

Assessment Schedule – 2025**Biology: Demonstrate understanding of trends in human evolution (91606)****Assessment Criteria**

Achievement	Achievement with Merit	Achievement with Excellence
<p><i>Demonstrate understanding</i> involves:</p> <ul style="list-style-type: none"> • using biological ideas to describe trends in human evolution. 	<p><i>Demonstrate in-depth understanding</i> involves:</p> <ul style="list-style-type: none"> • using biological ideas to explain how or why trends in human evolution occur. 	<p><i>Demonstrate comprehensive understanding</i> involves:</p> <ul style="list-style-type: none"> • linking biological ideas about trends in human evolution; and linking of ideas may involve justifying, relating, evaluating, comparing, and contrasting, and analysing using scientific evidence.

Cut Scores

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

Evidence

Question One

Evidence	Achievement	Achievement with Merit	Achievement with Excellence
<p>Skeletal changes that enabled efficient bipedal walking in australopithecines</p> <p>Pelvis:</p> <ul style="list-style-type: none"> • The pelvis is shorter and broader than quadrupeds, which lowers the centre of gravity and provides stability when upright. • The ilium is in a bowl-like shape, which helps support internal organs during bipedal walking and assists in balancing the body weight over the legs. • The pelvis / ilium is flared inwards and is shorter and broader. This means more surface area for (gluteal) muscle attachment. Effective muscle attachment helps stabilise the body during each step by keeping the torso upright and balancing the weight over one leg at a time. <p>Femur:</p> <ul style="list-style-type: none"> • The femur is longer, which allows for longer bipedal strides. This enables more energy-efficient movement and allows for bipedal walking over greater distances with less effort. • The carrying / valgus angle of the femur is positioned inward towards the knees. This positions the knees directly under the body, which aligns with the feet and the centre of gravity, thereby reducing side-to-side (lateral) movement while walking, making bipedal walking more energy efficient. <p>Knees:</p> <ul style="list-style-type: none"> • The knees are positioned under the pelvis by the valgus angle. This means the centre of gravity is supported for better balance and allows one foot to be lifted while the rest of the body mass can be shifted to be balanced over the grounded foot. • The knee joints in bipedal hominin are larger and stronger than quadrupedal primates. This helps absorb shock and support the extra weight during upright walking. • The condyles have rounded surfaces to support stress / weight of an upright posture. • The patella is larger / more robust to support greater stress of upright walking / is positioned to reduce lateral displacement / increase stability. 	<p>Describes:</p> <ul style="list-style-type: none"> • how one of the following enables efficient bipedal walking: pelvis, femur, knees • how one other of the following enables efficient bipedal walking: pelvis, femur, knees • an additional enabling factor of the three mentioned (pelvis, femur, knee) • an advantage of bipedal walking for an australopithecine in Africa • a second advantage of bipedal walking • a disadvantage of bipedal walking • a possible selection pressure that may have led to skeletal changes • a second possible selection pressure that may have led to skeletal changes • another difference seen in the skeleton (e.g. a foot difference). 	<p>Explains:</p> <ul style="list-style-type: none"> • how TWO of the following enable efficient bipedal walking: <ul style="list-style-type: none"> – pelvis – femur – knees • TWO advantages of bipedal walking for an australopithecine in Africa • TWO disadvantages of bipedal walking for an australopithecine in Africa • a possible selection pressure that may have led to skeletal changes. 	<p>Provides detailed discussion of:</p> <ul style="list-style-type: none"> • how skeletal changes to the pelvis, femur, and knees enable efficient bipedal walking, and the advantages and disadvantages of bipedal walking for an australopithecine in Africa • possible selection pressures that may have led to skeletal changes.

Evidence	Achievement	Achievement with Merit	Achievement with Excellence
<p>Advantages of bipedal walking for australopithecine in Africa:</p> <ul style="list-style-type: none"> • Energy-efficient long-distance travel: bipedal walking is more energy-efficient (compared to quadrupedal walking) over long distances. This meant australopithecines could travel further to find food / water / resources / or have a diverse / flexible range of resources because of the wide foraging range without using a lot of energy. • Improved thermoregulation: walking upright reduced the surface area for direct sun hitting the body, helping with cooling. • Higher field of vision: walking upright meant australopithecines could see over tall grasses and spot predators / see resources and plan movements. • Free hands: for carrying objects, i.e. walking upright allowed hands to be free to carry food back to a home-base or to carry offspring and so increasing their survival against potential predators; for early tool manipulation; and for accessing a wider range of food sources. <p>Disadvantages of bipedal walking for an australopithecine in Africa:</p> <ul style="list-style-type: none"> • Vulnerable to predators: walking upright may have made australopithecines more visible to predators; bipedal walking is slower; running speed is low and agility / manoeuvrability is limited (compared to quadrupeds), so may have negatively affected their ability to escape from predators. • Risk of injury: bipedal walking puts strain on the lower back, hips, and knees. • Difficulty with tree-climbing: bipedal walking meant australopithecines had a more limited ability to climb trees compared to quadrupedal hominins. This could have limited access to safe sleeping or feeding spots in trees. • Other examples that are not specific to walking, e.g. childbirth. 			

