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Level 3 Biology, 2016

91606 Demonstrate understanding of trends in human evolution

2.00 p.m. Thursday 10 November 2016
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 2–15 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

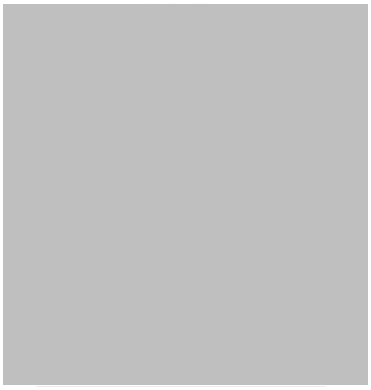
Documenting similarities and differences between Hominid species is fundamental to understanding their biological and evolutionary relationships. The skulls A and B show some similarities and differences. Anthropologists have agreed that Skull A is older than Skull B.

Skull A

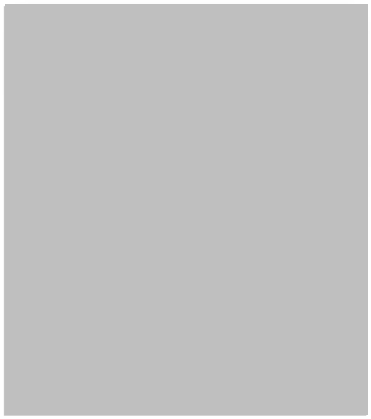
https://blogopithecus.files.wordpress.com/2009/03/tcahd-3d-reconstruction.jpg

Skull B

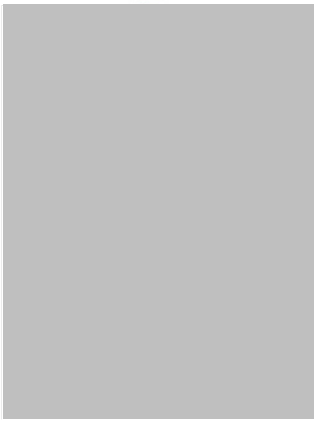
www.sideshowtoy.com/mas_assets/jpg/KAM05_press01-001.jpg



www.anthrophoto.com/cgi-bin/ImageFolio31//imageFolio.cgi?search=under&img=&cat=&bool=phrase



www.sideshowtoy.com/mas_assets/jpg/KAM05_press02-001.jpg



http://www.dlt.ncssm.edu/tiger/360views/Hominid_Skull-Homo_erectus_PekingMan_1200x900/top-bottom/Hominid_Skull-Homo_erectus_PekingMan-top-900.jp

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Discuss the selective forces which would support the evolutionary changes observed in Skull B compared to Skull A.

In your discussion:

- describe FOUR features that support Skull A being older than Skull B
- explain how these identified features can be linked to evidence of bipedalism, and to the types of food these hominids ate
- discuss how the changes in the skull features have led to evolutionary trends in bipedalism, diet, and intelligence of hominids.

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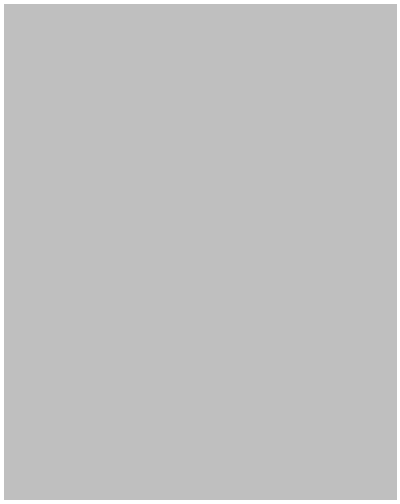
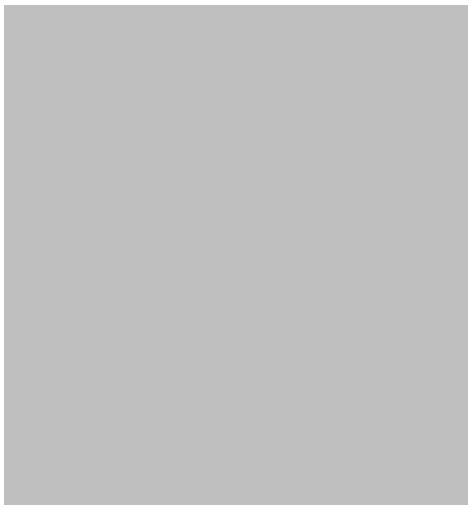
QUESTION TWO

