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Level: IGCSE Oxford AQA Biology (9201)
Subject: Biology
Topic: IGCSE AQA Biology
Type: Topic Question

To be used by all students preparing for IGCSE Oxford AQA Biology (9201)
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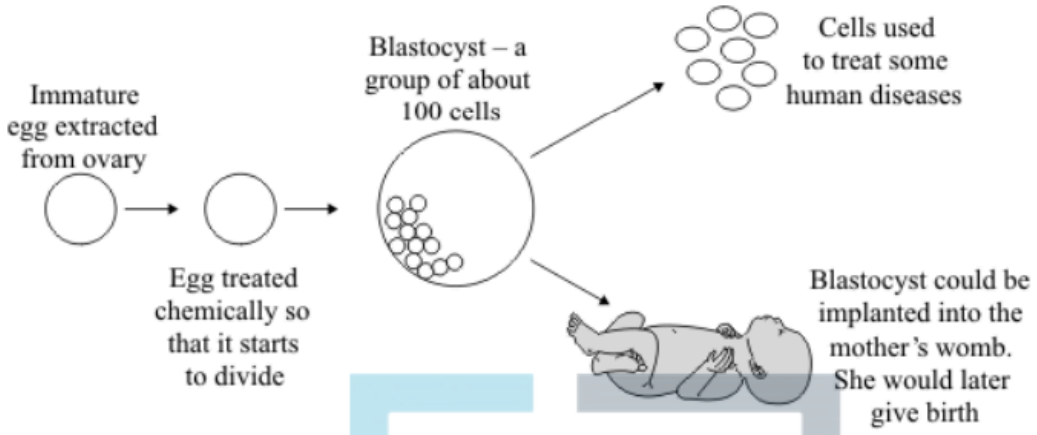
Biology **IGCSE AQA**

Key skills

1. The diagram shows how an immature egg could be used either to produce cells to treat some human diseases or to produce a baby.



Scientists may be allowed to use this technique to produce cells to treat some human diseases, but not to produce babies.

Using information from the diagram, suggest an explanation for this.

(Total 4 marks)

2. (a) In humans there are two types of cell division: **mitosis** and **meiosis.**

The table below gives statements about cell division.

Tick (✓) **one** box in each row to show if the statement is true for mitosis only, for meiosis only, or for both mitosis **and** meiosis.

The first row has been done for you.

Statement	Mitosis only	Meiosis only	Both mitosis and meiosis
How cells are replaced	✓		
How gametes are made			
How a fertilised egg undergoes cell division			
How copies of the genetic information are made			
How genetically identical cells are produced			

(4)

(b) Stem cells can be taken from human embryos.

In therapeutic cloning, an embryo is produced that has the same genes as the patient.

(i) Name **one** source of human stem cells, other than human embryos.

_____

(1)

(ii) Stem cells from embryos can be transplanted into patients for medical treatment.

Give **one** advantage of using stem cells from embryos, compared with cells from the source you named in part (i).

_____

_____

(1)

(Total 6 marks)

3. Stem cells can be used to treat some diseases.

(a) What is a stem cell?

