AQA GCSE BIOLOGY (HIGHER) · 8461

BIOLOGY



EXAM QUESTION PACK

4.1.2 CELL DIVISION

SCORE	PERCENTAGE
/55	%

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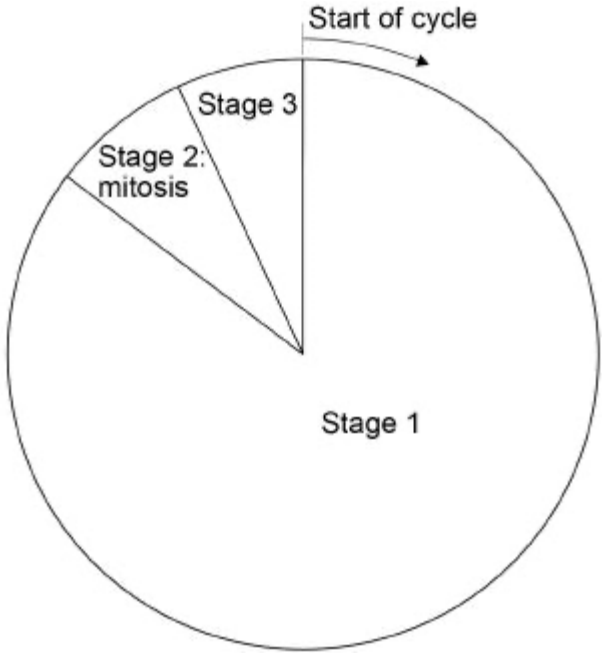
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Q1.

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 ☐

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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.

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1. _____

_____

2. _____

_____

(2)

(Total 8 marks)

Q2.

This question is about stem cells.

(a) Give **one** place in a plant where stem cells are found.

_____

_____

(1)

(b) What is **one** economic use of plant stem cells?

Tick **one** box.

To create genetically modified crops	☐
To create new species of plants	☐
To increase variation in plants	☐
To produce large numbers of identical plants	☐

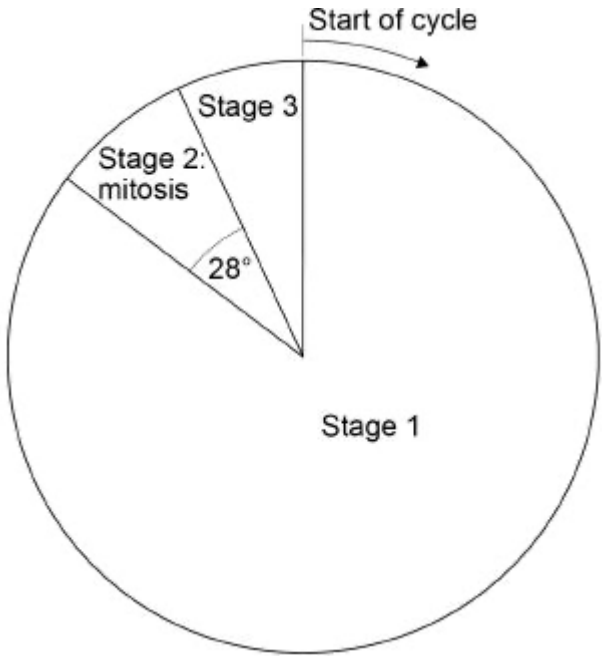
(1)

Embryonic stem cells divide by mitosis.

Figure 1 represents a cell cycle for a human embryonic stem cell.

Figure 1

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(c) The mass of DNA in the cell at the start of the cycle is 6 picograms.

A picogram is 10^{-3} nanograms.

Convert 6 picograms to grams.

Give your answer in standard form.

Mass = _____ g

(1)

(d) The time taken for this complete cell cycle is 15 hours.

Calculate how many hours the cell spent in mitosis.

Give your answer to 3 significant figures.

