

Marking Key

| Question | Answer | Explanation |
|----------|--------|---|
| 1 | A | Carrying angle is increased to allow the centre of gravity to fall within the base of support. |
| 2 | D | Bipedal locomotion improves cooling, frees hands for tool use, offers improved cooling. |
| 3 | B | <i>Paranthropus</i> had a robust jaw, not a robust skeleton, and is a robust australopithecine. |
| 4 | B | Humans, chimps and bonobos share approximately 99% of DNA at critical sites; have a high number of ancestral traits with primates and each has less DNA in common with gorillas. |
| 5 | A | There exist several species of australopithecines, generally clustered into two groups. |
| 6 | B | Bipedality likely occurred due to the energy efficiency in moving across mixed woodlands, improved social displays when vertical, increased heat dissipation when vertical and reduced heating. |
| 7 | C | Evolutionary trends in locomotion, dental arcades, and brain size occurred at different times and different rates over a period of 6 million years; brain size relative to body size increased as humans evolved. |
| 8 | C | <i>Homo erectus</i> dispersed out of Africa and is associated with more complex tool kits, but less so than <i>Homo ergaster</i> who remained in Africa, an increased body size and relative brain size. |
| 9 | C | At approximately 2 million years ago, <i>Paranthropus</i> , <i>Australopithecus</i> , and <i>Homo</i> existed in Africa, living apes are not our ancestors; <i>Homo sapiens</i> originated in Africa. |
| 10 | D | Early australopithecines exhibit a reduced brain size, and more archaic jaw (prognathic, U-shaped dental arcade and diastema). |
| 11 | A | Skull 1: gorilla. Skull 2: australopithecine. Skull 3: <i>Homo erectus</i> . Skull 4: <i>Homo neanderthalensis</i> . Skull 5: <i>Homo heidelbergensis</i> . Skull 6: <i>Homo sapiens</i> . |

Question 12.

12a) i)

Any two marks:

- *Homo sapiens* has a larger cranial volume. (1)
- 400cc (*afarensis*) vs. 1250-1400cc (*sapiens*). (1)
- Evolutionary trend of increasing cranial volume. (1)

12a) ii)

Any four marks:

- Prognathic *A. afarensis* skull vs. orthognathic *H. sapiens* skull. (2)
- Large canines in *A. afarensis* vs. molars and canines being the same size in *H. sapiens*. (2)
- Pre-canine diastema present in *A. afarensis*, but absent in *H. sapiens*. (2)
- Dental arcade is parallel/u-shaped in *A. afarensis* and parabolic in *H. sapiens*. (2)
- Foramen magnum is mid-way positioned in *A. afarensis* and central in *H. sapiens*. (2)

12b) i)

Any two marks:

- Ape has orthognathic face vs. prognathic face of *H. sapiens*. (1)
- Upper pre-canine diastema present in gorilla vs. absent in *H. sapiens*. (1)
- Parallel sided dental arcade of gorilla vs. parabolic dental arcade in *H. sapiens*. (1)
- Posterior foramen magnum in gorilla vs. centrally placed in *H. sapiens*. (1)
- Larger canines compared to other teeth in gorilla vs. canines similar size to other teeth in *H. sapiens*. (1)
- No forehead in gorilla vs. forehead present in *H. sapiens*. (1)
- Smaller cranial capacity relative to body size in gorillas vs. larger cranial capacity relative to body size in *H. sapiens*. (1)

Sagittal crest unique to gorilla. (1)

Nuchal crest unique to gorilla. (1)

Supra-orbital torus/brow ridge prominent/heavy-set in gorilla. (1)

12b) ii) Gorillas are quadrupedal knuckle-walkers. (1)

12b) iii)

Any three marks:

- C-shaped spine. (1)
- High centre of gravity/located high on chest. (1)
- No carrying angle. (1)
- Long arms/short legs. (1)

12b) iv)

Two adaptations with explanation:

- Arched foot/transverse arch. (0.5)
- Arch absorbs shock from bipedal walking. (0.5)
- Non-opposable big toe. (0.5)
- In line with the other toes to facilitate linear motion. (0.5)
- Enlarged heel bone. (0.5)
- Striking motion allowed. (0.5)

Question 13.

