

## Assessment Schedule – 2022

### Biology: Demonstrate understanding of trends in human evolution (91606)

#### Evidence Statement

#### Question One

Evidence	Achievement	Merit	Excellence
<p>Hominins refers to living and fossil species belonging to the human lineage / ancestors since divergence / bipedal human ancestors</p> <p>The endocranial region is interior to the skull, and the capacity is the size of the brain / within the skull / the inner lining of the skull</p> <p>The Out of Africa theory states that there were two great migrations out of Africa, one being <i>Homo erectus</i> who then evolved into Neanderthal and a second one about 60 000 years ago of <i>Homo sapiens</i>.</p> <p>DNA samples can be compared. DNA accumulates mutations / SNPs over time. The fewer the differences, the closer the relationship and therefore the less time from a common ancestor. DNA samples can be used to construct a tree of hominin evolution. Mitochondrial DNA is particularly useful, as it is not subject to selection pressure, and therefore accumulates mutations at a constant rate (molecular clock). Nuclear DNA gives gene similarities. These support the theory as the finds are in Africa and so show <i>Homo sapiens</i> are from Africa and we could work out when this was.</p> <p>By having a larger cranial capacity <i>Homo bodoensis</i> would have had more developed important centres such as memory, communication, creativity. This could bring lifestyle benefits, such as better tools for food collection, better bonds in group, better movement of group.</p> <p>The <i>H. bodoensis</i> hand may have had short and straight fingers and a more opposable thumb which would be more mobile and muscular – also the wrist would be rotatable – enabling precision and power grip, meaning they could potentially make tools in a precise manner, as they would have both strength for the power grip and the dexterity for finer work to make the tool specific.</p>	<ul style="list-style-type: none"> <li>• Describes hominin.</li> <li>• Describes endocranium / endocranial capacity.</li> <li>• Describes OOA hypothesis as <i>H.sapiens</i> evolving in Africa</li> <li>• Describes mtDNA as maternal, no recombination (aka it stays the same)</li> <li>• Describes how mtDNA can be used to date specimens by counting mutations</li> <li>• Describes how nDNA can be used to find similar genes / mutations.</li> <li>• Describes how fewer DNA differences mean species are more closely related / less time from divergence (common ancestor)</li> <li>• Describes a change to cranium (other than size)</li> <li>• Describes an advantage of a larger brain, e.g can think of better tools / area for speech or memory better etc.</li> <li>• Describes a suspected shape change to Bodos hand.</li> </ul>	<ul style="list-style-type: none"> <li>• Explains Out of Africa theory.</li> <li>• Explains how mtDNA (or explains nuclear) mutation rate is rather constant allowing us to date specimens (molecular clock) showing common ancestor is in Africa (OOA) / nuclear DNA: look at genes for number of SNPs.</li> <li>• Explains how increased cranial capacity leads to increased brain size and cognitive capacity linked to advantage, e.g. communication in the group for hunts.</li> <li>• Explains how named changes in the hand enabled <i>bodoensis</i> to have an advantage eg to make tools / gather efficiently / other.</li> </ul>	<ul style="list-style-type: none"> <li>• Discusses the OOA theory in relation to named DNA and also discusses how the skeletal features of Bodo offer advantage over early hominins.</li> <li>• Discusses the OOA theory as two migrations in relation to named DNA use for common ancestor (may link to the date of 500 000 ya) while also discussing how the skeletal features of Bodo offer an advantage over early named hominins.</li> </ul>

Not Achieved		Achievement		Merit		Excellence		
NØ = no response or no relevant evidence.	1a	2a	3a	4a	2m	3m	1st bullet point.	BOTH bullet points.

