

B2- Cell Division Exam Practice 2

Name:

Score:

Q1.

A plant shoot is made of several tissues.

(a) What is a tissue?

Tick (✓) **one** box.

A group of organs with one function

Cells with a similar structure and function

The organ systems in an organism

(1)

(b) What is the name of the tissue at the growing tip of a plant shoot?

Tick (✓) **one** box.

Meristem

Phloem

Xylem

(1)

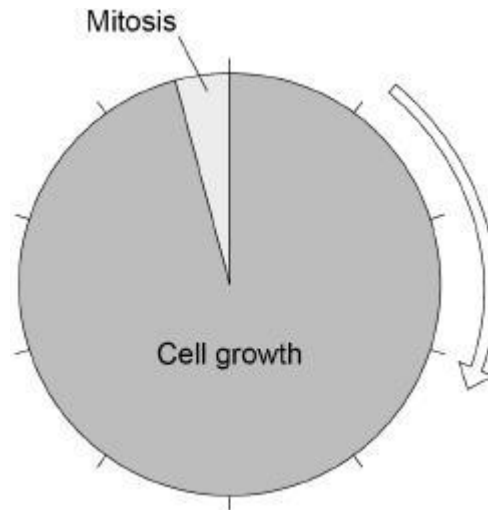
(c) Plant cells divide by mitosis so that the plant can grow.

Give **one** other reason plant cells divide by mitosis.

Do **not** refer to growth in your answer.

(1)

The diagram below shows a cell cycle.



(d) Which **two** processes happen during cell growth in the cell cycle?

Tick (✓) **two** boxes.

- The chromosomes are copied
- The chromosomes separate
- The cytoplasm divides in two
- The nucleus divides
- The organelles increase in number

(2)

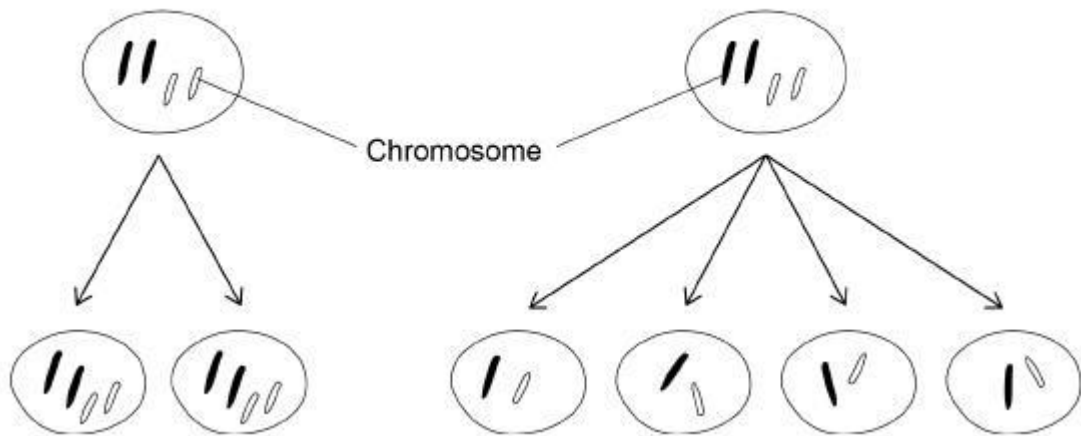
(e) In mitosis and meiosis cells divide to produce new cells.

Cell division by meiosis produces gametes.

The diagram below shows a cell dividing by mitosis and a different cell dividing by meiosis.

Cell dividing by mitosis

Cell dividing by meiosis



Describe how the cells produced by mitosis are different from the cells produced by meiosis.

Use information from the diagram above.

(3)

- (f) A scientist investigated cell division in the growing tip of a plant shoot. The scientist recorded data at different distances from the tip of the shoot. The table below shows the results.

Distance from shoot tip in mm	Mean cell length in μm	Percentage (%) of cells dividing
5	22	13
10	23	9
20	39	4
30	77	0
40	116	0

Give **two** conclusions from the data in table above.

1. _____

2. _____

(2)
(Total 10 marks)

Q1.

Stem cells can be collected from human embryos and from adult bone marrow. Stem cells can develop into different types of cell.

The table gives information about using these two types of stem cell to treat patients.

Stem cells from human embryos	Stem cells from adult bone marrow
It costs £5000 to collect a few cells.	It costs £1000 to collect many cells.
There are ethical issues in using embryo stem cells.	Adults give permission for their own bone marrow to be collected.
The stem cells can develop into most other types of cell.	The stem cells can develop into only a few types of cell.
Each stem cell divides every 30 minutes.	Each stem cell divides every four hours.
There is a low chance of a patient's immune system rejecting the cells.	There is a high chance of a patient's immune system rejecting the cells.
More research is needed into the use of these stem cells.	Use of these stem cells is considered to be a safe procedure.

Scientists are planning a new way of treating a disease, using stem cells.

Use **only** the information above to answer these questions.

(a) Give **three** advantages of using stem cells from embryos instead of from adult bone marrow.

1. _____
2. _____
3. _____

(3)

(b) Give **three** advantages of using stem cells from adult bone marrow instead of from embryos.