Time spent in mitosis = _____ hours

(2)

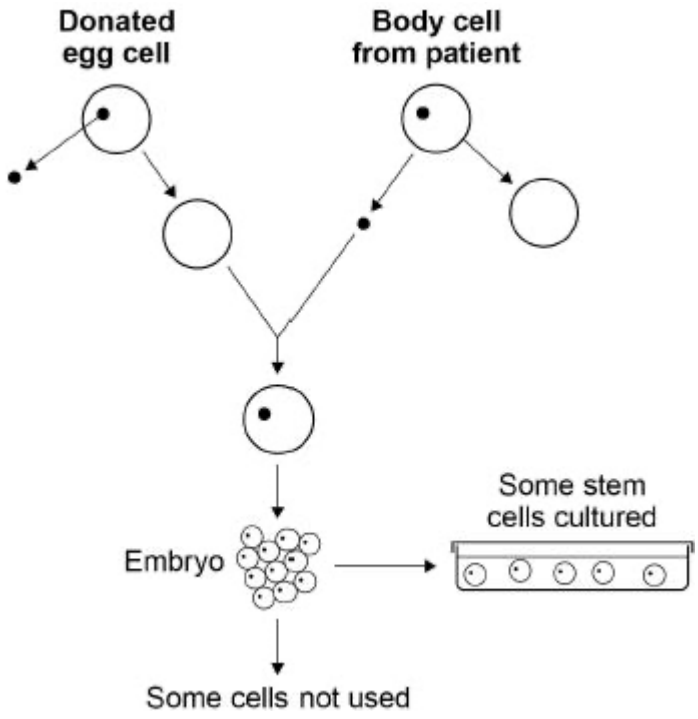
(e) Describe what happens in each of the three stages of the cell cycle.

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(5)

(f) **Figure 2** shows how embryonic stem cells are produced in therapeutic cloning for use in patients.

Figure 2



Give **two** advantages and **two** disadvantages of therapeutic cloning in medical treatments.

Use **Figure 2** to help you.

Advantage 1 _____

_____

Advantage 2 _____

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_____

Disadvantage 1 _____

_____

Disadvantage 2 _____

_____

(4)

(Total 14 marks)

Q3.

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.

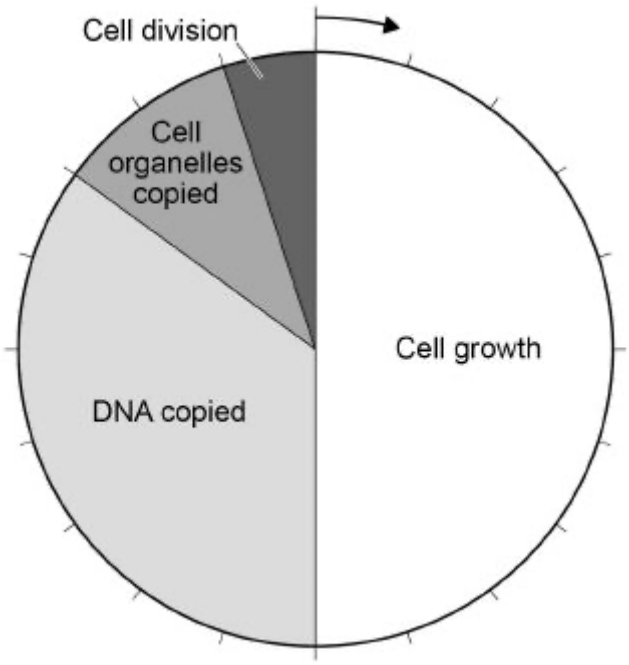
- To contract the muscles ☐
- To repair the muscles ☐
- To supply more oxygen to the muscles ☐
- To transmit nerve impulses ☐

(1)

Mitosis is part of the cell cycle.

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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.

