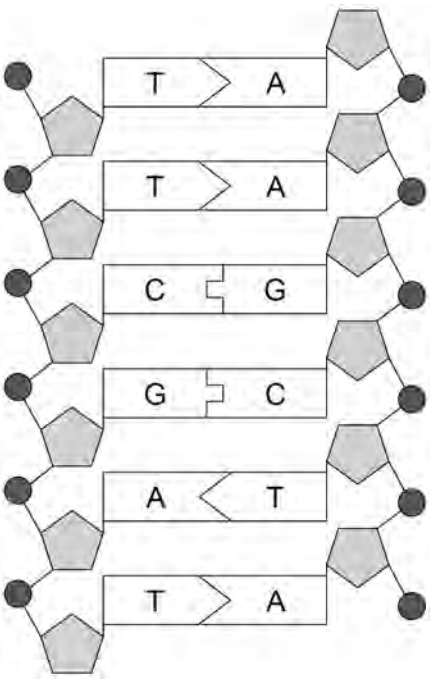
[2 marks]

Question 8 continues on the next page

Chromosomes contain DNA.

Figure 14 shows part of a DNA molecule.

Figure 14



0 8 . 5 What type of substances are labelled **A**, **C**, **G** and **T** in **Figure 14**?

[1 mark]

0 8 . 6 DNA is made of nucleotides.

How many nucleotides are shown in **Figure 14**?

[1 mark]

10

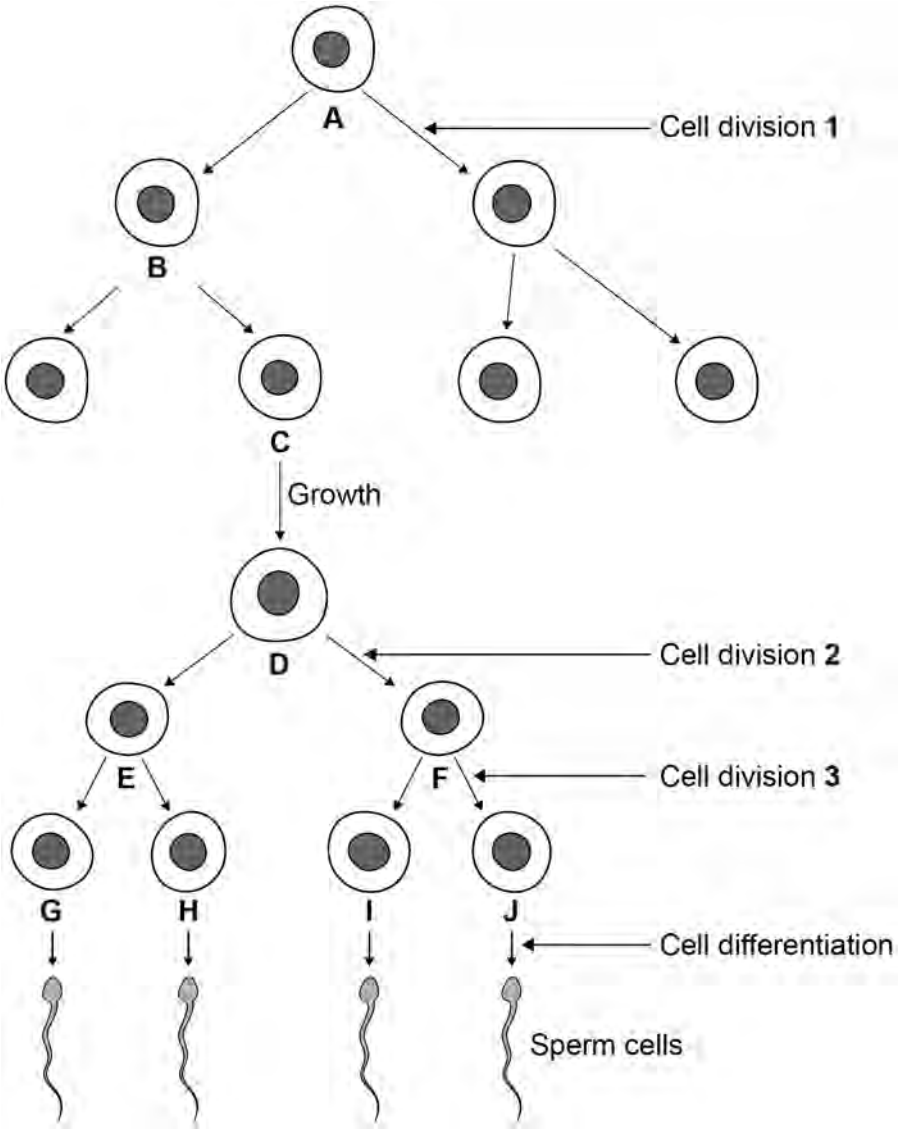
4.6.1.2 Meiosis

Question 07

0 6 New cells are produced by cell division.