Evidence	Achievement	Achievement with Merit	Achievement with Excellence
<p>Selection pressures:</p> <ul style="list-style-type: none"> • The climate became cooler and drier, changing forest to savannah. This was an impetus towards bipedalism as there were greater distances between resources. • There were great changes in diet, for example, the australopithecines were able to forage more easily on the grassland. • Individuals who had more efficient locomotion could forage further and, therefore, obtain more resources, giving them a greater chance of survival and success. • The open grasslands of the savannah exposed australopithecines to direct sunlight, particularly during the hottest times of the day (e.g. midday). Upright walking reduced the amount of body surface exposed to the sun and helped the body stay cooler. 			

N1	N2	A3	A4	M5	M6	E7	E8
ONE evidence point at Achievement.	TWO evidence points at Achievement.	THREE evidence points at Achievement.	FOUR evidence points at Achievement.	TWO evidence points at Merit.	THREE evidence points at Merit.	ONE evidence point at Excellence.	TWO evidence points at Excellence.

N0 = No response; no relevant evidence.

Question Two

Evidence	Achievement	Achievement with Merit	Achievement with Excellence
<p>Positive feedback relationship: The relationship is a loop. It is proposed that early hominin hands (such as <i>Homo habilis</i>) had opposable thumbs, enabling a power grip. The first tools (Oldowan) were made using a power grip where rocks were bashed together. The power grip allowed for better access to some foods, making it possible to crush bones or get into hard-to-access places (e.g. bone marrow), resulting in a wider range of diet / higher protein diet. Higher protein / energy foods led to brain expansion. Using tools meant hominins could access essential nutrients and calories needed for the energetically costly development and maintenance of a larger brain. As tools became more complex / specialised / sophisticated, brain size increased (especially in areas related to planning, problem-solving, and motor skills). Brain expansion also enhanced speech, language, and social learning. Culture evolution behaviours such as teaching, language, and social cooperation became an adaptive advantage and further reinforced hand development, tool use, and brain expansion in a feedback cycle / loop.</p> <p>Relationship between biological evolution and culture evolution: Biological evolution occurs through genetic change and involves the transfer of DNA from one generation to the next. Cultural evolution is the transmission of knowledge from generation to generation, not passed on by genetics, but by learning. The relationship is interdependent. Biological evolution provided the structural adaptation for tool use, and culture evolution in turn shaped / influenced the biological adaptations (hands, brains).</p> <p>Changes to the hand that influenced:</p> <ul style="list-style-type: none"> • Brain expansion: <ul style="list-style-type: none"> – Early hominins (e.g. <i>Homo habilis</i>) had a relatively longer thumb than other primates, allowing them to reach across the palm and touch the fingers (opposable thumb). This meant early hominins developed the power grip using tools, so were able to access more high-energy nutrients which then fuelled brain expansion. – The saddle joint (or similar) enables a wide range of thumb motion and allows the thumb to be brought across the hand to touch the tip of any finger. The precision grip allows better manipulation of objects and accuracy (e.g. early hominins were better able to develop and use tools (Acheulean, Mousterian, Palaeolithic), because they could strike the stone more accurately in the areas needed). The precision grip allowed for more sophisticated tools, and a greater ability to obtain high-energy foods for brain expansion. 	<p>Describes / defines:</p> <ul style="list-style-type: none"> • biological evolution • cultural evolution. <p>States:</p> <ul style="list-style-type: none"> • the change to the hominin hand. <p>Describes:</p> <ul style="list-style-type: none"> • the positive feedback <i>(accept an annotated diagram)</i> • a change to the hominin hand that influenced brain expansion • a second change to the hominin hand that influenced brain expansion • change to the hominin hand that influenced the development of tools • an advantage of cultural evolution • an advantage of biological evolution for cultural evolution • a disadvantage of biological evolution. 	<p>Explains:</p> <ul style="list-style-type: none"> • the relationship between cultural and biological evolution • the positive feedback relationship between hominin hands, brain expansion, and culture evolution <i>(accept an annotated diagram)</i> • how changes to the hominin hand influenced brain expansion • how changes to the hominin hand influenced the development of tools • how changes to the hominin hand influenced communication / language • how changes to the hominin hand influenced art • the advantages of biological evolution for culture evolution • the disadvantages of biological evolution for culture evolution. 	<p>Provides detailed discussion of:</p> <ul style="list-style-type: none"> • the positive feedback relationship between hominin hands, brain expansion, and culture evolution, including how changes to the hominin hand influenced the development of tools, communication / language, or art • the advantages and disadvantages of biological evolution for culture evolution.

