

Assessment Schedule – 2021

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

Evidence Statement

Question One

Evidence	Achievement	Merit	Excellence
<p>Africa became cooler and drier. This reduced forestation and allowed grasslands to dominate the landscape, and in extreme dryness, deserts formed in northern Africa. The need to move from the trees to the grasslands to collect food selected for bipedalism. Mutations that caused the following were selected for as it allowed more successful bipedal locomotion:</p> <ul style="list-style-type: none"> • reduction in nuchal crest • occipital condyles • a more centralised foramen magnum • an S-shaped spine • an increased valgus angle / Q angle (Q is for quadriceps) • changing relative proportions of leg • knees buttressed / femoral condyles • head of femur increased surface area (takes weight) • development of the more robust heel • big toe in alignment (thrust) • arched foot (shock). <p>These are all examples of skeletal changes that allowed for successful bipedal locomotion.</p> <p><i>Australopithecines</i> were early bipedal species. Walking upright is energy-efficient, and allows for sustained travel in grasslands in a hot environment. A bipedal hominin could scavenge food and carry more back to shelter.</p> <p>The increased valgus angle allows for more stability and less sway when walking bipedally. Energy was conserved. The arch acts as a shock absorber – again saving energy. The big toe allowed thrust when walking, using energy for forward movement, and the strengthened heel and ankle allowed more long-distance walking with no injury.</p> <p>Saved energy with this increased balance could be used in reproduction and care for the young, which would lead to more success and survival.</p> <p>With <i>Australopithecine</i> now standing more upright, they could see over grasses to find food more easily, and see predators earlier.</p> <p>Through seeing the predator or food, the <i>Australopithecine</i> would use its large cranium, for example, to think about the best route for survival, increasing the success of the population with more reproductive-age members surviving.</p>	<ul style="list-style-type: none"> • (abiotic) The Earth became (cooler and) drier. • Forests gave way to grasslands / open savannah / food higher • (biotic) sexual selection • Cranium change described. • Spine change described. • Leg change described. • Another leg change described. • Describes a benefit to early hominins of being bipedal. 	<ul style="list-style-type: none"> • A link is made between skeletal change of the cranium and successful locomotion.g. the central foramen magnum allowed the heavy skull to ‘balance’ on the spine. • A link is made between skeletal change of the spine and successful locomotion • Explains how the leg features of <i>Australopithecine</i> led to success or survival <p>E.g. the valgus angle allowed the legs to swing and reduce disruptive lumbering bipedal locomotion.</p> <ul style="list-style-type: none"> • Explains how a 2nd leg feature of <i>Australopithecines</i> led to survival or success <p>E.g. the thrusting big toe provided push with a heel and arched foot to reduce impact while walking.</p> <ul style="list-style-type: none"> • Successful bipedalism link to success. <p>E.g. dietary change due to reduced forest foods led to seed, root, and scavenged animal matter consumption.</p> <ul style="list-style-type: none"> • Bipedalism linked to survival of <i>Australopithecine spp.</i> 	<ul style="list-style-type: none"> • Discusses the changed environment of Africa, and the influence this had on the cranium, the spine, and the legs of <i>Australopithecines</i> / early hominins for success OR survival. • Discusses the changed features of Africa, and the influence this had on the cranium, the spine, and the legs of <i>Australopithecines</i> / early hominins for success AND survival.