**Question Two**

Evidence	Achievement	Merit	Excellence
<p>In an ice age, water is trapped at the poles. It is easier for migration as there are land bridges. Migration can be initiated by climate change, as conditions and food sources may change, leading to group fragmentation or restricted gene flow when conditions change.</p> <p>Caring for group members gives advantages such as not losing group knowledge, e.g toolmaking / benefit gained through looking after friends and family.</p> <p>A disadvantage is there is less food to go round, expending energy and time to move / care for injured people.</p> <p>The Levallois technique is a method of creating stone tools by first striking flakes off the stone, or core, along the edges to create the prepared core and then striking the prepared core in such a way that the intended tool is flaked off with all of its edges pre-sharpened.</p> <p>The demise of the Neanderthal could be climate change might have resulted in tools becoming less effective for the food now available / Neanderthals may have also declined due to competition from <i>Homo sapiens</i> moving up from Africa. There would also be a reduction in access to raw stone materials to make tools due to sea level rise cutting off land bridges.</p> <p>Climate change would also have led to fragmented populations, which would have reduced the Neanderthal gene flow. This would have led to inbreeding reducing the overall fitness of the population.</p>	<ul style="list-style-type: none"> <li>• Describes idea of hominin migration, idea of moving as a group to obtain resources.</li> <li>• Describes an advantage of caring for group members.</li> <li>• Describes a disadvantage of caring for group members.</li> <li>• Describes how migration can fragment groups of Neanderthals.</li> <li>• Describes the tool making of Neanderthal / advantage of the technique.</li> <li>• Describes that during the ice age, water is trapped at the poles, lowering water levels and allowing ease of travel.</li> <li>• Describes a reason for the demise of Neanderthal.</li> </ul>	<ul style="list-style-type: none"> <li>• Explains advantage of caring for injured group members.</li> <li>• Explains disadvantage of caring for injured group members.</li> <li>• Explains benefit of / knowledge of Levallois technique.</li> <li>• Explains how climatic changes can lead to population fragmentation.</li> <li>• Explains a reason for demise of Neanderthal.</li> <li>• Explains that during the ice age, water is trapped at the poles, lowering water levels and allowing ease of travel which changes when ice age over.</li> </ul>	<ul style="list-style-type: none"> <li>• Discusses the movement of populations in ice age conditions alongside the cost and benefit of caring in their society linked to named reasons for demise even though they had a good tool making society (with technique / tools described).</li> <li>• Discusses the movement of populations to named areas in ice age (why harder / easier) alongside the explained costs and benefits of caring in society linked to reasons for demise 39 000 ya even though they had a good tool making society (through explaining why that technique was good). Gives reasons for demise, e.g. inbreeding, loss of ‘fitness of population / competition with <i>H. sapiens</i> / decreased territory, different selection pressures.</li> </ul>

Not Achieved		Achievement		Merit		Excellence		
NØ = no response or no relevant evidence.	1a	2a	3a	4a	2m	3m	1st bullet point.	BOTH bullet points.

**Question Three**

Evidence	Achievement	Merit	Excellence
<p>Cooler and drier climate meant that forests became savannah. This led to selection pressure towards bipedalism. Food resources were further apart, which meant bipedalism was a more successful evolutionary strategy. Teeth show diet, and with fire to soften food, large teeth were no longer selected for / less fibrous material. The ability to use fire meant food could be softer, and this meant teeth could be smaller.</p> <p>The complex brain meant we had :                      Successful use of tools and fire which may have created a positive feedback loop, further enhancing cranial capacity. Tools and fire would mean that human beings could exploit a wider range of environments, e.g the Pacific.                      Develop speech and comprehension centres / memory / forethought                      Dogs were domesticated, and this enabled humans to hunt more effectively, increasing their success; the dogs also eat scraps and stop disease / protection                      Pigs can provide protein for a long time, necessary on sea voyages, also eat bugs around the house, therefore keeping it clean. They also eat scraps, and can be traded.</p>	<ul style="list-style-type: none"> <li>• Describes change from forest to savannah linked to bipedalism selection due to sparse trees.</li> <li>• Describes an advantage to being bipedal in savannah.</li> <li>• Describes smaller teeth means softer diet / no need to chew / less plant matter in diet. Prob don't get fibrous or plant material.</li> <li>• Complex brain meant use of fire / tools / curiosity / speech.</li> <li>• Describes advantages of domestication of dog.</li> <li>• Describes advantage of domestication of pig.</li> <li>• Describes methods of traversing into the Pacific region, e.g. following coast or mention of water craft.</li> </ul>	<ul style="list-style-type: none"> <li>• Explains that savannah means resources are further apart, arboreal lifestyle no longer efficient, selection pressure for bipedalism.</li> <li>• Explains link of smaller teeth to diet / fire.</li> <li>• Explains link between increased brain capacity and improvements in technology.</li> <li>• Explains advantages of dogs, e.g using sense of smell to help hunting / protection.</li> <li>• Explains advantage of pigs' renewable source of protein meat.</li> <li>• Explains movement / methods of migration into Europe and down to the Pacific region.</li> </ul>	<ul style="list-style-type: none"> <li>• Discusses how bipedalism, then changes: E.g teeth and brain led to better technology / abstract thought and how domestication allowed <i>Homo sapiens</i> to migrate to Europe and Pacific.</li> <li>• Discusses how bipedalism, then changes, E.g teeth and specific named areas and functions of the brain led to better technology / domestication of pigs and dogs allowed <i>Homo sapiens</i> to migrate successfully to Europe and Pacific, e.g rafts. Discusses the positive feedback loop of brain size / improved technology / increased survival / increased brain size.</li> </ul>

Not Achieved		Achievement		Merit		Excellence		
NØ = no response or no relevant evidence.	1a	2a	3a	4a	2m	3m	1st bullet point.	BOTH bullet points.

**Cut Scores**

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – 7	8 – 13	14 – 18	19 – 24