Evidence	Achievement	Achievement with Merit	Achievement with Excellence
<ul style="list-style-type: none"> • The development of tools: <ul style="list-style-type: none"> – Improved dexterity and tool use due to opposable thumbs and the development of a power grip, allowing for precise control when striking a stone. – Changes to the saddle joint causing a precision grip and ability to manipulate tools more precise way. • Communication / language / art: <ul style="list-style-type: none"> – Problem-solving and iterative thinking: As hominins learned to craft more sophisticated tools, it required more planning, creativity, and understanding of materials. The ability to experiment with and refine tool-making techniques encouraged iterative thinking and problem-solving. – Transfer of knowledge / skills: Tool making required skilled individuals to show others how to craft and use tools effectively. This fostered social learning and early forms of teaching, encouraging communicative gestures and possibly vocal sounds to coordinate and convey ideas. – Coordination of fine motor skills: The brain regions that control hand movements overlap with those involved in speech and language processing. As hand dexterity improved, it may have driven the brain to expand and reorganise in ways that also supported the evolution of vocal control and language. – Art-making: With increased dexterity, hominins could carve designs and create patterns. Early evidence of art, such as engraved bones and beads, indicates that hand skills were applied in ways beyond practical tool making. – Development of abstract thought: Engaging in art like engraving or painting required abstract thought, imagination, and the ability to represent concepts visually. These activities likely helped foster symbolic thinking, essential for developing complex language and culture. <p>Advantages of biological evolution on culture evolution:</p> <ul style="list-style-type: none"> • Larger brains allowed for advanced cognitive abilities such as problem-solving, abstract thinking, and planning. These cognitive skills made it possible for humans to develop complex languages, technologies, and social structures, all required for cultural evolution. 			

Evidence	Achievement	Achievement with Merit	Achievement with Excellence
<ul style="list-style-type: none"> • Hand development allowed for the production of sophisticated tools and therefore access to higher energy nutrients that fuelled areas of the brain such as speech, abstract thought, all required for culture evolution. • Brain expansion and reorganisation favoured humans with enhanced memory and learning abilities, which supported the transmission of cultural knowledge across generations, from tool-making techniques to social norms and traditions. • The development of brain areas that control vocal cords, articulate sounds, and use hand gestures enabled language development and comprehension. Language increased the capacity to transmit information, share ideas, and build collective knowledge, accelerating cultural evolution. • Generalist hominin diet and adaptability made it possible for hominins to disperse and form cultures in a variety of environments. This flexibility led to a diverse range of cultural practices tailored to different climates, resources, and social conditions. <p>Disadvantages of biological evolution on culture evolution:</p> <ul style="list-style-type: none"> • The biological constraints of human ageing and lifespan limit how much cultural knowledge can be retained within a single generation. Important skills or information can be lost if not successfully transmitted before the death of knowledgeable individuals (especially when knowledge was held by individuals and not written down). • Biological evolution occurs at a much slower rate than cultural evolution. This lag means that human biology may not be fully adapted to modern cultural environments. • Traits that were once advantageous (e.g. a preference for high-calorie foods) may pose health risks in modern societies where food is abundant, demonstrating how biological evolution can sometimes clash with cultural evolution. • Brain expansion has led to prolonged childhood (and adolescence), as larger brains require a longer time to mature. Children remain dependent on adults for food, protection, and learning for many years, far longer than most other animals. • Brain expansion increased head size, which led to a narrower margin for safe childbirth due to the limitations of the human pelvis (adapted for bipedalism). Hence, brains (culture evolution) could not continue to expand and advance due to the biological constraints of brain size and safe childbirth. 			

N1	N2	A3	A4	M5	M6	E7	E8
ONE evidence point at Achievement.	TWO evidence points at Achievement.	THREE evidence points at Achievement.	FOUR evidence points at Achievement.	TWO evidence points at Merit.	THREE evidence points at Merit.	TWO evidence points at Excellence, but discussion for one is weaker.	TWO evidence points at Excellence.

N0 = No response; no relevant evidence.

