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91606



Draw a cross through the box (\boxtimes) if you have NOT written in this booklet



Mana Tohu Mātauranga o Aotearoa New Zealand Qualifications Authority

Level 3 Biology 2024

91606 Demonstrate understanding of trends in human evolution

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.

Check that this booklet has pages 2–12 in the correct order and that none of these pages is blank.

Do not write in the margins (1/////2). This area will be cut off when the booklet is marked.

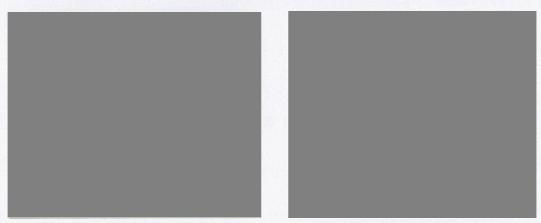
YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

TOTAL

QUESTION ONE: Movement of hominids and hominins

Chimpanzees find most of their food in trees, so they need to be able to climb and forage for food in an arboreal environment. They also need to be able to cover long distances of up to 5 kilometres per day between food spots. As a result, chimpanzees have a wide range of types of movement, both in the trees and on the ground. These include quadrupedal and bipedal walking. Research has found that the energy cost of bipedal and quadrupedal walking in the chimpanzee is quite similar. This similarity in energy cost suggests that carrying out bipedal walking would have had no effect on the energy costs for early hominin ancestors.

Habitual bipedalism, however, may have favoured changes of the hip to allow a more upright posture and the changes to the lower limbs that allowed for more efficient walking over long distances.



Chimpanzee with baby.

Modern human with baby.

Discuss factors relevant to quadrupedal movement and bipedialism.

In your answer, include discussion of:

- · the terms habitually bipedal and arboreal, including descriptions
- reasons for the differences between the modern human and the chimpanzee, related to the forms
 of the spine, pelvis, and valgus angle
- why modern humans are bipedal despite a named disadvantage of this characteristic.

Bipedausm is the ability for an organism to wark on 2 limbs. an arboreal environment is one Where there are 10ts of trees so organisms in order to increase the likealthood of Burviving need to be able to be quadrapedausm bracheation in order to swing through trees

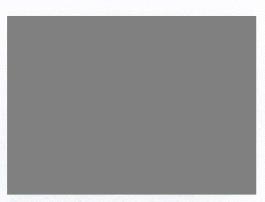
in modern humans our spines have evolved to have a "s" Spine compared to Chimpanzees "Shaped which have a "C this allows the centre of and be over Shirt this reason for the evolved Change in spine shape is due to the need to maintain gravity. additional the shaped ' Spine allows absorbing feature angle angled in more compared to chimps This Puolootian is necessary due to 1 the becoming bipedal as similar to acts Shaped Spine distances and therefore 哥. ph places In modern humans Smaller Decome the upright standing has led postion. This to push out nar nodern humans. bables

the reason we as humans had to adapts to this change If our peluis did not smaller and centre be in ligh as NOT be walking with our outwards. A disadvantage of bipedal walking OUR harder became and push out be Argnant decreased the rate or 1+ ment there were Successful births. 155 Thowever the advantage to travel former able out weighes the distances vantages as allowed For to which increased th () (VIVal as they sould ware forther 5 Bipedai walking freed up hands of individuals anowing do things like hold their children. Habtucu environment are rorced to be due to bipedai.

QUESTION TWO: Neanderthal fibre use

Neanderthals (*Homo neanderthalensis*) made many tools. Numerous examples of their Levallois stone tools have been discovered. They may well have used other material such as wood or fibre; however, these break down easily and do not fossilise, so are not preserved.

Recently, a stone tool was discovered with evidence of Neanderthals having used twisted fibre made from bark. The fibre was a 3-ply cord, with the fibres arranged as shown in the image below. This method of cord-making is still in widespread use today. Twisted fibres provided the basis for clothing, rope, bags, nets, mats, and boats – all of which, once discovered, would have become important parts of daily life. This evidence of understanding and use of twisted fibres shows us that Neanderthals had use of complex, multi-component technology, as well as a mathematical understanding of pairs, sets, and numbers.



Fragment of twisted cord with the yarn structure highlighted in colour.



Ply confirms the number of yarns twisted together.

Discuss how the use of twisted fibres would have advantaged the Neanderthals.