_____

_____

Time taken = _____ hours

(2)

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

_____

_____

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 ☐

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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 ☐

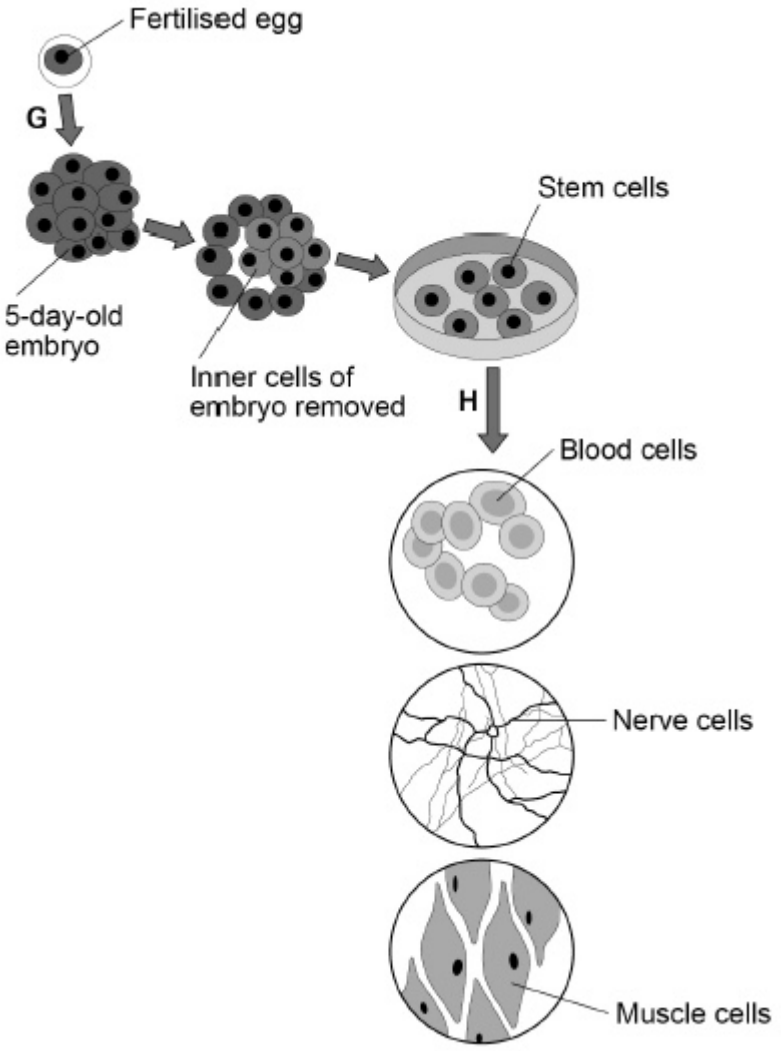
(1)

(Total 9 marks)

Q4.

The diagram shows how cells from human embryos can be used to grow 'replacement body parts' for humans.

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(a) How many chromosomes are in a **fertilised** human egg?

Tick **one** box.

12 ☐ 23 ☐ 46 ☐ 92 ☐

(1)

(b) What is the process labelled **G**?

Tick **one** box.

Fertilisation ☐

Inheritance ☐

Meiosis ☐

Mitosis ☐

(1)

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(c) When the embryo is three days old, it contains eight cells.

How many times has the fertilised egg cell divided by day three?

Tick **one** box.

2 ☐ 3 ☐ 4 ☐ 8 ☐

(1)

(d) Stem cells become specialised in the process labelled **H** in the diagram.

What is the process labelled **H**?

Tick **one** box.

Differentiation ☐

Evolution ☐

Genetic modification ☐

Selective breeding ☐

(1)

(e) Which **two** parts would be found in all the cells in the diagram.

Tick **two** boxes.

Cell membrane ☐

Cell wall ☐

Chloroplasts ☐

Cytoplasm ☐

Plasmids ☐

(2)

(f) Why might stem cells from human embryos be more useful than stem cells from adults?

_____

_____

(1)

(g) Some parents have stem cells from the umbilical cord of their baby collected and stored.

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These stem cells can be used to treat diseases in the child later in life.

Why might stem cells from their own umbilical cord be used rather than stem cells from another embryo?

Tick **one** box.

Less risk of rejection of umbilical cord stem cells.	☐
Stem cells from another embryo can treat more diseases.	☐
Umbilical cord stem cells are older.	☐

(1)

(h) Some medical uses of stem cells are still experimental.

