

# 3

90719



NEW ZEALAND QUALIFICATIONS AUTHORITY  
MANA TOHU MĀTAURANGA O AOTEAROA

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## Level 3 Biology, 2009

### 90719 Describe trends in human evolution

Credits: Three  
2.00 pm Thursday 19 November 2009

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 2–8 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.	<input type="checkbox"/>	Explain trends in human evolution.	<input type="checkbox"/>	Discuss trends in human evolution.
<b>Overall Level of Performance</b>				<input type="checkbox"/>

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

## QUESTION ONE: BIOLOGICAL EVOLUTION

(a) The images below show the hands (seen from above and below) of a juvenile gorilla and a Neandertal.

## Juvenile gorilla

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## Neandertal

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From M.W.Tocheri, C.M.Orr, M.C.Jacofsky & M.W.Marzke, 'The evolutionary history of the hominin hand since the last common ancestor of *Pan* and *Homo*', *Journal of Anatomy* 212 (2008), pp 544–562 (doi: 10.111/j.1469-7580.2008.00865.x).

Compared to the gorilla, the Neandertal hands show:

- shorter, straighter fingers, and
- a longer thumb relative to the fingers.

Explain **how** these skeletal differences contribute to how well each species could manipulate objects.

(b) *Homo* and *Australopithecus* skeletons both have pronounced valgus angles, and broader and shallower pelvic girdles, compared to the chimpanzee skeleton. In addition, the big toe in *Homo* is in line with the rest of the toes. In *Australopithecus afarensis* there is some separation between the big toe and the remaining toes, and in the chimpanzee the big toe is widely separated from the rest.

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## A comparison of the skeletons of a modern human, an *Australopithecus afarensis*, and a modern chimpanzee.

From: M. Pigliucci, 'Evolution: the overwhelming evidence', *Science* 323 (2009), pp 716–717.

Discuss the adaptive significance of **each** of these skeletal differences in relation to its impact on the effectiveness of bipedalism.

## QUESTION TWO: CULTURAL EVOLUTION

(a) At least 27 000 years ago, people living in what is now Austria buried two newborn babies in a grave. The babies were found side-by-side, covered with red ochre, and under the shoulder-blade of a mammoth. More than 30 ivory beads were also found in the grave.

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Einwogerer et al. (2005) Upper Palaeolithic infant burials. *Nature* 444: 285.

Discuss what this burial **and** the associated evidence suggest about social behaviour **and** abstract thought in stone-age *Homo sapiens*.

(b) Upper Palaeolithic people sometimes hunted large numbers of prey animals – such as horses, reindeer, red deer and bison – at one time. At times they drove herds off cliffs or into box canyons, while at other sites long walls of stone were built to channel animals to a kill site. At the same time new weapons (arrow heads, new spear tips, spear throwers) were developed.

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## Palaeontologists at a mass kill site.

<http://www.lithiccastinglab.com/gallery-pages/2002februarycolbysitepage1.htm>

Discuss what the existence of mass kill sites implies about social structures in these communities.

## QUESTION THREE: DISPERSAL

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Possible phylogenetic relationships between Neandertals, modern humans, and chimpanzees, based on DNA analyses.

From S. Freeman & J. C. Herron, *Evolutionary Analysis*, 3rd edition (Pearson, 2004).

(a) Explain which theory of modern human origins is best supported by these data.

(b) Discuss the patterns and timing of dispersal in **both** Neandertals and modern humans. **Your discussion should be based on the information given in the diagram on the facing page.**

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

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## Question number

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