

## B2- Cell Division Exam Practice 1

Name:

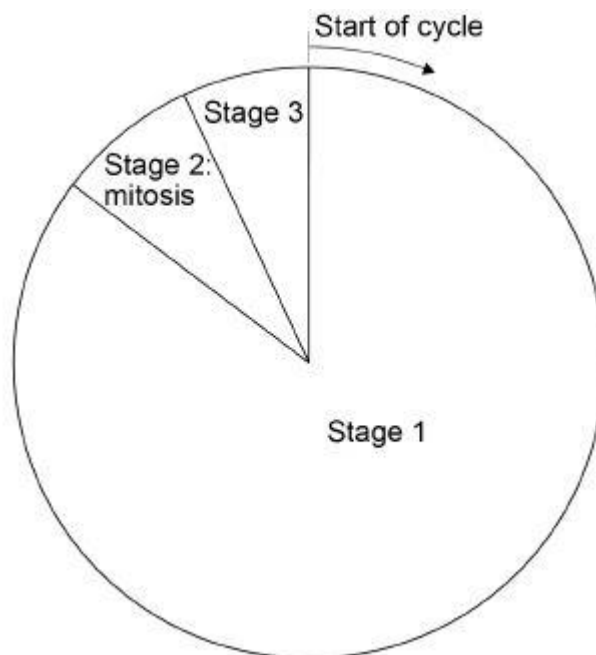
Score:

**Q1.**

Cells divide in a series of stages called the cell cycle.

Stage 2 of the cycle is mitosis.

The diagram below shows a simplified cell cycle for a human body cell.



(a) Draw **one** line from each stage in the cell cycle to what happens during that stage.

Stage in the cell cycle	What happens during that stage
Stage 1	Nucleus divides
Stage 2	Cell divides into two
Stage 3	Copies of the DNA are made

(2)

(b) The mass of DNA in a human body cell at the start of the cell cycle is 6 picograms.

What mass of DNA will be in each of the new cells produced by this cell division?

Tick **one** box.

- 3 picograms
- 6 picograms
- 9 picograms
- 12 picograms

(1)

(c) Stem cells are undifferentiated cells.

Which statement about stem cells is correct?

Tick **one** box.

- Animal stem cells are found in meristems
- Animal stem cells divide by meiosis
- Meristem cells in plants can differentiate throughout the life of the plant
- Meristem cells in plants can only differentiate into one type of cell

(1)

Stem cells from human embryos can differentiate into most types of human cell.

Research is being done into the use of embryonic stem cells in medical treatments.

The long-term effects of using embryonic stem cells in patients are not well understood.

In therapeutic cloning, human embryos are produced using a donated human egg cell and a cell from the patient.

- The embryo produced contains the same genetic information as the patient.
- Stem cells are taken from the embryo and stimulated to divide to form cells the patient needs.
- The embryo is then destroyed.

(d) Suggest **two** advantages of therapeutic cloning.

1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_

(2)

(e) Suggest **two** disadvantages of therapeutic cloning.

1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_

(2)

(Total 8 marks)

**Q2.**

Muscle cells divide to form new muscle cells.

(a) Which **two** cell components are copied before the muscle cells start to divide?

Tick **two** boxes.

- Cytoplasm
- Mitochondria
- Plasmids
- Ribosomes
- Vacuole

(2)

(b) Why do muscle cells need to divide by mitosis more often than most other cells?

Tick **one** box.

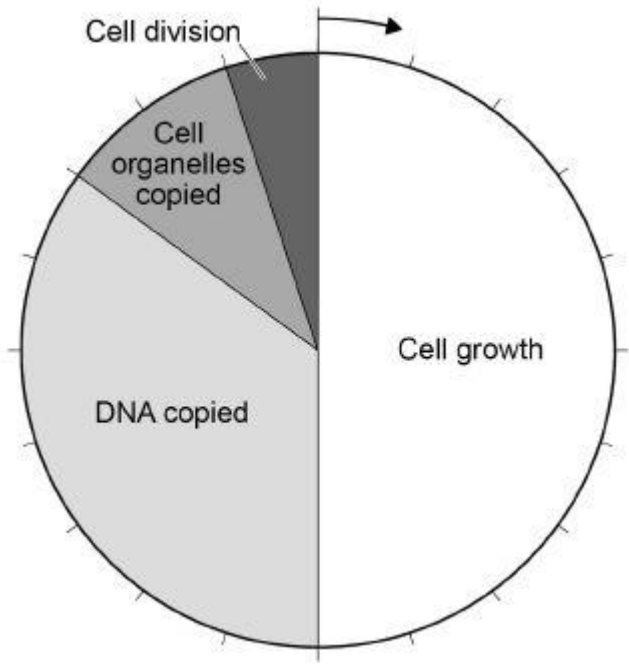
- To contract the muscles
- To repair the muscles

- To supply more oxygen to the muscles
- To transmit nerve impulses

(1)

Mitosis is part of the cell cycle.