In your answer, include discussion of:

the Levallois technique

- the endocranial region that would have developed, allowing for the understanding and use of mathematical rope-making
- TWO explanations of how Neanderthal might have used tools, leading to an increase in health
- a reason **how** and a reason **why**, with the benefit of twisted fibre for food gathering, Neanderthals were able to succeed in the cold, European climate.

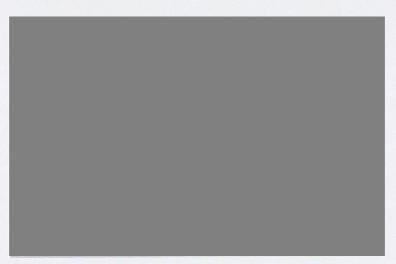
The levallois technique was when one stone was to Smashed against another to produce a flare. This flake was then Used to Cut Flores. The neanderthals may have used these tools to cut plants and make hutural medicines that could have increase

their health additionally by Using the twisted frames 40 make rope which led to being able to make bags it allowed for them to carry more FOOD SUCH as huts, berries and Fish Which Increased the rate OF Survival allowed for them to gan the nececary ammounts of numents which allowed them to right off diseases that could have harmed them I they did not have substantial energy The When the neander Inhabited the earth Ice age which made It incredibing difficult to find and gather Food. The making OF twisted fibre ahowed for the neanderthals to gath make bags and nets to carry more food accross longer distances. They needed to do this due to the Ice age. It ment that the neander able d to beep them nutrient leve

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QUESTION THREE: The island of Flores

Remains of one of the most recently discovered early human species, *Homo floresiensis*, have been found only on the island of Flores, Indonesia. The fossils of *H. floresiensis* date to between 60 000–100 000 years old, and stone tools made by this species date to between about 50 000–190 000 years old. *H. floresiensis* individuals stood approximately 110 cm tall, had small brains, large teeth for their small size, and relatively large feet for their short legs. Despite their small body and brain size, *H. floresiensis* made and used stone tools, hunted small elephants and large rodents, and coped with predators, such as the giant Komodo dragon. Recent evidence suggests that *H. floresiensis* did not use fire; previous evidence for the use of fire is now associated with the later *Homo sapiens*.



Flores, an island located in the Indonesian archipelago.



Artist's impression of *H. floresiensis* attacking a Komodo dragon.

Male Komodo dragons weigh 85 kilograms, on average.

Discuss reasons for the success of *H. floresiensis*. In your answer, include discussion of:

- how their small size might have enabled population success on the island
- the success of *H. floresiensis* despite not having controlled use of fire
- TWO reasons why substantial brain development would be a selective advantage to early hominin species.

Homofloresiensis despite being small to the sixcess them being small allowed them to maintain more energy the food they hunted for Maux 10 able Sustain them for periods of time their success on the 05 a smau elephant they hunted for Sustain I them for a period OF time. additionary to them Deing Small able to hixe and Sneak UD more efficiently which preu Their rate of Survival able were to Survive around longer being found reproduce able to SUCCESSFULLY and Species Survive For WANIMAR having fire nomov Were STILL SUccess Surviving. IRPLA due

fire amous predators to see where 400 are. For smaller Individuals Such as H. Floresinses the H would have allowed predators such as the glant Romano dragon to stee where they are and thes they may not have been able to defend themselves. In early homonins Substantial brain development 15 Im portant as It anowed for the Wernicks and broccas in size this anowed for organisims to & develop Speech and language which they used to communicate with eachother this ted would be a Selective advantage as (1) It would mean they would be able to come up with a plan for hunting which would increase the rate of survival for the hominins as they would be able to hunt in Packs and know the plan to so therefore they would be Food, thus they would be

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

QUESTION

Extra space if required.

Write the question number(s) if applicable.

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https://www.komodoluxury.com/blog/flores-island-travel-guide/https://x.com/Extinct_Animals/status/1361733833230483461/photo/3https://www.ourbigjourney.com/komodo-island-land-of-the-komodo-dragon/

Merit

Subject: Biology

Standard: 91606

Total score: 15

Q	Grade score	Marker commentary
One	M5	The benefits of the S-shaped spine and an advantage of bipedalism are explained in this response. With more adequate explanations of other aspects, this response may have been awarded a higher score.
Two	M5	This response effectively links to the question by explaining both the connection between tool use and health, as well as the relationship between food gathering in cold conditions and the application of 3-ply knowledge.
Three	M5	The response provides explanations for the success associated with the small stature of <i>Homo floresiensis</i> and how the absence of fire may have contributed to their success.