13a)

- Annotations on diagram. (1)
- Diagram of s-shaped human and c-shaped gorilla spines. (1)

13b)

- C-shaped spine of gorilla for quadrupedal/knuckle-walking. (1)
- S-shaped spine of human for bipedal walking/shock absorption. (1)

13c)

| Structure | Gorilla | Modern Human |
|------------------------|---------|--------------|
| Longitudinal arch | ✓ | ✓ |
| Transverse arch | | ✓ |
| Wedge-shaped vertebrae | | ✓ |
| Prognathism of the jaw | ✓ | |
| Nuchal crest | ✓ | |
| Sagittal crest | ✓ | |

Question 14.

- 14a)** *Homo erectus*. (1)
- 14b)** *Homo neanderthalensis*. (1)
- 14c)** *Australopithecines/Australopithecus afarensis/africanus*. (1)
- 14d)** *Homo sapiens*. (1)
- 14e)** *Homo neanderthalensis*. (1)
- 14f)** *Australopithecines/Australopithecus afarensis/africanus*. (1)
- 14g)** *Paranthropus robustus*. (1)

Question 15.

- 15a)** Magdalenian tool culture. (1)
- 15b)** *Homo sapiens*. (1)
- 15c)**
 - Bone/antler tools/spears/fishing hook. (1)
 - Located near body of water so fishing for food. (1)

15d)

Any four marks:

- Cold, dry environments so heavier facial features. (1)
- Robust skeleton in Neanderthals/barrel-shaped chest to retain heat at the core. (1)
- Smaller body length in Neanderthals so there is less surface for heat to be exchanged. (1)
- Shorter limbs in Neanderthals reduce heat loss. (1)
- Large nose for warming/humidifying cold, dry air. (1)
- Diet largely meat and to digest this heavy mandible/large jaw. (1)

15e)

Any two marks:

- Bipedality likely occurred due to the energy efficiency in moving across mixed woodlands. (1)
- Improved social displays/threaten other members/groups when vertical. (1)
- Increased heat dissipation when vertical. (1)
- Reduced heating when vertical/sun strikes a smaller portion of body. (1)

Question 16.

16a)

Any ten marks (1 mark for adaptation and 1 mark for description):

- The S-shaped spine. (1)
- Absorb shock from walking. (1)
- Arched foot. (1)
- Absorb shock from bipedal walking. (1)
- Non-opposable big toe. (1)
- In line with the other toes to facilitate linear motion. (1)
- Pelvis is short and broad. (1)
- In order to support the organs above. (1)
- Increased carrying angle exists at the femur. (1)
- Allows the centre of gravity to fall within the base of support (increased stability). (1)
- The centre of the gravity is low. (1)
- Support vertical locomotion. (1)
- Foramen magnum is centralized and located under the cranium. (1)
- Positioned so that the skull sits on top of the vertebral column. (1)

16b)

Any three marks:

- *Paranthropus* has a smaller body size, whereas *Homo sapiens* has a larger body size. (1)
- *Paranthropus* has a lighter skeleton, whereas *Homo sapiens* has a heavier skeleton. (1)
- *Paranthropus* has a wide face/jaw and zygomatic arches, whereas *Homo sapiens* had a narrow face and no zygomatic arches. (1)
- *Paranthropus* has a smaller brain volume. (1)
- *Paranthropus* had a midway foramen magnum, whereas *Homo sapiens* has a centrally placed foramen magnum. (1)

16c)

Any three marks:

- Neanderthals have the largest cranial volume. (1)
- Neanderthals have an occipital bun. (1)
- Neanderthals have very prominent brow ridges. (1)
- Neanderthals have a prominent zygomatic arch. (1)
- Projecting nose. (1)
- Lack of chin. (1)

16d)

Any four marks:

- Increase in sociality indicated by Neanderthals. (1)
- Neanderthals had rituals/burials where they honoured their dead. (1)
- Trend towards a community environment – fossil evidence suggests Neanderthals cared for their disabled. (1)
- Tools became more sophisticated at the same time the cranium size and number of convolutions increased. (1)
- Speech and community meals/game shared by the group. (1)