

## UNIT 4 BIOLOGY

### Revision Booklet 14 (Hominin Evolution) - SOLUTIONS

#### 2012 – Question 8

##### Question 8a.

Marks	0	1	Average
%	56	44	0.5

Longer upper limbs or prehensile toe

##### Question 8b.

Marks	0	1	2	Average
%	14	35	51	1.4

The precision grip would allow for, for example, the making or using of tools. The projecting nose would allow for, for example, greater sense of smell or thermoregulation.

The precision grip allows fine manipulation in humans to perform tasks such as writing, and the making and using of tools, etc.

Answers such as climbing, which is characteristic of other primates and not dependent on the precision grip, were incorrect.

##### Question 8c.

Marks	0	1	2	Average
%	24	34	42	1.2

Enlarged brain case, accommodating a larger brain. This allowed for more complex thought processes and the ability to adapt to changing new environments.

##### Question 8d.

Marks	0	1	2	Average
%	21	39	41	1.2

Two of

- significance of burning: hygiene, ritual or ability to use fire
- significance of making bed: knowledge passed down, use of tools.

Students were not required to state whether their significances were cultural or technological or both; however, many students set out clear and well-thought-out answers.

#### 2011 – Question 7

##### Question 7a.

Marks	0	1	2	Average
%	34	38	28	1

7ai.

One of:

- mtDNA is inherited from the mother
- there is no crossing over/recombination/non-disjunction in mtDNA
- the mutation rate is known and used to determine evolutionary time.

Many students made comments about the mutation rate. It is important to note that coding regions of mRNA mutate at a slow rate and non-coding regions mutate at a fast rate.

7aii.

Nuclear/chromosomal DNA

##### Question 7b.

Marks	0	1	2	Average
%	31	51	18	0.9

Inferences could include:

- modern humans evolved relatively recently
- African populations are the oldest
- humans are related to small number of ancestors
- humans evolved and migrated out of Africa.

**Question 7c.**

Marks	0	1	2	3	Average
%	12	30	36	22	1.7

7ci.

DNA has degraded.

7cii.

Other evidence such as examination and comparison of (one of):

- fossils
- tools
- amino acids.

Dating methods such as:

- stratigraphy
- radioisotopic dating.

It was important that students outlined evidence as requested in the question. For example, to state 'fossils' did not gain the mark, but to state that 'the skulls of early hominins could be compared' gained the mark.

**Question 7d.**

Marks	0	1	2	Average
%	31	39	30	1

7di.

Parts of the hominin could have been scattered by scavengers or decayed faster due to exposure to decomposers.

7dii.

One of:

- absence of decomposers
- low oxygen levels
- the organism had hard body parts.

Some incorrect answers included that fossils were covered by lava or that oxygen inhibits fossilisation.

**2010 – Question 5****Question 5a.**

Marks	0	1	2	Average
%	45	40	15	0.7

Two of:

- jaw X is more parabolic than jaw Y
- the canine teeth are larger in jaw Y
- the teeth are a more uniform size in jaw X.

The Australopithecus jaw is more parabolic and the Gorilla jaw is U shaped or more square. Too often students confused these descriptions and as a consequence did not gain the marks available. Many students incorrectly stated that jaw X was the gorilla or that jaw Y was the Australopithecus.

**Question 5b.**

Marks	0	1	2	Average
%	82	14	4	0.2

Both of:

- the inactivation of one centromere enables meiosis/cell replication to occur
- gametes are able to be produced.

This question was poorly answered. Most students did not answer this question in terms of the significance of the inactivation of one of the centromeres but instead answered in terms of human evolution.

## 2009 – Question 6

### Question 6a.

Marks	0	1	Average
%	53	47	0.5

Any of:

- big toe is arranged parallel to other toes
- big toe is not opposable
- prints indicate two feet, not four, or the use of hands/knuckles.

### Question 6b.

Marks	0	1	2	Average
%	21	26	52	1.3

Set 2 and two of:

- prominent brow ridge
- smaller cranial capacity
- face protrudes more
- foramen magnum is positioned further back.

Some students gave too much information, some of which was incorrect. It is advisable that students give their best answer first. Students should only give the number of reasons asked for in the question.

