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NZQA

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

For Supervisor's use only

Level 3 Biology, 2008

90719 Describe trends in human evolution

Credits: Three
9.30 am Monday 17 November 2008

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(s) 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.

For Assessor's use only	**Achievement Criteria**				
Achievement		**Achievement with Merit**		**Achievement with Excellence**	
Describe trends in human evolution.	☐	Explain trends in human evolution.	☐	Discuss trends in human evolution	☐
Overall Level of Performance	☐				

You are advised to spend 40 minutes answering the questions in this booklet.

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QUESTION ONE

Computer-assisted tomography (CAT scanning) was used to provide information on the shape of the brain in *Homo floresiensis*, and has been used in an attempt to determine how *floresiensis* is related to other hominins.

Figure 1: Comparisons of virtual brain shapes of hominin brains.

From D. Falk et al. (2005) The brain of LB1, Homo floresiensis. *Science* **308**: 242–245.

(a) Use the information in Figure 1 to identify which of the three other species shown is most closely related to *floresiensis* **and** give a reason to support your answer.

Identification: _____

Reason: _____

_____

_____

The partially-complete skeleton of 'Lucy' (*Australopithecus afarensis*) provides a great deal of information about this species.

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Figure 2: *Australopithecus afarensis* skeleton.

http://a.abcnews.com/images/Politics/3c1ef73d-7522-4d19-a2c6-c8505a8a5ab3_ms.jpeg

(b) Describe TWO features of the skeleton **shown above** that could be used to determine whether *Australopithecus afarensis* was able to walk bipedally.

(c) The upper arm bone of 'Lucy', *Australopithecus afarensis*, had a large cross-section relative to her body weight. In addition, her lower vertebrae had relatively small joint surfaces. These features are also seen in baboons and other quadrupedal primates.

Explain how *A. afarensis* was most likely to have moved around, based on these data.

QUESTION TWO: CULTURAL EVOLUTION

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(a) Define the term **cultural evolution**.

Plants were domesticated at much the same time in different regions of the world – see Figure 3 below.

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Figure 3: Regions of plant domestication.

M. Balter (2007) *Science* **316**: 1830–1835.

Note: 'B.P.' = years before present.

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Homo sapiens were present in Asia at least 60 000 years ago, and in Europe around 40 000 years ago. However, they arrived in the Americas much more recently, about 15 000 years ago. Despite this, plants were domesticated at much the same time in all these regions.

(b) Explain why domestication of plants occurred at similar times in widely separated regions.

(c) Many people of northern European descent carry an allele that allows them to digest lactose, the sugar present in milk. This allele probably appeared about 9 000 years ago and spread through *H. sapiens* populations in Europe.

Describe the cultural innovation that preceded or accompanied this genetic change.

(d) Discuss the impact of agriculture on the subsequent development of permanent settlements. In your answer you could consider:

- trade
- division of labour
- population size
- health and disease.

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QUESTION THREE : DISPERSAL

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There has been considerable debate about the most likely explanation for the origin and dispersal of **modern *Homo sapiens***.

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Figure 4: A diagram showing the appearance and distribution of various *Homo* species.
From: M. M. Lahr & R. Foley (2004) Human evolution writ small. *Nature* **431**: 1043–1044.

(a) Identify the hypothesis that best describes the information presented in Figure 4.

Question Three continues on the following page.

(b) Discuss how well this hypothesis is supported by the available scientific evidence. Your answer **could** include reference to:

- skeletal remains
- mitochondrial DNA
- nuclear DNA
- cultural evidence (eg tools).

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

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Question number