_____

_____

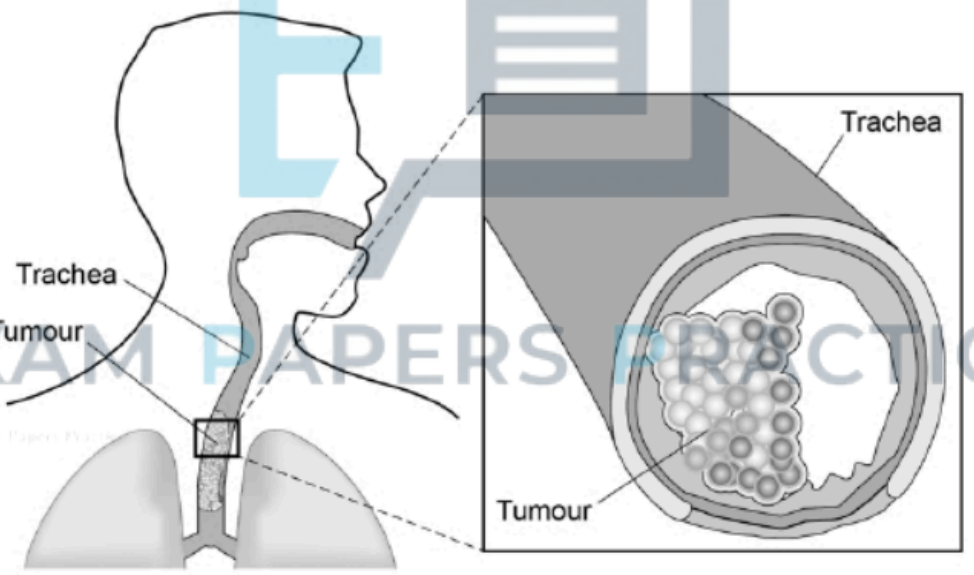
_____

_____

(2)

Figure 1 shows a malignant tumour in the trachea of a patient.

Figure 1



(b) Give **one** way a malignant tumour differs from a benign tumour.

_____

_____

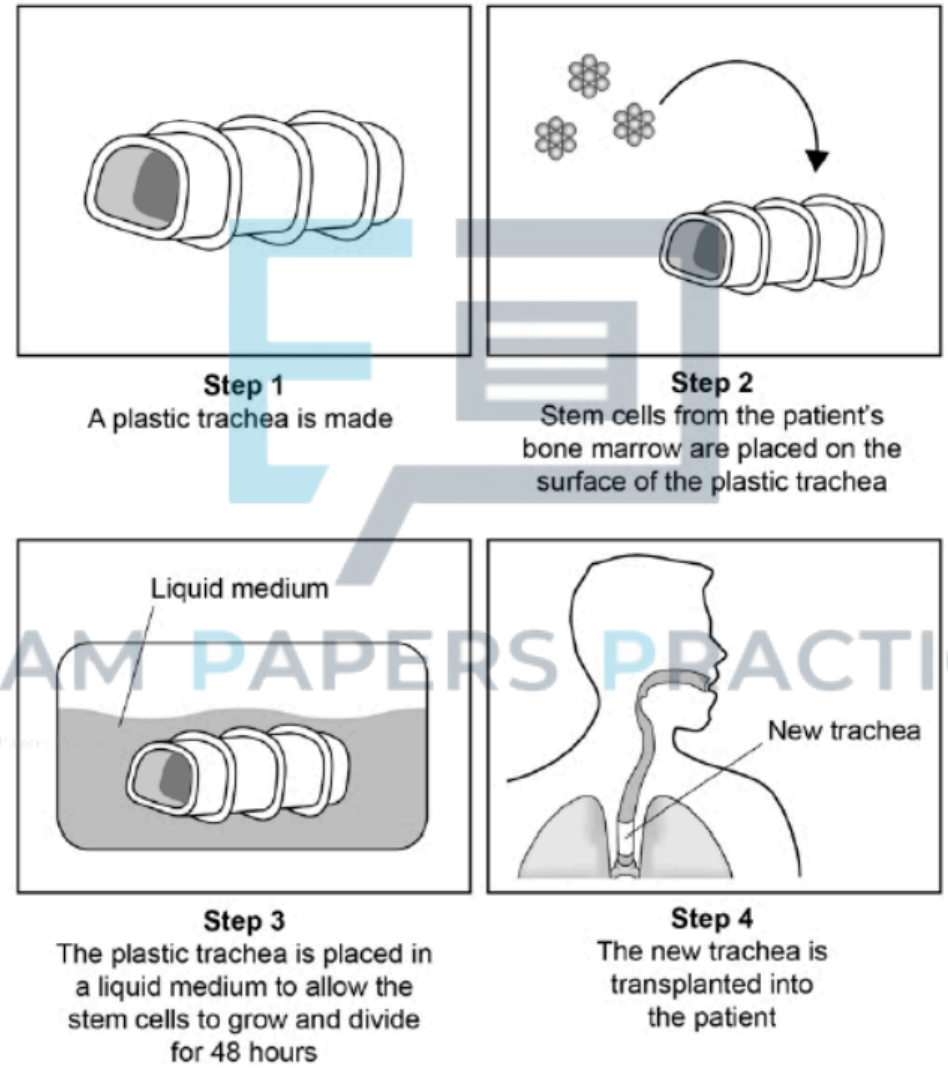
(1)

Scientists can treat the patient's tumour by replacing the trachea with a plastic trachea.

