Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Score: \_\_\_/20

APPLECROSS SENIOR HIGH SCHOOL

3A/3B Human Biological Science Test 2

31. In 1991, nine skeletons were found in Russia. They were believed to be those of Tsar Nicholas II, his family and staff who were killed in 1917 during the Russian revolution. Very small amounts of DNA were isolated from these skeletons. This DNA was used in the polymerase chain reaction (PCR). Genetic fingerprinting was then carried out on this DNA to identify the skeletons.

The chart shows some of the results obtained from the genetic fingerprinting of seven of the skeletons, three children and four adults.



Figure 1.

1. Explain why the polymerase chain reaction was used in this investigation.

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(1 mark)

(b) In the polymerase chain reaction, DNA is heated to 95 °C and nucleotides, enzymes and DNA primers are added to the mixture.

(i)  Explain why the DNA is heated to 95 °C.

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(1 mark)

(ii)  What are DNA primers and what do they do?

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(2 marks)

(iii) Which **two** of the adults (1, 2, 3 or 4) are the parents of the children?

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(2 mark)

32. Many trials involving the technique of gene therapy have been carried out in humans, with varying success.

(a) What is the aim of gene therapy?

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(1 mark)

(b) Name one agent that could act as a vector in gene therapy.

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(1 mark)

33. Suggest two ways in which PCR differs from transcription

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(2 marks)

34. (a) What is nuclear transfer?

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(2 marks)

1. How could nuclear transfer be used therapeutically?

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(2 marks)

35. To engineer (grow) tissues for implantation into human, what **three** things are required?

1.

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| 2. |
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| 3. |
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(3 marks)

36. Below is a diagram outlining the use of a plasmid in recombinant DNA.



Figure 2.

Explain the steps involved in creating the cut point, through to the end stage of inserting the genes. Include the necessary materials or substances

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(3 marks)