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><i>Homo erectus</i> made and used Acheulian tools, and hunted in groups to collect nutrient-rich foods that enhanced their survival. The nutritional value of their food was further enhanced through the controlled use of fire. Fire killed bacteria, made food more easily digestible, and provided warmth and protection from predators, and a hearth that encouraged communication and cooperative learning opportunities. Dependence on meat allowed this species to migrate. Vegetarian species are dependent on a species of vegetation, and are place-based as a result. Meat is meat, wherever you are. Meat is high-energy; less volume is needed for higher energy. The Acheulian tools allowed for successful hunting and processing of food. Food could be chopped up, carried to a lair or carried while moving from place to place. Cooperative hunting, nutritious food, and controlled use of fire allowed <i>H. erectus</i> to follow their prey, to move to new areas, and to migrate out of Africa. Their dependence on meat for food was a new adaptable behaviour in hominids. <i>H. erectus</i> could adapt to new areas with new food sources that they were able to hunt and consume.</p> <p>There is / was a positive feedback loop, and food encourages more brain development, which encourages better thought – better food, and so on.</p>		<ul style="list-style-type: none"> Describes / (defines) cultural evolution. Acheulean tools were: <ul style="list-style-type: none"> (may be annotated drawing) / bifacial stone tools, a teardrop shape made with about 250 blows of a stone to create sharpened edges / bilateral symmetry hand axes to chop meat or dig roots OR used to create composite tools tied to wooden handles for hunting. Use of Acheulean benefit. Migration was possible by <i>H. erectus</i> due to good tools getting food etc Fire enabled (these need to be described). Cooking / warmth / light / protection / food safety. Fire enabled (these need to be described) up to 2 points: <ul style="list-style-type: none"> Cooking / warmth / light / protection / food safety. <i>H. erectus</i> worked in groups to hunt cooperatively to be successful, e.g. bigger animal. Cooperative meant they look after one another / shared energy needed. 		<ul style="list-style-type: none"> Acheulian tools use explained eg that allowed for hunting and the cooking of meat, providing greater energy for this species or clothing making / digging roots / shelter making with tools Fire example explained eg :More nutritious food as a result of cooking meant, for example, increased reproductive success / Fire ‘hearthing’ behaviour lengthened the day, providing heat and light at night, allowing for communication opportunities that enhanced learning and cultural knowledge for this species. Successful cooperation practices via cooperation technologies allowed <i>H. erectus</i> to move to new prey and migrate accordingly. 		<ul style="list-style-type: none"> The controlled use of fire, enhanced tool technologies, and cooperative hunting techniques explained. Better hunting leads to more high-energy food, leads to more time, and more cooperation, which leads to more successful hunting, allowing for successful migration. Therefore they were more successful than the other <i>spp</i> at the time. The controlled use of fire, enhanced tool technologies, and cooperative hunting techniques form a positive feedback loop. Better hunting leads to more high-energy food, leads to more time and more cooperation, which leads to more successful hunting. The combination of fire, successful tools, and cooperative behaviour allowed for an adaptability (in food sourcing) that allowed colonisation of new areas and supported a migratory way of life, and enabled <i>H. erectus</i> to be more successful than other hominins at the time. 	

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>Asian erectus or <i>H. floresiensis</i> in south east asia or <i>H. neanderthalensis</i> / <i>denisovans</i> / <i>heidelbergensis</i> in Europe.</p> <p>With the Out of Africa theory, <i>Homo sapiens</i> evolved in Africa. <i>Homo erectus</i> had left Africa approx 1.5 mya and further evolved out of Africa. About 50 000 years ago, modern humans left Africa and replaced all other spp. In MR theory <i>H. erectus</i> left Africa and evolved through gene flow into sapiens with variation seen in different areas.</p> <p>Each theory has an initial migration of <i>H. erectus</i> leaving Africa. However the difference is where <i>H. sapiens</i> evolved. Out of Africa theory has <i>H. sapiens</i> evolving in Africa from the population that remained, whereas the multiregional theory has <i>H. sapiens</i> evolving in Europe due to gene flow between the migrating populations.</p> <p>Physical and behavioural differences are endocranial and others. Group work, harvesting ability, etc.</p>	<ul style="list-style-type: none"> • May describe Asian erectus / <i>H. floresiensis</i> / <i>H. neanderthalensis</i> / <i>denisovans</i> / <i>heidelbergensis</i>. • Describes the Out of Africa theory as <i>H. erectus</i> leaves Africa, (1.5 mya – 2 mya) then later <i>H. sapiens</i>. (60 000 – 100 000). • Describes multiregional theory that (<i>H. erectus</i> left then) groups migrated out of Africa and evolved together in Europe into <i>H. sapiens</i>. (through gene flow). • Describes a (specific) physical aspect of (unique to) <i>H. sapiens</i> success, e.g. cranium / frontal lobe / Broca’s etc. • Describes a behavioural aspect to <i>H. sapiens</i> success, e.g. teamwork / shelter-building / caring / fishing / sophisticated tools. • Describes a second behavioural or physical aspect to <i>H. sapiens</i>’ success, e.g. teamwork / shelter-building / caring / fishing / sophisticated tools. 	<ul style="list-style-type: none"> • Links the two theories together, pointing out a difference. • Explains a physical aspect of <i>H. sapiens</i>’ success, e.g cranial capacity leading to clothes leading to success in cold climates / frontal lobe / Broca’s etc. • Explains a 2nd physical aspect of <i>H. sapiens</i>’ success, e.g cranial capacity leading to clothes leading to success in cold climates / frontal lobe / Broca’s etc. • Explains a behavioural aspect of <i>H. sapiens</i>’ success, e.g. group work building bonds, caring, migration to other areas. • Explains a 2nd behavioural aspect of <i>H. sapiens</i>’ success, e.g. group work building bonds, caring, migration to other areas. 	<ul style="list-style-type: none"> • Explains the two theories of dispersal and discusses reasons, both behaviourally and physically, for the success of <i>Homo sapiens</i>, linking to both Europe (and the Pacific). <i>H. sapiens</i> left Africa to ultimately replace all other hominin species – their capabilities surpassed those of existent species to persevere today. • Discusses reasons, both behaviourally and physically, for the success of <i>Homo sapiens</i> linking to both Europe and the Pacific, e.g. sewing, seafaring, better food, frontal lobe, success in new environment. Contains dates. Has more abstract thought, e.g. could use star navigation.

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Cut Scores

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