The plastic trachea has a layer of the patient's own stem cells covering it.

Figure 2 shows the procedure.

Figure 2



(c) In **Step 3** the cells are left for 48 hours to divide.

Name the type of cell division in **Step 3**.

_____

(1)

(d) In **Step 3** the cells are given oxygen and water.

Name **two** other substances the cells need so they can grow and divide.

1. _____

2. _____

(2)

(e) Give **two** advantages of using the stem cell trachea compared with a trachea from a dead human donor.

1. _____

_____

2. _____

_____

(2)

(f) Sometimes the stem cell trachea is not strong enough.

Doctors can put a stent into the trachea.

Suggest how a stent in the trachea helps to keep the patient alive.

_____

_____

_____

_____

(2)

(g) Stem cells can also be obtained from human embryos.

Evaluate the use of stem cells from a patient's own bone marrow instead of stem cells from an embryo.

Give a conclusion to your answer.

(6)

(Total 16 marks)

4. This question is about cell division.

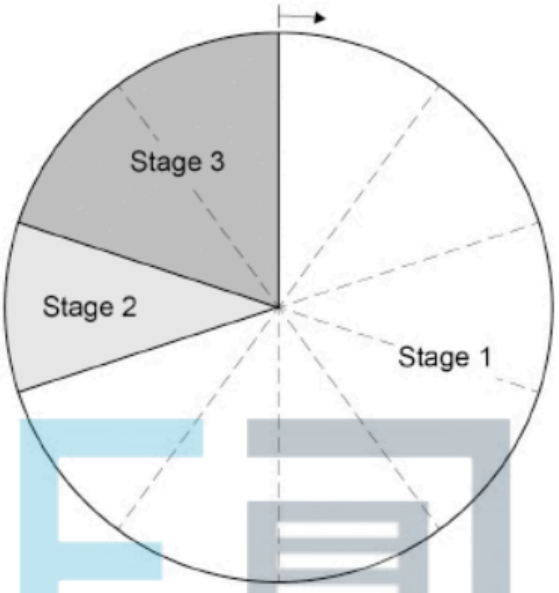
(a) Which process makes two identical new body cells for growth and repair?

Tick (✓) **one** box.

- Differentiation ☐
- Fertilisation ☐
- Mitosis ☐

(1)

The chart shows the three stages of a cell cycle.



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

Stage of cell cycle	What happens during that stage
Stage 1	One set of chromosomes is pulled to each end of the cell
Stage 2	The cytoplasm and cell membrane divide to form two new cells
Stage 3	The cell grows and the chromosomes replicate

(2)

(c) What percentage of the total time for the cell cycle is taken by stage 1?

_____

_____

_____

Percentage = _____ %

(2)

(d) A cell divides to form two new cells every 24 hours.

How many days will it take for the original cell to divide into 8 cells?

Tick (✓) **one** box.

1 ☐ 3 ☐ 6 ☐ 8 ☐

(1)

(e) The chromosomes contain the genetic material.

Name the chemical which the genetic material is made from.

_____

(1)

(f) The genetic material is made of many small sections.

Each section codes for a specific protein.

What is one section of genetic material on a chromosome called?

Tick (✓) **one** box.

A gamete ☐

A gene ☐

A nucleus ☐

(1)

(g) Stem cells are cells which have **not** yet been specialised to carry out a particular job.

Bone marrow cells are one example of stem cells.

Explain how a transplant of bone marrow cells can help to treat medical conditions.

_____

_____

_____

_____

(2)

(Total 10 marks)

5. An animal called an axolotl lives in water.

Figure 1 shows an axolotl.

Figure 1

Oxygen enters the axolotl's bloodstream through the gills by diffusion.

(a) What is diffusion?

Tick (✓) **one** box.

