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3

90729

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

National Certificate of Educational Achievement
TAUMATA MĀTAURANGA Ā-MOTU KUA TAEA

Level 3 Science, 2004

90729 Describe genetic processes

Credits: Four
2.00 pm Wednesday 17 November 2004

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should answer ALL the questions in this booklet.

If you need more space for any answer, use the page provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–9 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

Achievement Criteria *For Assessor's use only*		
Achievement	**Achievement with Merit**	**Achievement with Excellence**
Describe genetic processes. ☐	Explain genetic processes. ☐	Discuss genetic processes. ☐
Overall Level of Performance ☐		

You are advised to spend 45 minutes answering the questions in this booklet.

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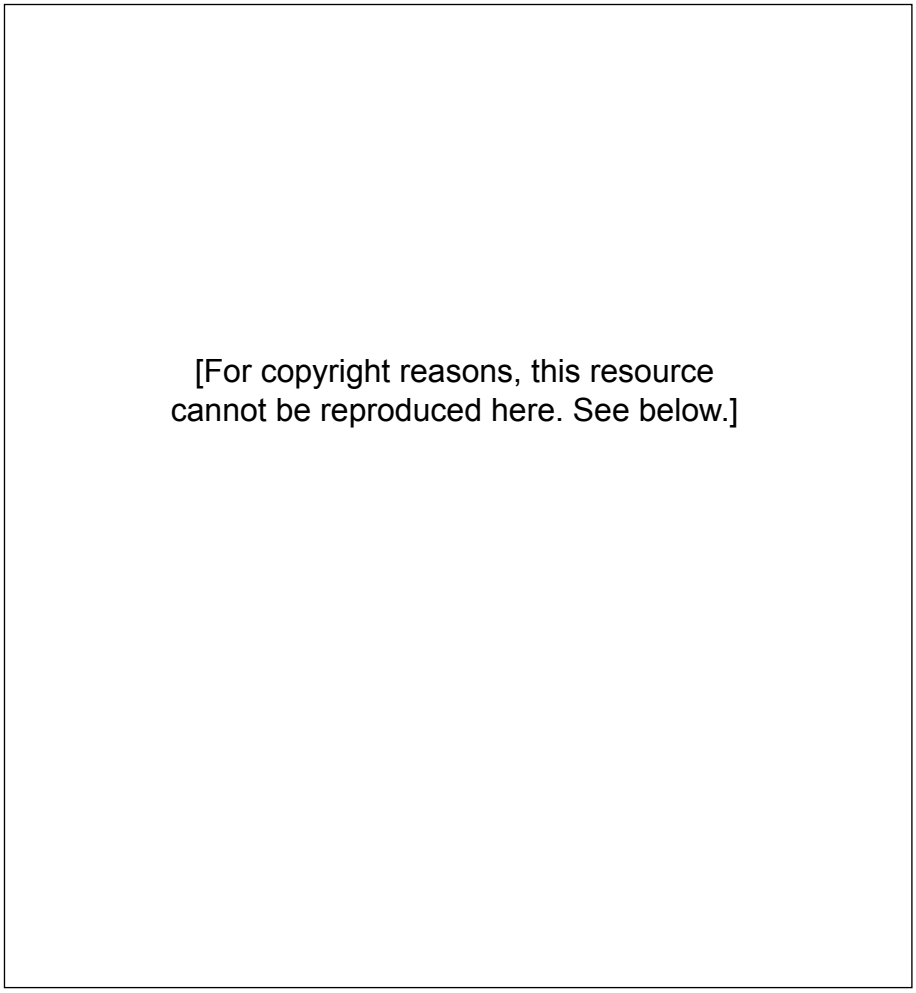
QUESTION ONE: DNA AND DNA REPLICATION

A section of DNA is shown in the diagram below.



Source: *Biology Y13 Pathfinder,* S Jarvis and A Schofield, New House, p40

(a) Name the following parts of the DNA molecule:

(i) the sugar _____

(ii) the names of TWO of the bases _____

(iii) the bond that joins the base pairs together _____

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(b) The DNA enzyme polymerase has a key role in DNA replication.

Explain the role of DNA polymerase in DNA replication. Use a diagram in your answer if this will help.

(c) As a cell divides, the DNA needs to be replicated accurately.

Discuss why it is important for the cell that DNA is replicated exactly.

QUESTION TWO: POLYMERASE CHAIN REACTION

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The polymerase chain reaction (PCR) is an important tool with many applications.

(a) Explain the main function of the polymerase chain reaction.

(b) Describe ONE application of the polymerase chain reaction, other than forensics.

(c) PCR is used by police forensic staff to match suspects to crime scenes.

Discuss the benefits and risks associated with the use of PCR in police forensic work.

QUESTION THREE: PROTEIN SYNTHESIS

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The diagram below shows the stages of protein synthesis:

Source: *Biology Y13 Pathfinder*, S Jarvis and A Schofield, New House, p45

(a) Write the correct code in each numbered box (labelled 1–3) on the diagram above.

(b) Explain the role of the anticodon on the molecule labelled **(i)**.

(c) Describe ONE use in the body of the molecule being made at **(ii)**.

(d) Discuss the role of mRNA in protein synthesis.

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QUESTION FOUR: GENETIC ENGINEERING OF PLANTS

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The diagram below shows the use of a bacterium in the genetic engineering of plants.

Source: *Y13 Biology*, Richard Allen and Tracey Greenwood, Tutor Courseware, p316

(a) Explain the role of plasmids in genetic engineering.

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Recently a Danish company developed a genetically engineered plant that could help detect landmines. The plant has been given a gene that changes the plant's leaves from green to red when its roots come into contact with nitrogen dioxide gas that evaporates from buried explosives. The introduced gene turns the leaves red in the same way that some plants' leaves turn red in autumn.

(b) Discuss the **scientific** implications of releasing this plant into the wild.

Extra paper for continuation of answers if required.
Clearly number the question.

Assessor's use only

Question number