The diagram below shows the percentage of time taken by each stage of a cell cycle.



(c) The cell cycle shown in the diagram above takes 21 hours in total.

Cell division takes 5% of the total time.

Calculate how many hours cell division takes.

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Time taken = \_\_\_\_\_ hours

(2)

(d) What percentage of time is spent copying DNA in the cell cycle shown in the diagram above?

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Percentage = \_\_\_\_\_

(2)

(e) A sperm cell from a dog contains 39 chromosomes.

How many chromosomes are there in each dog muscle cell?

Tick **one** box.

39

78

156

312

(1)

(f) A sperm cell fuses with an egg cell.

What is this process called?

Tick **one** box.

Fertilisation

Meiosis

Ovulation

Respiration

(1)

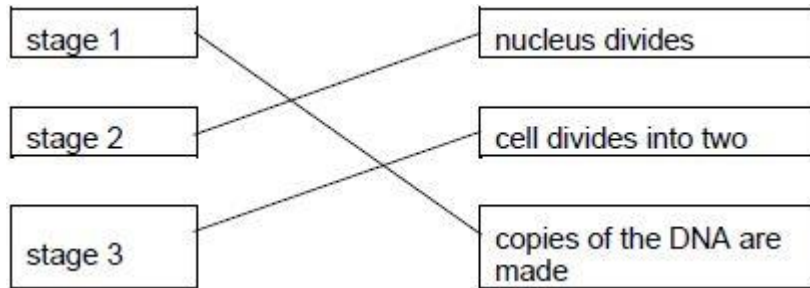
(Total 9 marks)



Mark schemes

**Q1.**

(a)



*allow 1 mark for 1 or 2 correct  
credit can be given where students have  
matched the boxes correctly, for example  
numbering the boxes*

2

(b) 6 picograms

1

(c) meristem cells in plants can differentiate throughout the life of the plant

1

(d) any **two** from:

- may cure / treat diseases  
**or**  
cure medical conditions  
**or**  
produce replacement cells / tissues / organs  
*allow example e.g. diabetes / paralysis  
allow cells can be stored for future use  
ignore used in medical treatments  
ignore patient makes / grows cells / tissues /  
organs*
- cells unlikely to be **rejected** by patient)  
*ignore same genetic information*
- cells / tissues of any type can be produced  
*ignore differentiated into most types of cells*
- many cells produced
- cells produced could be used for research
- would reduce waiting time for transplants

2

*ignore references to cost  
ignore all reference to producing babies / IVF*

(e) any **two** from:

- (potential) life is killed / destroyed  
*allow embryo is killed*

*ignore embryo is destroyed*  
*ignore embryo is a life / becomes a baby*

- shortage of donors / eggs
- egg donation / collection has risks
- do not yet know risks / side effects of the procedure on the patient  
*ignore long term effects are not well understood*  
*allow may cause tumours / cancer*
- may transfer (viral) infection
- poor success rate  
*allow in terms of viable egg / embryo / cell / tissue / organ production*

2

*ignore references to cost*  
*ignore unethical unqualified*  
*Ignore reference to religion / beliefs*

[8]

**Q2.**

(a) mitochondria

1

ribosomes

1

(b) to repair the muscles

1

(c)  $\frac{5}{100} \times 21$

*allow  $\frac{1}{20} \times 21$*

1

1.05 (hours)

*allow for 2 marks 1 hour 3 minutes or 1:03 (hours)*

1

*an answer of 1.05 hours scores 2 marks*

(d)  $\frac{7}{20} \times 100$

*allow  $5 \times 7$*

1

35 (%)

1

*an answer of 53 (%) scores 2 marks*

(e) 78



(f) fertilisation

### Combined Higher Mark scheme

#### Q1.

Marks should **not** be awarded for simply copying the information provided

A mark may be awarded for a comparison between treatments if the answer only involves copied information

any **four** from:

*For all 4 marks to be awarded, there must be at least 1 pro and 1 con*

#### embryo stem cells – examples of

pros

- can treat a wide variety / lots of diseases / problems
- many available / plentiful
- using them better than wasting them
- painless

cons

- (possible) harm / death to embryo
- (relatively) untested / unreliable / may not work  
*allow long term effects not known  
or may be more risky*
- embryo can't be 'asked' / 'embryo rights' idea

#### adult bone marrow stem cells – examples of

pros

- no ethical issues (in collection) **or** permission given
- quick recovery
- (relatively) safe  
*allow does not kill (donor) / low risk*
- well tried / tested / know they work

cons

- operation hazards eg infection

- few types of cell / tissue produced **or** few diseases / problems treated
- painful so may deter donors

4

Conclusion to evaluation:

A reasoned conclusion from the evidence

1

**[5]**