The movement of particles from a high concentration to a low concentration	☐
The movement of particles from a low concentration to a high concentration	☐
The movement of water from a concentrated solution to a more dilute solution	☐

(1)

(b) Describe how **one** feature of the axolotl's gills increases the rate of diffusion of oxygen.

Use information from **Figure 1**.

Feature _____

Description _____

_____

_____

(2)

If a gill of an axolotl is removed, stem cells in the damaged area will divide and a new gill will grow.

(c) Complete the sentence.

Choose the answer from the box.

adaptation	differentiation	evolution	variation

When stem cells specialise to produce gill cells, this process is

known as _____.

(1)

(d) Complete the sentence.

Choose the answer from the box.

binary fission	mitosis	mutation

To grow a new gill the stem cells divide by _____.

(1)

(e) Which **one** of the following does **not** contain stem cells?

Tick (✓) **one** box.

- Bone marrow ☐
- Embryos ☐
- Hair ☐
- Meristem tissue ☐

(1)

(f) Axolotls are small animals. Axolotls are used in stem cell research.

What are **two** advantages of using axolotls in stem cell research?

Tick (✓) **two** boxes.

Axolotls are cheap to feed. ☐

Axolotls are easy to breed. ☐

Axolotls are endangered. ☐

Axolotls live in water. ☐

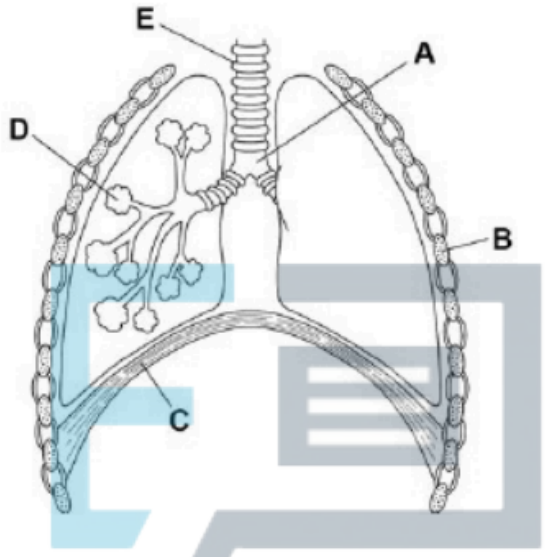
Axolotl research is cruel. ☐

(2)

Oxygen uptake in humans takes place in the lungs.

Figure 2 shows the human breathing system.

Figure 2



(g) Where does oxygen enter the bloodstream?

Tick (✓) **one** box.

A ☐ B ☐ C ☐ D ☐

(1)

(h) Name part **E** on **Figure 2**.

_____

(1)

(i) Which blood vessel carries blood to the lungs?

Tick (✓) **one** box.

Aorta ☐

Pulmonary artery ☐

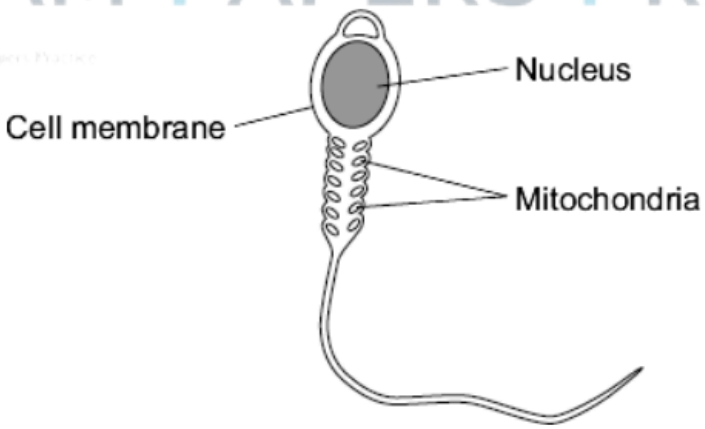
Vena cava ☐

(1)

(Total 11 marks)

6. Cells in the human body are specialised to carry out their particular function.

(a) The diagram shows a sperm cell.



The sperm cell is adapted for travelling to, then fertilising, an egg.

(i) How do the mitochondria help the sperm to carry out its function?