1. _____

2. _____

3. _____

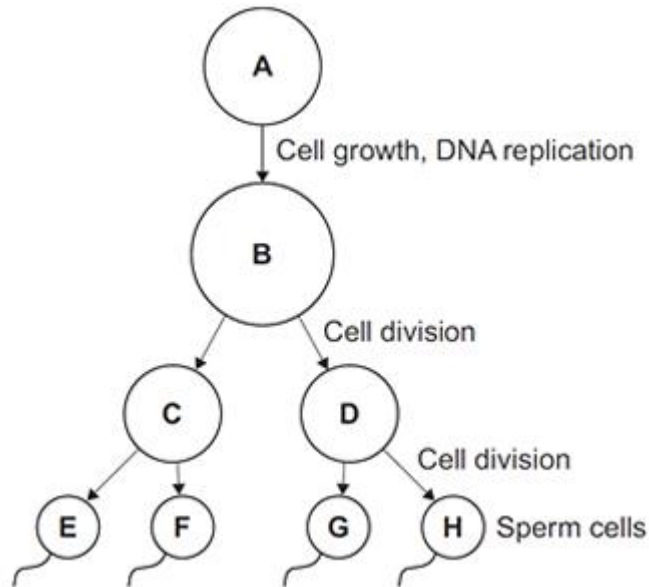
(3)

(Total 6 marks)

Combined Higher Question

Q1.

The diagram below shows the production of human sperm cells.



(a) Name the organ where the processes shown in the diagram above take place.

(1)

(b) (i) Not every cell in the diagram above contains the same amount of DNA.

Cell A contains 6.6 picograms of DNA (1 picogram = 10^{-12} grams).

How much DNA is there in each of the following cells?

Cell B _____ picograms

Cell C _____ picograms

Cell E _____ picograms

(2)

(ii) How much DNA would there be in a fertilised egg cell?

_____ picograms

(1)

(iii) A fertilised egg cell divides many times to form an embryo.

Name this type of cell division.

(1)

(c) 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.

(i) What are stem cells?

(2)

(ii) Suggest why it is ethically more acceptable to take stem cells from an umbilical cord instead of using stem cells from a 4-day-old embryo produced by In Vitro Fertilisation (IVF).

(1)

(iii) Stem cells taken from a child's umbilical cord could be used to treat a condition later in that child's life.

Give **one** advantage of using the child's own umbilical cord stem cells instead of using stem cells donated from another person.

(1)

(iv) Why would it **not** be possible to treat a genetic disorder in a child using his own umbilical cord stem cells?

(1)

(Total 10 marks)

Mark schemes

Q1.

- (a) cells with a similar structure and function 1
- (b) meristem 1
- (c) repair / replace (damaged) tissue
or
replace (damaged) cells
ignore repair unqualified
ignore repair cell(s)
allow asexual reproduction
allow cloning 1
- (d) the chromosomes are copied 1
- the organelles increase in number 1
- (e) (for mitosis)
allow converse for meiosis if clearly stated
- any **three** from:
- 2 cells produced instead of 4 cells
 - cells contain 4 chromosomes instead of 2 chromosomes
allow cells contain 2 pairs of chromosomes instead of single chromosomes
allow cells contain same number of chromosomes as parent cell
allow cells are diploid
allow contain the full number of chromosomes
 - (cells produced) are (genetically) identical to each other
 - (cells produced) are (genetically) identical to parent cell
- 3
- (f) any **two** from:
- the further from the (shoot) tip the longer the cells are
allow the cell length is greatest at 40 mm
 - the further from the (shoot) tip the lower the percentage of dividing cells
 - as the percentage of cells dividing decreases the length of the cells increases
 - no cells dividing from 30 mm from shoot tip
or
cell division stops from 30 mm from shoot tip
 - the increase in length is greater the further from the (shoot) tip
allow converse
- 2

Q2.

- (a) *comparisons are **not** required but should be credited
accept a clear indication of the statement even if incomplete*

can develop into most other types of cell 1

each cell divides every 30 minutes 1

low chance of rejection by the patient's immune system 1

- (b) any **three** from:

- cheaper / only costs £1000
*this **must** be comparative
ignore costs £1000*
- can collect many (stem) cells
- adults give permission for their own bone marrow to be collected
comparisons are not required but should be credited
- safe 3

[6]

Combined Higher Mark Scheme

Q1.

- (a) testis / testes 1
allow testicle(s)

- (b) (i) **B** = 13.2
C = 6.6
E = 3.3 2
*all 3 correct = 2 marks
2 or 1 correct = 1 mark
If no marks awarded allow ecf for C **and** E based on answer to B
ie C = ½ B and E = ½ C for one mark*

- (ii) 6.6 1
allow twice answer for cell E in part bi

- (iii) mitosis

correct spelling only

1

- (c) (i) any **two** from:
- cells that are able to divide
 - undifferentiated cells / not specialised
 - can become other types of cells / tissues **or** become specialised /differentiated
- allow pluripotent*

2

- (ii) 4-day embryo is a (potential) human life

or

destroying/damaging (potential) human life

allow cord would have been discarded anyway

ignore reference to miscarriage

allow cannot give consent

1

- (iii) perfect tissue match **or** hard to find suitable donors

allow same/matching antigens

allow no danger of rejection

allow no need to take immunosuppressant drugs (for life)

*ignore genetically identical **or** same DNA*

1

- (iv) stem cells have same faulty gene / allele / DNA / chromosomes

allow genetically identical

ignore cells have the same genetic disorder

1

[10]