

GCSE Biology (9 – 1)

Cell Division & Stem Cells

Name:

Group:.....

Instructions

- Read each question carefully before you begin to answer it.
- Use black ink or black ball-point pen for your answers.
- Fill in the boxes at the top of this page with your name and group.
- Attempt to answer every question in the booklet.
- Answer the questions in the spaces provided – there may be more space than you need in some answer spaces.
- Calculators may be used for this booklet.
- For any calculations, you **must** show all your working.
- Any and all drawings or graphs should be completed in pencil.



For markers use	
Question	Mark
1	/5
2	/8
3	/3
4	/4
5	/7
6	/6
7	/4
8	/3
9	/10
Total	/50
%	
Grade	

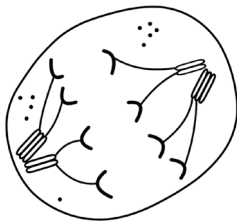
Information

- The maximum mark for this paper is 50 marks.
- The marks for each question are shown in brackets.
- Please be aware that good English and clear presentation are required in your answers.

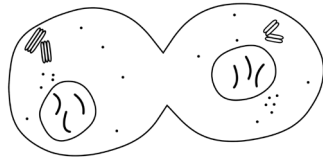


1. Cell division is a vital biological process that drives growth, repairs tissues, and ensures the inheritance of genetic information across generations. Circle the letter of the correct answer in each question.

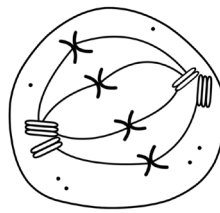
- a) The figures below show the different stages of mitosis.
Put the stages of mitosis into the correct order.



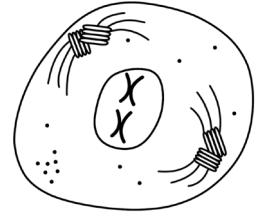
1



2



3



4

A 1 → 2 → 3 → 4

B 3 → 2 → 1 → 4

C 2 → 1 → 4 → 3

D 4 → 3 → 1 → 2

(1 mark)

- b) During which phase of the cell cycle does DNA replication occur?

Prophase

Interphase

Telophase

Metaphase

A

B

C

D

(1 mark)

- c) What is the primary purpose of mitosis in **multicellular** organisms?

- A To produce gametes for sexual reproduction.
- B To increase genetic diversity.
- C To enable growth and repair of tissues.
- D To reduce the chromosome number by half.

(1 mark)

- d) How many daughter cells are produced at the end of meiosis?

- A Two, genetically identical to the parent cell.
- B Two, genetically different from the parent cell.
- C Four, genetically identical to the parent cell.
- D Four, genetically different from the parent cell.

(1 mark)

- e) If a cell has 46 chromosomes before mitosis, how many chromosomes will each daughter cell have after mitosis?

23

46

92

12

A

B

C

D

(1 mark)

(Total for Question 1 is 5 marks)

2. This question is about stem cells.

In 2012, Sir John Gurdon and Shinya Yamanaka were awarded the Nobel prize for medicine for their research on stem cells. Their work showed that mature adult stem cells can be reprogrammed to return to embryonic-like stem cells.

a) Describe the possible medical benefits of this research.

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(3 marks)

b) Where could adult stem cells be found in a human?

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(1 mark)

c) Explain the differences between embryonic stem cells and adult stem cells.

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(2 marks)

d) Stem cells can produce more cells using mitosis.

Identify the **four** phases of mitosis in the correct order.

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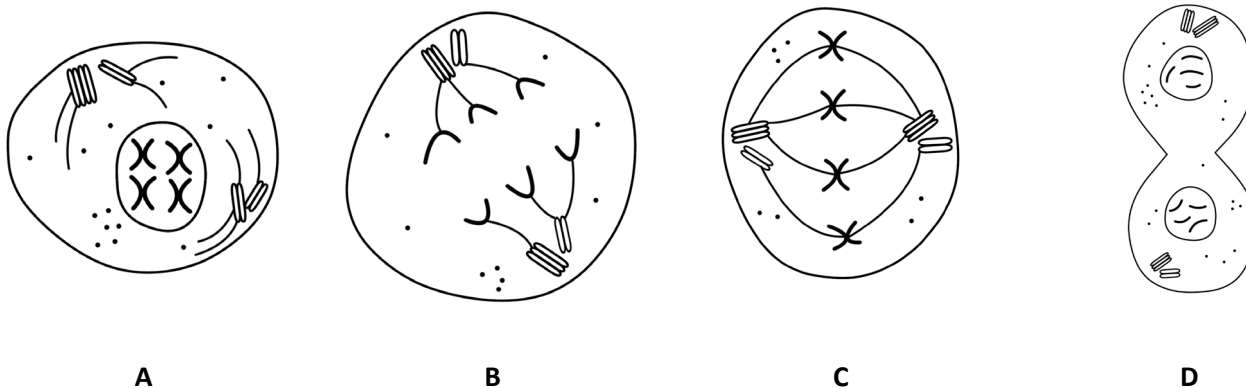
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(2 mark)

(Total for Question 2 is 8 marks)

3. The figure below shows four stages of mitosis, labelled A, B, C and D.

a) Place the stages of mitosis into the correct order. Circle the letter of the correct order.