### Questions 6c.

Marks	0	1	Average
%	27	73	0.8

Evidence of:

- tools
- use of fire.

### Question 6di-iii.

Marks	0	1	2	3	Average
%	31	33	26	11	1.2

#### 6di.

Articulate speech/writing/painting/ceremonies enabled information to be passed on.

#### 6dii.

Any of:

- the brain – an increase in capacity leads to greater processing of information
- precision grip led to the ability to make tools for fine manipulation
- structures involved with speech led to communication through speech.

#### 6diii.

- yes – medical advances or genetic manipulation mean that modern humans are interfering in their own selection to the extent that natural selection no longer operates
- no – humans still exist in many different environments and are still subjected to different selective pressures, for example, disease

Students could argue either for or against the statement; however, a mark was only awarded if a reasoned argument was presented.

Question 6 was attempted by nearly all students and with some degree of success.

## 2008 – Question 8

### Question 8a.

Marks	0	1	Average
%	75	25	0.3

Different palaeontologists may make different **interpretations** of the same data.

### Question 8bi-ii.

Marks	0	1	2	Average
%	14	32	55	1.4

#### 8bi.

Either of:

- *Australopithecus afarensis* evolved about three million years ago
- *Homo heidelbergensis* evolved from *Homo ergaster* (about one million years ago).

#### 8bii.

Any of:

- *Homo erectus* evolved from *Australopithecus afarensis* in Model 1
- *Homo erectus* evolved from *Homo ergaster* in Model 2
- Model 2 shows linear evolution from *Australopithecus afarensis*.

For this part, any correct statement about the relationships illustrated was awarded a mark. These parts of the question did not require interpretation.

### Question 8c.

Marks	0	1	2	Average
%	32	35	33	1.1

*Homo erectus* had:

- a larger brain case
- a less prominent brow ridge
- a more parabolic jaw.

or

Correct statements with respect to teeth size or position of foramen magnum received one mark for each correct feature named.

Many answers were not structural, such as type of diet. Other incorrect answers included, placement of eyes, sagittal crest and hair.

Size of brain is incorrect as this can only be inferred; the size of the brain case is the feature.

### Question 8d.

Marks	0	1	Average
%	65	35	0.4

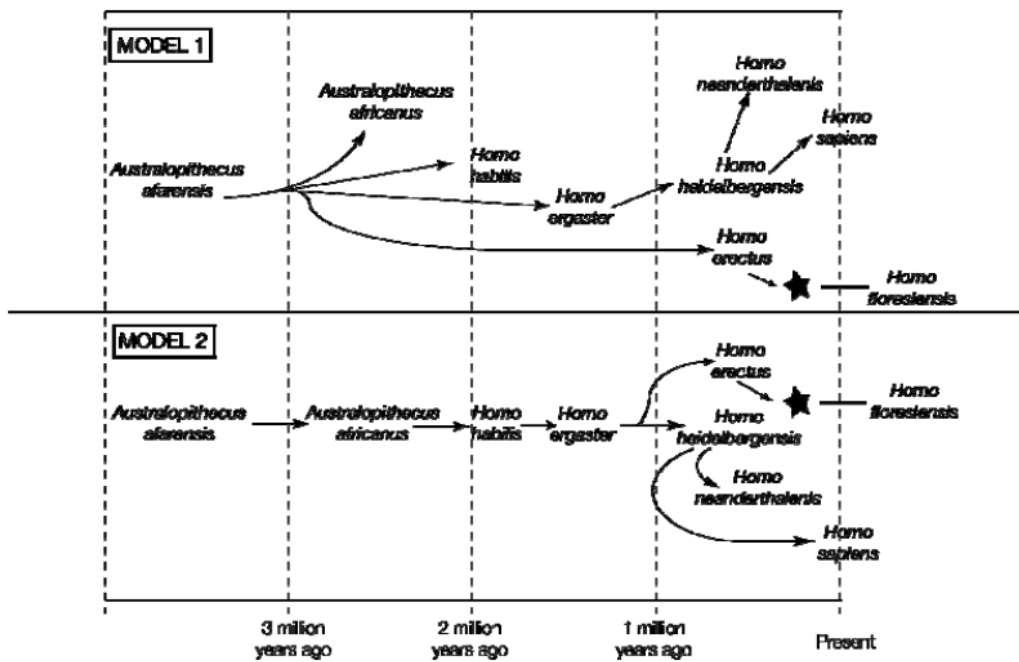
Any of:

- different customs and lifestyle prevented interbreeding
- different mating behaviour or rituals
- mating occurred, however, viable offspring were not produced.