Why do some scientists have concerns about the use of stem cells?

_____

_____

(1)

(i) Some people object to the use of embryonic stem cells because of religious beliefs.

Give **one** other ethical concern about the use of embryonic stem cells?

_____

_____

(1)

(Total 10 marks)

Q5.

When an organism grows, new cells are produced by cell division.

(a) What type of cell division happens to produce new body cells?

Tick **one** box.

Differentiation	☐
Meiosis	☐
Mitosis	☐

(1)

(b) Why can cancers grow very large?

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Tick **one** box.

Cancer cells are specialised ☐

Cell division is slow ☐

Cell division is uncontrolled ☐

(1)

(c) Give **one** factor which increases the risk of getting cancer.

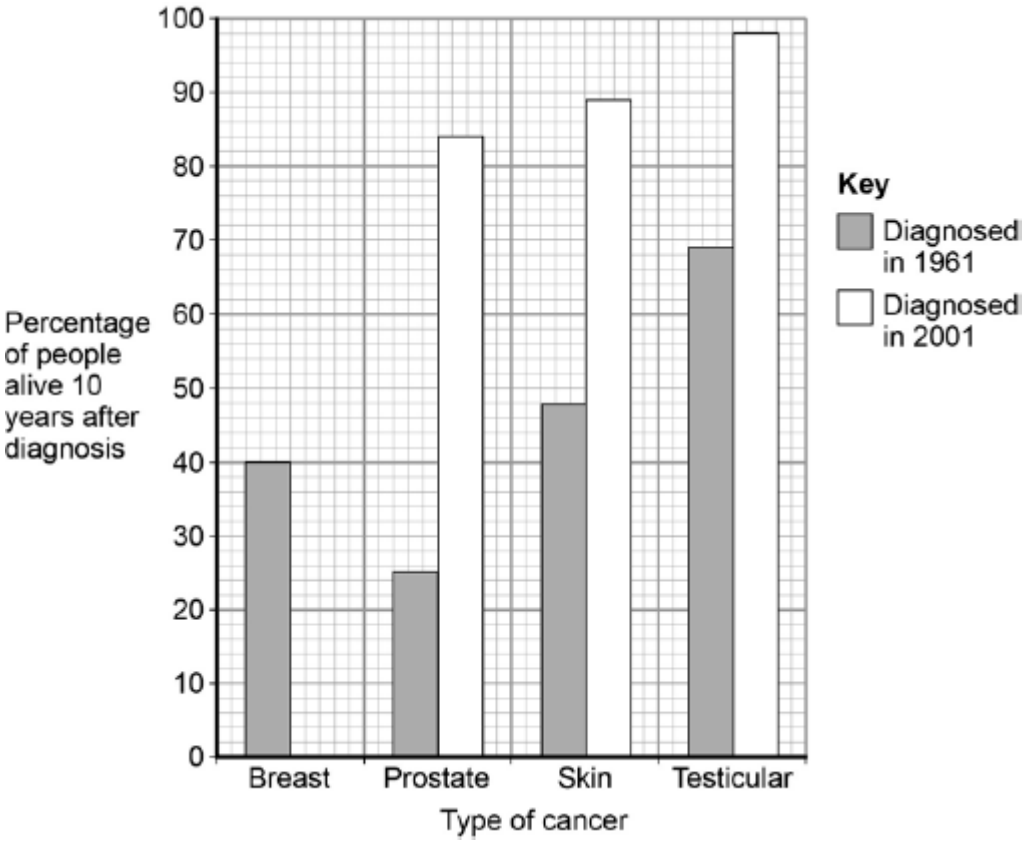
_____

(1)

(d) Survival rates for people with cancer have improved a lot.

People who are alive 10 years after diagnosis are usually considered to be cured.

The figure below shows data for people diagnosed with cancer in 1961 and 2001.



78% of people diagnosed with breast cancer in 2001 were alive 10 years later.

Complete the figure above to show this information.

