

**AQA, OCR, Edexcel**

**A Level**

# **A Level Biology**

**Stem Cells Answers**

Name:

**M M E**

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Total Marks: /31

## Stem Cells

Answer	Marks
<p>1.</p> <p>a)</p> <p>i) Totipotent - can produce all cell types including extraembryonic cells (placenta and umbilical cord) Pluripotent - can produce all specialised cells but not embryonic cells</p> <p>ii) - cell division occurs through mitosis to form an embryo made up of totipotent cells -Differentiation of these cells occurs as they multiply to form pluripotent cells -Further cell differentiation occurs to produce specialised cells that make up the foetus.</p> <p>iii) Nerve cells, bone cells, blood cells, organ cells, skin cells, brain cells etc.</p> <p>b)</p> <p>i)- Bone marrow contains adult stem cells that divide and differentiate to replace red blood cells (erythrocytes) and white blood cells (neutrophils) - Someone with leukaemia has damaged blood/bone marrow cells</p> <p>-Stem cells from a healthy adults bone marrow can be transplanted into a leukaemia patient to produce healthy blood cells</p>	<p>2 marks</p> <p>3 marks</p> <p>2 marks</p> <p>3 marks</p>

<p>c)</p> <p>i) Growing areas – roots and shoots</p> <p>ii) Totipotent cell is taken from a plant and placed in a growth medium containing nutrients and growth factors.</p> <ul style="list-style-type: none"><li>- Stem cell will grow into unspecialised cells</li><li>- Growth factors used</li></ul>	<p>1 mark</p> <p>3 marks</p>
<p>2.</p> <p>a)</p> <p>i) – under certain conditions some genes are activated while others are deactivated</p> <ul style="list-style-type: none"><li>- mRNA is only transcribed from active genes</li><li>- this mRNA is then translated in the ribosomes into proteins</li><li>-these proteins determine cells shape a function</li><li>-Interaction on the cells via specific proteins causes the cells to become differentiated.</li></ul> <p>b)</p> <p>i) Stem cells could be used to grow new organs instead of waiting for a donor (e.g. kidney transplant)</p> <p>Prevent issues of rejection from a donor organ</p> <p>Improve quality of life (blindness/paralysis)</p>	<p>5 marks</p> <p>2 marks</p>

<p>ii) <u>Adult:</u></p> <ul style="list-style-type: none"><li>- Can be obtained from body tissue/ easy to obtain</li></ul> <p><u>Embryonic:</u></p> <ul style="list-style-type: none"><li>- Created in a laboratory</li><li>- Have the capacity to develop into any specialised cell</li></ul> <p>iii) - introduction of specific transcription factors to adult stem</p> <ul style="list-style-type: none"><li>-means that embryos don't have to be used - avoids ethical issues</li><li>-More efficient process long term</li></ul> <p>c)</p> <p>i) - stem cell use involves embryos, which have the potential to develop into a foetus</p> <ul style="list-style-type: none"><li>- Belief that each embryo has a right to life</li><li>-Stem cell research creates many embryos that are destroyed without any stem cells being taken (waste)</li></ul> <p>ii) <u>Any three from:</u></p> <ul style="list-style-type: none"><li>- Deciding if the research being done is in the best interests of society</li><li>- Ensuring research is not unnecessarily repeated</li><li>- Monitoring who is carrying out the research and the facilities used</li><li>-Producing universal guidelines for scientists to control research</li><li>-Monitoring other scientific research to ensure guidelines are up to date</li><li>-Providing information to society to help them understand the benefits of scientific research</li></ul>	<p>3 marks</p> <p>2 marks</p> <p>2 marks</p> <p>3 marks</p>
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