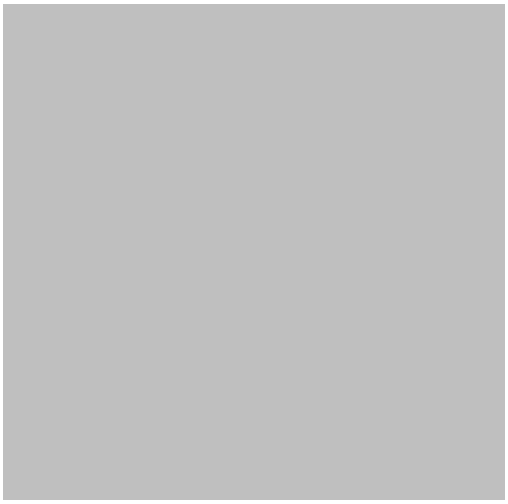
Homo habilis, *Homo erectus*, and *Homo neanderthalensis* have developed different forms of cultural evolution to help them survive successfully in their ecological niche. Some of these forms of cultural evolution are shown in the pictures below.

Homo habilis
http://earlyman.yolasite.com/homo-habilis.php





Homo neanderthalensis
http://ies.aquiscelenis.climantica.org/2012/02/20/homo-neanderthalensis/
http://hoopermuseum.earthsci.carleton.ca/neanderthal/neanderthal.jpg



Homo erectus
www.erasmatazz.com/library/science/the-phylogeny-of-play.html
www.flashofgold.com/14-events-that-changed-military-history/

Analyse the different aspects of cultural evolution.

In your analysis:

- define cultural evolution
- describe the different forms of cultural evolution associated with *Homo habilis*, *Homo erectus*, and *Homo neanderthalensis*
- explain how these different forms of cultural evolution are adaptive advantages for the species who use them
- discuss the advantages and disadvantages that cultural evolution has had on biological evolution.

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QUESTION THREE

Modern humans began to migrate out of Africa around 100 000 years ago. Map 1 below shows the migration paths that modern humans took.

As humans moved through Europe and Asia they would have met these earlier hominins, like the Neanderthals in Europe and Denisovans in Asia (Map 2).

Scientists analysed the genetic information of more than 1 500 people from all around the world, and determined that ancestors of modern humans interbred (admixture) with Neanderthals and Denisovans.

Today, the genetic makeup of most people born outside Sub-Saharan Africa is 1 to 4 percent Neanderthal. The Denisovans also left Africa early, and like their Neanderthal relatives, they interbred with *Homo sapiens*.

The Tibetan people have a variant of the EPAS1 gene that allows them to deal with low oxygen with fewer red blood cells than the rest of us. Their blood stays thin and healthy 4.8 kilometres up. This gene can be traced back to the Denisovans; they shared this gene with people who now live in Tibet.

HLA is a gene that helps white blood cells destroy micro-organism intruders in our bodies. Researchers believe people carrying this gene can thank Neanderthals and Denisovans for it, as these hominins had already adapted to infections and diseases found outside Africa.

Map 1. Migration Routes of *Homo sapiens*

Adapted from: Sinclair, Anna Roberts & M. *Level 3 Biology Study Guide*, 3rd Edition. ESA Study Guide

Map 2. Migration Route and Regions of Admixture

http://www.nature.com/nrg/journal/v12/n9/fig_tab/nrg3029_F4.html#figure-title-history/

Discuss the advantages and disadvantages of taking the various migration routes, and the possible effects that this has had on cultural and biological evolution.

In your discussion:

- describe the reasons for dispersal to other regions, and identify the benefits gained from the dispersal
- explain how changes in the environment could have influenced the migration routes used
- explain how the evidence of mtDNA and DNA analysis support the 'out of Africa' dispersal model
- discuss how admixture (interbreeding of two previously isolated populations) could have helped with dispersal.

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