**Year 12 ATAR Human Biology**

**ATHBY 2021**

**Task 7: Extended Response**

**Conditions Total: \_\_\_ / 25**

Time for task: 30 minutes

**Part A:** You have one week to research the topic and complete notes. (5 marks)

**Part B:** 30 minutes for in class validation – examination-style extended answer question.

**Task weighting: 4%**

**Part A:**

Gene therapytechniques, potential uses, and ethics 1 mark each for 3 marks

References - >3 sources used 1 mark, correct format 1 mark

**Part B: In-class assessment 20 marks**

Answer each part of the following question on the lined paper provided.

Responses could include clearly labelled tables and graphs, clearly labelled diagrams with explanatory notes, lists of points with linking sentences and annotated flow diagrams with introductory notes.

There are many diseases that affect the ability to breathe normally. One of these is cystic fibrosis. This is a genetic disease, one symptom of which is excess mucous in the lungs that causes breathing difficulties.

Recently there has been much discussion and trialling of treatments involving gene therapy and cell replacement therapy for cystic fibrosis.

1. Discuss two ethical implications that may arise due to genetic screening of all new born babies in Australia.

Two of, for example:

• who has access to the data

• the rights of the individual in the future to this information

• the rights of the newborn baby

• privacy of the individual

• whether the data is secure

Any other reasonable response. Students should discuss the advantage and disadvantage.

1 mark for stating

1 mark discussing

Total 4 marks

1 mark clarity of response

(5 marks)

1. Describe the steps involved in recombinant DNA Technology (12 marks) and explain how it is being used to develop gene therapy treatments for inherited diseases (3 marks)

(15 marks total)

* 1. Gene therapy aims to replace gene coding for inherited disease (1)
  2. with a normal gene by using a vector to transfer normal gene into a patient’s DNA (1)
  3. Gene therapy involves the use of recombinant DNA technology (1)
  4. Where DNA sequences or gene are isolated and inserting into the patient’s DNA (1)
  5. Restriction enzyme (RE) cuts DNA at a specific site / DNA sequence (1)
  6. 2 pieces of DNA cut with same RE-produce fragments with matching sticky ends (1)
  7. DNA with the normal gene is cut with a specific RE (1)
  8. A plasmid / phage / bacteriophage / virus is cut with the same restriction enzyme (1)
  9. The cut produces sticky / staggered / jagged ends (1)
  10. Fragments with matching ends join up / anneal due to base pairing (1)
  11. DNA Ligase joins the isolated gene / DNA segment forming Recombinant DNA plasmid or recombinant DNA (1)
  12. The combined gene and plasmid are inserted into a vector / bacterial cell / virus (1)
  13. Vector is a carrier that transfers the DNA into the patient’s cells (1)
  14. Vector is cloned / bacteria reproduces to make copies of the gene (1)
  15. Vector containing corrected DNA is introduced into the patient’s cells (1)
  16. Vector is taken in by the cell (1)
  17. Corrected DNA makes its way to nucleus and is integrated with patient’s DNA (1)
  18. Encoded protein is produced by cell (1)
  19. Reducing / eliminating symptoms of disease (1)