**TYPE:** Extended Response

**TASK 11: Stem Cells and Tissue Engineering (50 marks)**

The questions are worth 20% of the marks and the essay based on the same information is worth 80%. Task is research based questions followed by an in-class essay. Students are to use internet resources to complete the questions. The essay will be written in class under exam conditions (ie without notes)

**Time for the tasks (1 hour)**

* Research and answering questions – 1 session
* Validation essay in class – 5 minutes reading time and 55 minutes working time

**What you need to do:**

* Follow the instructions provided very carefully to complete the test.
* Draw any results in pencil and answer all questions given.
* It is your responsibility to organise your time effectively.
* There is to be no discussion between you or any of your class mates.
* No sharing of any equipment or answers at all.

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| **Requirements for assessment** | **Due dates:** |
| * Conduct research and answer questions | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| * Complete all essay questions | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**DO NOT TURN THIS PAGE OVER UNTIL YOU ARE TOLD TO**

**STUDENT NAME: ANSWER KEY**

**TEACHER: Mrs Cunningham YEAR: 11**

**Stem Cell and Tissue Engineering**

In class essay component (35 marks)

1. Discuss the advantages and disadvantages of each of ;

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| **CONTEXT** | **ADVANTAGES** | **DISADVANTAGES** |
| **Embryonic stem cells from surplus IVF embryos** | **These cells are undifferentiated, allowing them to be used in all parts of the body, giving them the potential to cure hundreds of diseases with the use of all of the different cells that can be created from them.**  **Embryonic stem cells are very similar to cancerous cells, "Gaining a better understanding of the molecular, biochemical and functional characteristics of cancer stem cells may lead to the development of more effective, precisely targeted treatments" (Norris par.7). This could change the lives of countless people around the world.** | **The  way that they are**[**acquired**](https://sites.google.com/site/stemcellresearchdebate/home)**. Since human embryos are destroyed during the process of harvesting embryonic cells, this makes the research unpopular with those that believe human life begins at conception and that this life is being destroyed.** |
| **Embryonic stem cells created by therapeutic cloning** | **Can help create vital organs and stop wait times**  **When organs are made out of a patient's own cell, doctors do not have to worry about organ or tissue rejection by the immune system of the patient.**  **Organs would have an exact match of the patient's DNA. No need for organ donors and no surgery required for the second party.**  **Allows for researchers to test cures for certain diseases, Parkinson's and diabetes and study regeneration of organs.** | **Just a small portion of stem cells are usable.**  **Some cells mutate and cause tumours in patients.**  **In order to cure disease, millions of eggs are needed. We do not currently have this type of supply of eggs.**  **Many people believe it is ethically wrong and against "god's" wishes.**  **Extracting eggs from a female is costly and painful for the woman.**  **The cost of therapeutic cloning is very high.** |
| **Induced pluripotent stem cells** | **The advantage of iPS cells is that they are not derived from human embryos, which is the ethical concern in this field.**  **Scientists are more likely to obtain more federal funding and support.**  **Cell technology would permit for creation of cell lines that are genetically tailored to a patient. This could eliminate the concern of immune rejection.** | **The retroviruses used are associated with cancer because they insert DNA anywhere in a cell's genome, which could potentially trigger the expression of cancer-causing genes.**  **The successful reprogramming rate in human iPS cells from fibroblasts is very low (<0.02%)** |
| **Adult stem cells as treatments for specific human diseases** | **Utilize small samples of adult tissues, to obtain an initial culture of a patient's own cells for expansion and subsequent implantation in the same person (that is called an autologous transplant). Avoids immune rejection by the recipient and also protects the patients from viral, bacterial or other contamination from another individual (donor) in case of allogenic transplant.**  **Directing them to a desired fate is easier.** | **Culturing adult stem cells in*-vitro*is very difficult and has not been possible for some types.**  **Also they have a very short life, when cultured *in-vitro*as compared to embryonic cells.** |

1. Discuss the ethical issues (if any) raised by using EACH of those four classes of stem cells to treat human diseases.

**Embryonic stem cell research poses a moral dilemma. It forces us to choose between two moral principles:**

* **The duty to prevent or alleviate suffering**
* **The duty to respect the value of human life**

**Students should discuss these two principles with examples where possible**

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| Section | Possible Mark | Mark achieved |
| Research & Questions | 10 |  |
| In class essay | 40 |  |
| TOTAL | 50 |  |