Question Three

Evidence	Achievement	Achievement with Merit	Achievement with Excellence
<p>Out of Africa hypothesis: This proposes modern <i>Homo sapiens</i> evolved in Africa and then migrated outwards, replacing other hominin species like Neanderthals and Denisovans.</p> <p>By developing the ability to make clothing and shelter, hominins could thrive/live in environments previously not accessed and obtain a wider range of resources for survival.</p> <p>The use of animal skins for clothing meant Neanderthals, Denisovans, and <i>H. sapiens</i> could live in cold habitats / environments and retain body heat / prevent hypothermia. This meant they could move seasonally with herds and have a constant food supply.</p> <p>The construction of shelters provided warmth in cold habitats or protection from harsh heat, and safety from predators.</p> <p>Specialised adaptation is a trait that evolves and increases an organism's survival in a specific environment.</p> <p>Neanderthals had specialised adaptations that were specific to cold environments in Europe. They had short, stocky, short-limbed bodies helpful for preserving heat, but their bodies weren't suited for warmer, tropical / coastal regions. Muscle-heavy bodies required high-calorie food, making them dependent on large prey that also inhabited cooler regions only.</p> <p>Denisovans had specialised adaptations specific to mountain and forest habitats in Siberia / Centra Asia (possibly Southeast Asia), and also specialised adaptations specific to high-altitude living (i.e. cold-adapted bodies such as Neanderthals, which limited dispersal to low-altitude, tropical or warmer regions).</p> <p>Having specialised adaptations makes species vulnerable to environmental change.</p> <p><i>H. sapiens</i> were taller and had leaner bodies that were better for heat regulation in warm and cold environments. They also had a broader diet,</p>	<p>Describes:</p> <ul style="list-style-type: none"> the Out of Africa hypothesis that <i>H. sapiens</i> outcompeted all other hominins an advantage of clothing an advantage of shelter a specialised adaptation by Neanderthals a specialised adaptation by Denisovans inbreeding / interbreeding the development of abstract thought a communication advantage or defines Broca's and Wernecke's. 	<p>Explains:</p> <ul style="list-style-type: none"> the Out of Africa theory, including <i>H. erectus</i> and date / what happened to first wave (i.e. outcompeted or that they became the Neanderthals and Denisovans) how the ability to make clothing increased the ability to disperse how the ability to make shelter increased the ability to disperse how a specialised adaptation of Neanderthals affected their survival and dispersal how a specialised adaptation of Denisovans affected their survival and dispersal how inbreeding <i>OR</i> interbreeding may have affected survival or dispersal of Neanderthals / Denisovans how abstract thought may have helped <i>H. sapiens</i> disperse how communication may have helped <i>H. sapiens</i> disperse. 	<p>Provides detailed discussion of:</p> <ul style="list-style-type: none"> possible reasons why Neanderthals and Denisovans were more restricted geographically than <i>H. sapiens</i>. factors that influenced the successful dispersal of modern <i>H. sapiens</i>.

<p>eating fish, plants, and small animals, allowing for survival in many ecosystems. They had higher genetic diversity, which increased a population’s resilience to disease.</p> <p>Inbreeding refers to reproduction between closely related individuals within a population. Inbreeding leads to a high chance of inheriting genetic disorders and reduces genetic diversity. Inbreeding also causes higher infant mortality, weaker immune systems, and reduced fertility.</p> <p>Abstract thought is the ability to think about ideas / concepts that are not directly visible / present. It allows humans to reason, imagine, and plan.</p> <p>Communication in humans increased cooperation and sharing of ideas (transfer of culture evolution), allowing for trade and the forming of alliances while dispersing.</p> <p>Abstract thought would have advantaged <i>H. sapiens</i> over Neanderthals and Denisovans as it allowed them to plan migrations, share survival strategies, develop more advanced tools and form social networks. This may have allowed them to exploit a broader range of resources and adapt more effectively to different environments.</p> <p><i>H. sapiens</i> may have had advantages in terms of social structure, technology (e.g. more advanced tools and weapons), and hunting strategies, allowing them to out-compete Neanderthals and Denisovans in shared habitats / niches and resources.</p> <p>Neanderthals had their own tool culture (Mousterian tools), but they did not innovate at the same rate as <i>H. sapiens</i> in terms of tools and art. This gap may have limited Neanderthals’ ability to adapt and survive in changing environments.</p>			
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N1	N2	A3	A4	M5	M6	E7	E8
ONE evidence point at Achievement.	TWO evidence points at Achievement.	THREE evidence points at Achievement.	FOUR evidence points at Achievement.	TWO evidence points at Merit.	THREE evidence points at Merit.	ONE evidence point at Excellence.	TWO evidence points at Excellence.

N0 = No response; no relevant evidence.