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QUALIFY FOR THE FUTURE WORLD
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Level 3 Biology, 2018

91606 Demonstrate understanding of trends in human evolution

2.00 p.m. Monday 19 November 2018
Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of trends in human evolution.	Demonstrate in-depth understanding of trends in human evolution.	Demonstrate comprehensive understanding of trends in human evolution.

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 attempt ALL the questions in this booklet.

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

Check that this booklet has pages 2–16 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.

TOTAL

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QUESTION ONE

Homo naledi skeletal fossils were found in 2013, and this has created debate amongst scientists as to where it belongs in hominin evolution. *Homo naledi* has features that meant it was well adapted for standing and walking on two feet, but that it is also likely that it was comfortable climbing trees.

The skeletal fossils of *Homo naledi* have features of both *Homo* species and *Australopithecus* species.

Homo naledi	*Homo sapiens*
	

Adapted from: https://goo.gl/ro5MNn, https://goo.gl/A5TGSY, https://goo.gl/uyYiar, https://goo.gl/UwKjUN, https://goo.gl/osEFtx

Estimated hominin phylogeny

https://subtextlife.weebly.com/diepkant/october-01st-2014

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Using the fossil evidence in the diagrams provided and your knowledge of hominin evolution, describe and explain how biological features in *Homo naledi* support the idea that they could walk bipedally AND were also good tree climbers.

Use the skeletal evidence to explain and justify where you would place *Homo naledi* in the suggested hominin evolutionary phylogeny provided on the previous page.

In your answer:

- describe THREE features that assisted with bipedal movement and THREE features that assisted with tree climbing
- explain why these features assisted bipedal movement or tree climbing
- compare and contrast features that suggest *Homo naledi* share a distant OR more recent common ancestor with *Homo sapiens*.

There is more space for your answer to this question on the following pages.

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QUESTION TWO

http://media-2.web.britannica.com/eb-media/53/42153-004-BAA9B07B.jpg

The lactase enzyme that is present in infants, assists with the breakdown of lactose. Some areas have shown an increase in this enzyme in the adult populations over the past 11 000 years.

https://goo.gl/LdGmtJ

With increased brain size, the ability of speech and the division of labour led to the development of agriculture.

Evaluate the effects that the development of abstract thought, food gathering (hunter-gatherer, domestication of plants and animals), and shelter (caves, temporary settlement, permanent settlement) had on the cultural and biological evolution of *Homo sapiens* with reference to agriculture.

In your answer:

- describe agriculture, cultural evolution, AND biological evolution
- explain how the development of abstract thought, food gathering, and shelter may have affected cultural and biological evolution
- evaluate the advantages and disadvantages of the development of agriculture on the evolution of *Homo sapiens*.

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There is more space for your answer to this question on the following pages.

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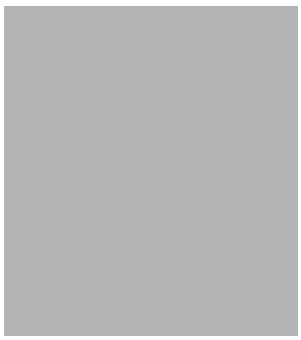
QUESTION THREE

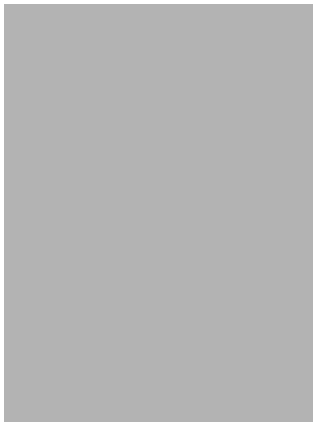
Modern humans have dispersed throughout the world. The two main theories are the Out of Africa or Replacement Model, and the Multiregional Model. The latest theories of human dispersal suggest that migrating *Homo sapiens* interbreeding (admixture) with earlier hominins helped with migration.

Cultural evolution



https://goo.gl/sSFLH1

https://goo.gl/ERmKbC



https://goo.gl/ERmKbC

Out of Africa versus the Multiregional Model

Adapted from: https://www.nature.com/scitable/content/Out-of-Africa-versus-the-multiregional-hypothesis-6391

Levels of genetic diversity between 51 populations

Adapted from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4262934/

Whole genome sequencing archaic interbreeding showing migration of *Homo sapiens*

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https://aspergerhuman.files.wordpress.com/2015/06/nrg3625-f1.jpg

Helpful genes in hominin evolution

Gene	Function
FOXP2	Protein produced is helpful in transcribing regions in the brain used for language and speech.
SRGAP2	Gene helps to drive the development of the neocortex, which in humans is used for language and conscious thought.
HACNS1	Gene enhancer associated with limb development, especially the wrist and thumb in humans.
EPAS1	Of Denisovan origin and found in modern-day Tibetans. Allows increase in red blood cell production to cope with low oxygen found at high altitudes.
HLA	Neanderthals and Denisovans had this gene that helps white blood cells destroy micro-organisms that cause disease in our bodies.

Analyse the information provided and discuss how biological and cultural evolution assisted human dispersal. Evaluate which dispersal model is more likely.

In your answer you:

- describe the Multiregional Model and the Out of Africa Model (Replacement Model).
- explain which model is best supported by the evidence provided
- discuss how cultural evolution and biological evolution may have supported hominin dispersal. (Biological evolution includes interbreeding and the gaining of helpful genes.)

There is more space for your answer to this question on the following pages.

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Extra paper if required.
Write the question number(s) if applicable.

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