(1)

(e) Which type of cancer diagnosed in 1961 had the highest survival rate?

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Tick **one** box.

Breast ☐

Prostate ☐

Skin ☐

Testicular ☐

(1)

(f) Which type of cancer shows the biggest improvement in the percentage of people alive after 10 years?

Tick **one** box.

Breast ☐

Prostate ☐

Skin ☐

Testicular ☐

(1)

(g) Suggest **two** reasons why the survival rates for all cancers have increased.

1. _____

_____

2. _____

_____

(2)

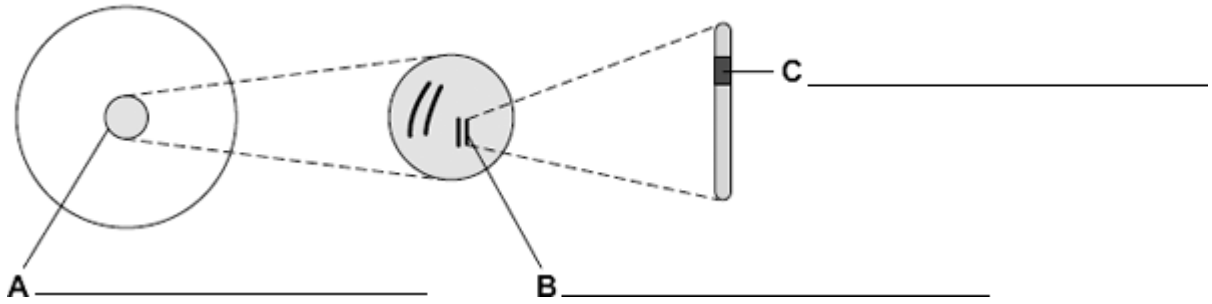
(Total 8 marks)

Q27.

Diagram 1 shows an animal cell and some of the structures inside the cell.

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Diagram 1



(a) Use words from the box to label structures **A**, **B** and **C**, on **Diagram 1**.

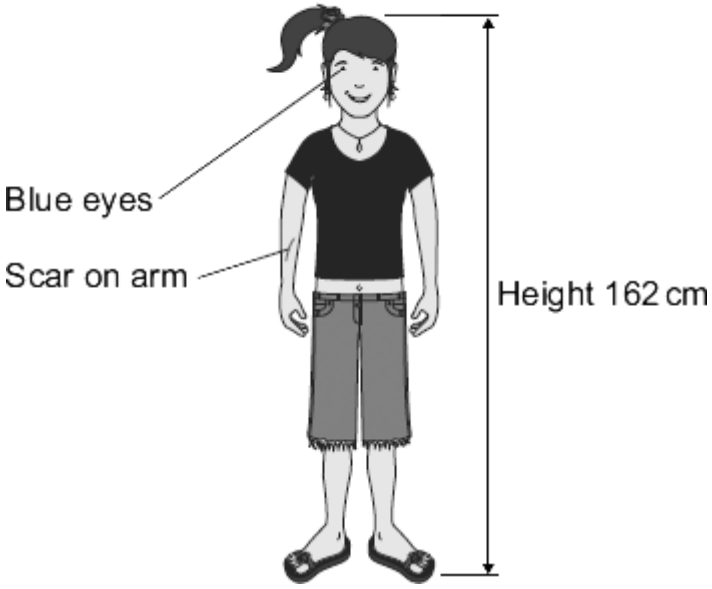
Characteristic	**Chromosome**	**Gamete**	**Gene**	**Nucleus**

(3)

(b) Factors that may affect characteristics include genes and the environment.

Diagram 2 shows some of the characteristics of a girl.

Diagram 2



Draw **one** line from each characteristic in **List A** to the factor(s) that affect the characteristic in **List B**.

List A **Characteristic**	**List B** **Factor(s) that affect the characteristic**
	Affected by genes only
Blue eyes	
	Affected by environment only

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Height 162 cm	Affected by both genes and the environment
Scar on arm	Affected by neither genes nor the environment

(3)
(Total 6 marks)

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