2A2B HUMAN BIOLOGY

EXTENDED RESPONSE – STEM CELLS AND TISSUE ENGINEERING

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Teacher: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Due: \_\_\_\_\_\_\_\_\_ /32

One of the most recent advancements in medical technology has been the use of stem cell cloning to provide the raw material required for tissue engineering. The applications of this range from blood vessel replacement and skin, bone and tendon repair, to the treatment of degenerative nerve diseases.

⮚ Write the question number before each answer.

⮚ Write answers in own words.

⮚ Use your ‘useful terms in science’ handout to help you answer the questions correctly.

⮚ Staple your answers to the back of this booklet when handing in.

1. **State** which type of stem cell is more versatile; pluripotent stem cells or multipotent stem cells, and **explain** why. (2 marks)

2. **List** two currently accepted and routinely practiced stem cell therapies. (2 marks)

3. **Outline** two benefits of using a tissue engineered skin product, such as Apligraf, to treat wounds that require grafts. (2 marks)

4. ‘Creating human embryonic stem cells destroys a life’ is a common belief in society. Respond to this statement by **describing** three advantages and three disadvantages of using embryonic stem cells for research. (6 marks)

5. Embryonic stem cells are capable of self-renewal and are quite prolific in the lab (many cells can be made). **Explain** why this is appealing to scientists. (1 mark)

6. **Describe** the benefits of using stem calls to study diseases and to test the effects of new drugs.

(2 marks)

7. In regards to how the stem cells are obtained, **explain** which stem cell type you would feel most comfortable using if you required the assistance of stem cells to cure a disease. **Explain** your choice.

(2 marks)

Using the timeline on the following page, answer the questions below.

1. When was the first bone marrow transplant performed and in which country? (1 mark)

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2. Would the scientists who performed this transplant have necessarily known which cells in the blood helped cure the patient? Explain. (2 marks)

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3. When were embryonic stem cells discovered? (1 mark)

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4. How long after starting bone marrow transplants was cord blood transfusions used to treat disease of the blood? (1 mark)

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5. How long did it take for scientists to publish work on human embryonic stem cells (hESCs) after embryonic stem cells were first derived from mice? (1 mark)

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6. What is the significance of Dolly the sheep? (2 marks)

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7. Locate on the time line all references to Somatic Cell Nuclear Transfer (SCNT) and answer the following questions.

a) When did scientists first publish findings on SCNT and in which organism? (1 mark)

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b) How long after Dolly the sheep were the first successful SCNT produced in humans? (1 mark)

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8. What are MSCs? (1 mark)

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a) Are MSCs embryonic stem cells or tissue stem cells? (1 mark)

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b) Name three disorders on which scientists are trialing their use? (1 mark)

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9. When did scientists first report the approval to start a clinical trial with human embryonic stem cells and for what purpose? (2 marks)

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