Figure 5 shows sperm formation in a human.

Figure 5



4.6.1.2 Meiosis

Question 07 · continued

0 6 . 1 Which cell division in **Figure 5** represents mitosis?

[1 mark]

Tick (✓) **one** box.

Cell division **1** ☐

Cell division **2** ☐

Cell division **3** ☐

0 6 . 2 Which two cells in **Figure 5** are genetically identical?

[1 mark]

Tick (✓) **one** box.

A and **C** ☐ **B** and **I** ☐ **F** and **J** ☐ **G** and **H** ☐

0 6 . 3 How many chromosomes are there in cell **J** in **Figure 5**?

[1 mark]

0 6 . 4 How many of the cells **C**, **D**, **E**, **F**, **G**, **H**, **I** and **J** contain a Y chromosome?

Use **Figure 5**.

[1 mark]

Question 6 continues on the next page

4.6.1.2 Meiosis

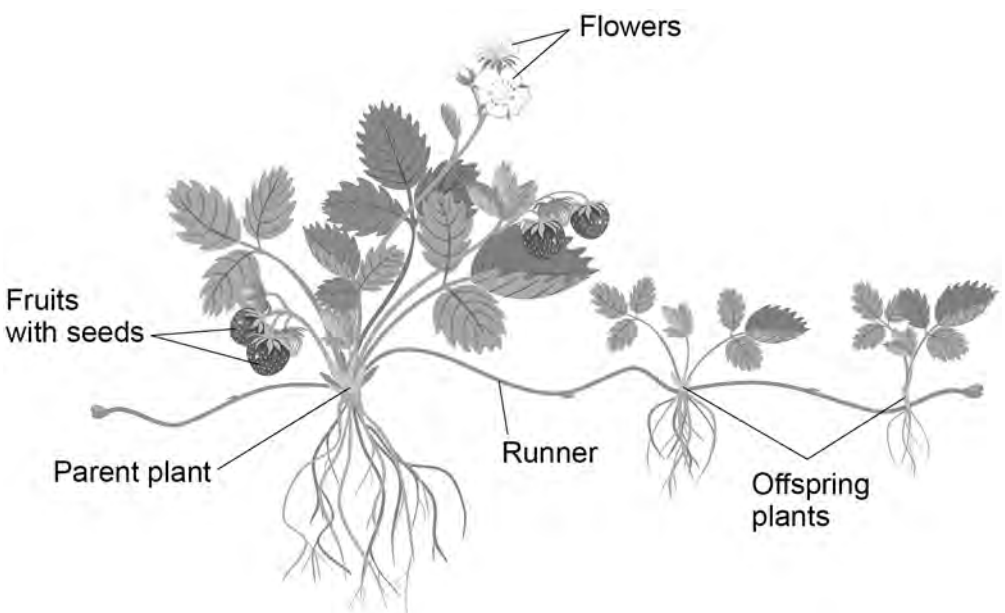
Question 07 · continued

Strawberry plants can reproduce both sexually and asexually.

Figure 6 shows a strawberry plant reproducing:

- sexually using flowers, fruits and seeds
- asexually using horizontal stems called runners.

Figure 6



0 6 . 5 Explain why the offspring produced using runners are genetically identical.

[2 marks]

4.6.1.2 Meiosis

Question 07 · continued

0 6 . 6 Explain why the offspring produced using flowers, fruits and seeds are **not** genetically identical.

[2 marks]

0 6 . 7 Describe **two** advantages of **asexual** reproduction for the survival of strawberry plants.

[2 marks]

1

2

0 6 . 8 Describe **two** advantages of **sexual** reproduction for the survival of strawberry plants.

[2 marks]

1

2

12