A C → B → D → A B A → C → B → D C D → C → A → B D A → B → C → D
 (1 mark)

b) Interphase is part of the cell cycle but it is **not** part of mitosis.
 Describe what happens within the cell during interphase.

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(2 marks)

(Total for Question 3 is 3 marks)

4. This question is about meiosis.

a) What is meiosis?

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(2 marks)

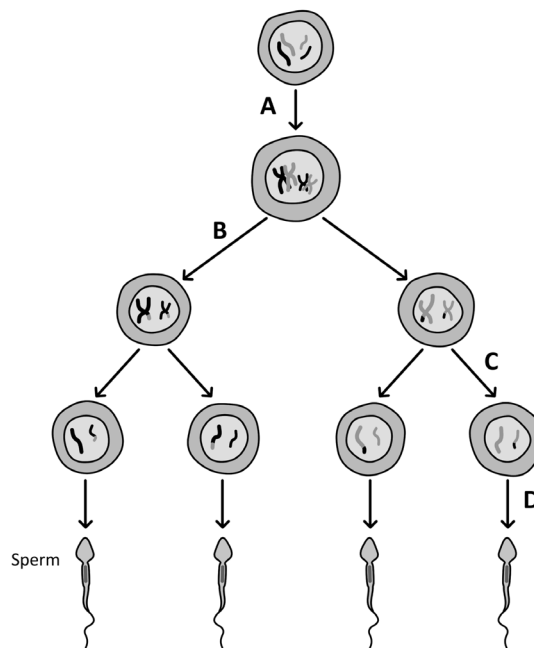
b) Describe what happens to chromosomes during Prophase 1 of meiosis.

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(2 marks)

(Total for Question 4 is 4 marks)

5. The figure below shows the process to produce sperm cells.



a) Four phases of the figure above have been labelled as A, B, C and D. Match each phase of meiosis to a letter on the figure above.

- In what stage is the DNA replicated?
- In what stage does crossing over occur?
- In what stage does recombination occur?

(3 marks)

b) The function of sperm cells is to fertilise ovum cells to form a zygote. The zygote divides to form an embryo containing embryonic stem cells. Describe what is meant by the term **embryonic stem cell**?

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(2 marks)

c) Discuss **one** ethical concern associated with the use of embryonic stem cells in medical research.

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(2 marks)

(Total for Question 5 is 7 marks)

6. Mitosis and meiosis are both different forms of cell division.

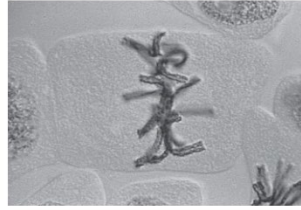
Compare and contrast mitosis and meiosis.

[illegible]

(6 marks)

(Total for Question 6 is 6 marks)

7. The figure below shows one of the stages of mitosis.



a) Which stage of mitosis is shown in the figure above?

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(1 mark)

b) Meiosis is another form of cell division that occurs.

Explain what happens in meiosis prophase 1 that increases genetic variation.

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(3 marks)

(Total for Question 7 is 4 marks)

8. A fertilised egg cell divides many times to form an embryo.

a) Name this type of cell division.

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(1 mark)

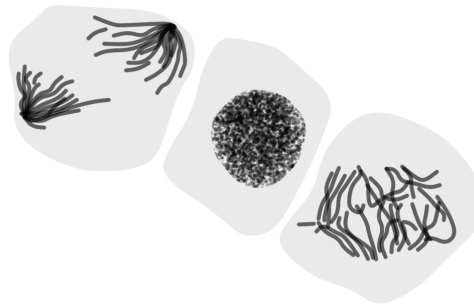
After a baby is born, stem cells may be collected from the umbilical cord. These can be frozen and stored for possible use in the future.

b) What are stem cells?

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(2 marks)

(Total for Question 8 is 3 marks)

9. The figure below shows a number of animal cells showing different stages of cell division.



- a) Cancer can manifest in different forms.
Identify **two** different categories of cancer and explain the key difference between them.

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(3 marks)

- b) Describe how uncontrolled cell division can lead to the development of cancer **and** explain why early detection is important.

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(4 marks)

- c) State **two** risk factors that can increase the chance of developing cancer.

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(2 marks)

- d) Suggest one method of treating cancer.

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(1 mark)

(Total for Question 9 is 10 marks)