_____

_____

(1)

(ii) The nucleus of the sperm cell is different from the nucleus of body cells.

Give **one** way in which the nucleus is different.

_____

_____

(1)

(b) Stem cells from human embryos are used to treat some diseases in humans.

Explain why.

_____

_____

_____

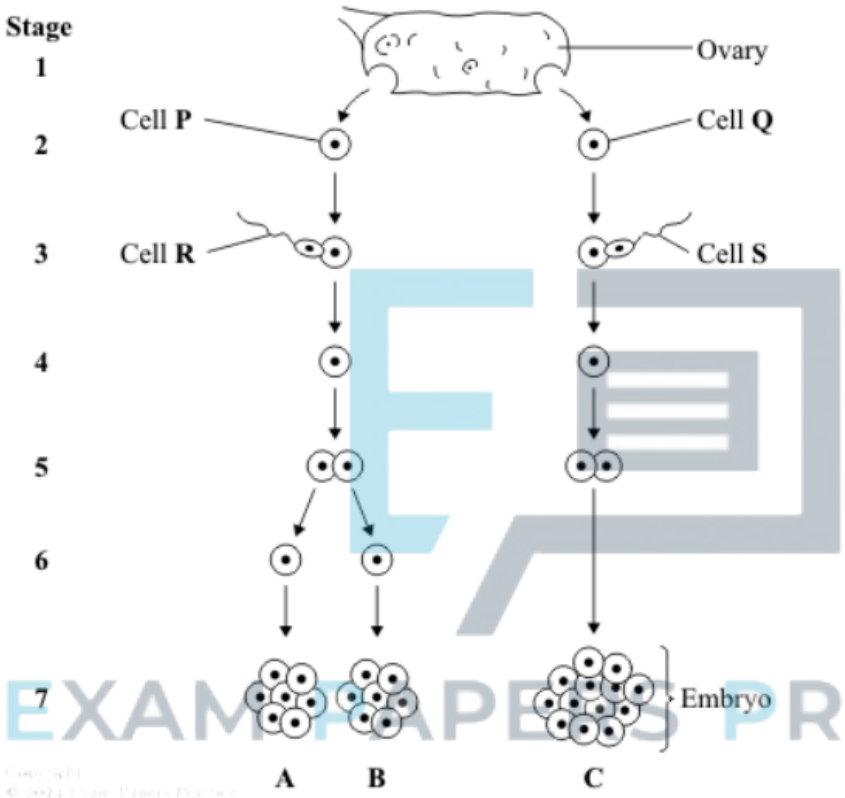
_____

(2)

(Total 4 marks)

7. A woman gives birth to triplets.
Two of the triplets are boys and the third is a girl.
The triplets developed from two egg cells released from the ovary at the same time.

The diagram shows how triplets **A**, **B** and **C** developed.



(a) Which stages on the diagram show gametes?

Draw a ring around your answer.

1 and 2 **2 and 3** **3 and 7** **1 and 7**

(1)

(b) Embryo **B** is male.

Which of the following explains why embryo **B** is male?

Tick (✓) **one** box.

Cell **P** has an X chromosome; cell **R** has an X chromosome. ☐

Cell **P** has a Y chromosome; cell **R** has an X chromosome. ☐

Cell **P** has an X chromosome; cell **R** has a Y chromosome. ☐

(1)

(c) The children that develop from embryos **A** and **C** will **not** be identical.

Explain why.

You may use words from the box in your answer.

egg	genes	sperm

_____

_____

_____

_____

_____

(2)

(d) Single cells from an embryo at **Stage 7** can be separated and grown in a special solution.

(i) What term describes cells that are grown in this way?

Draw a ring around your answer.

lleles **screened cells** **stem cells**

(1)

(ii) What happens when the cells are placed in the special solution?

Tick (✓) **two** boxes.

The cells divide ☐

The cells fertilise ☐

The cells differentiate ☐

The cells separate ☐

(2)

(iii) Give **one** use of cells grown in this way.

_____

_____

(1)

(iv) Some people might object to using cells from embryos in this way.

Give **one** reason why.

_____

_____

_____

(1

(Total 9 marks