

**AQA, OCR, Edexcel**

**A Level**

# **A Level Biology**

**Stem Cells Questions**

Name:

**M M E**

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**Total Marks: /31**

## Stem Cells

1. Multicellular organisms are made up of different types of cells that form tissues and organs that are specialised for their function. All of these cells were originally stem cells.
  - a)
    - i) How do totipotent stem cells differ from pluripotent stem cells? (2 marks)
    - ii) Explain the process a fertilised egg cell undergoes to become a foetus made up of specialised cells. (3 marks)
    - iii) Give two examples of specialised cells in a human foetus. (2 marks)
  - b) Some stem cells can be found in adults. Over the past few decades more research has been performed on adult stem cells and their properties.
    - i) Leukaemia is a type of blood cancer. Explain how cells found in adult bone marrow can be used to treat leukaemia. (3 marks)
  - c) Stem cells can also be found in plants, these cells are all totipotent.
    - i) Where in plants are totipotent cells found? (1 mark)
    - ii) Explain how totipotent plant cells can be used in tissue culture. (3 marks)
2. Stem cells differentiate to become specific cell types through a process called specialisation. Specialisation occurs through gene expression.
  - a) Totipotent cells all contain the same genes, however not all of these genes are ultimately expressed.
    - i) Explain how differential gene expression ultimately forms an organism with specialised cells. (5 marks)

- b) Because of the unique properties of stem cells to have the capacity to develop into any cell type, scientists have long been researching methods in which they can be used in medical science to treat disease.
- i) Describe how stem cells could help transform organ transplantations. (2 marks)
  - ii) Discuss the scientific advantages and of using adult and embryonic stem cells. (3 marks)
  - iii) Pioneering research in Japan in 2006 showed that adult stem cells could become induced pluripotent stem cells. How are adult stem cells induced to become pluripotent stem cells and why is the use of them in research advantageous? (2 marks)
- c) However the use of stem cells in research and medicine has raised many ethical issues within society.
- i) Outline some of the ethical issues surrounding the use of stem cells in research. (2 marks)
  - ii) Why is it important that scientific research such a stem cell research is regulated? (3 marks)