A common incorrect answer was that the two species were geographically isolated, yet the stem of the question stated that the two species 'were living in the same area'.

Question 8e.

Marks	0	1	Average
%	23	77	0.8



The arrow could be placed in either Model 1 or Model 2.

Unfortunately many students failed to answer this question; presumably they did not see this part.

Question 8f.

Marks	0	1	2	Average
%	89	9	1	0.1

8fi.

If adult and child fossils of *Homo floresiensis* were found that had skulls indicating all had the same small brain characteristic.

8fii.

If fossils were found in the same area and had normal sized skulls.

If adult and child fossils of *Homo sapiens* were found in the same area and had skulls indicating child brain size much larger than that of the fossil called *Homo floresiensis*.

2005 – Question 8

Question 8a.

Marks	0	1	2	3	Average
%	47	12	20	20	1.1

The following points needed to be made:

- two populations become separated/isolated from each other
- there is selection for different characteristics (for example, behavioural, physiological, morphological, etc.) in the two populations. The different selective pressures in the two environments result in the two groups becoming distinct from each other
- over time, individuals from the two populations become so different that they are no longer able to interbreed to produce fertile offspring.

One mark was given for each point. Students who answered this question well tended to clearly set out the main steps of speciation and provided the means to assess that speciation had occurred.

**Question 8b.**

Marks	0	1	2	Average
%	33	46	21	0.9

Any two of:

- thick eyebrow ridges
- sloping forehead
- no chin.

All the information required to answer this question was supplied. Too often, features that were not given in the stimulus material or features that were incorrect (such as having a small brain) were used by students.

**Question 8c.**

Marks	0	1	Average
%	52	48	0.5

Radioactive carbon dating or radio isotopic dating.

Common incorrect answers included using the relative position of fossils, stratigraphy, or using a radioactive isotope with a very long half life, such as Potassium.

**Question 8d.**

Marks	0	1	Average
%	34	66	0.7

Examples of cultural evolution in a human population are:

- wearing clothes
- art
- burying the dead.

This question was generally well answered. Responses that could also apply to animals (for example, hunting in groups, living in caves, communicating with others) were not awarded the mark; however, the use of language was accepted.

**2005 – Question 9****Question 9a.**

Marks	0	1	Average
%	14	86	0.9

Any one of:

- better able to detect and avoid predators
- better able to locate food (other animals)
- better able to hear the calls of a mate
- better able to hear their offspring (if they wander away).

**Question 9b.**

Marks	0	1	Average
%	34	66	0.7

Divergent evolution

Adaptive radiation or speciation were not awarded the mark, as these terms do not fit the data given.

**Question 9c.**

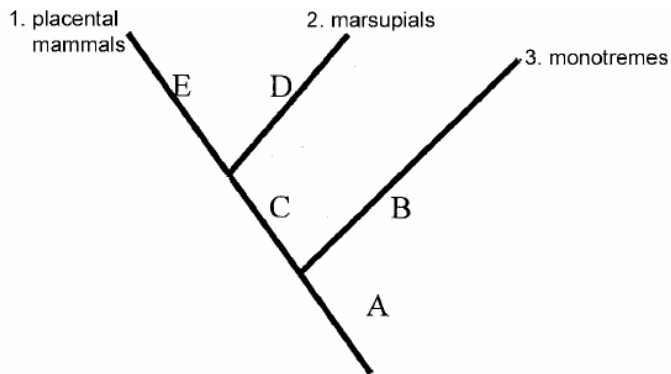
Marks	0	1	Average
%	40	60	0.6

Convergent evolution or parallel evolution

**Question 9d.**

Marks	0	1	Average
%	48	52	0.5

- 1 and 2: placental mammals or marsupials
- 3: monotremes



Marks were not awarded if the word mammals was used instead of placental mammals (all three groups are mammals).

**Question 9e.**

Marks	0	1	2	Average
%	48	34	18	0.7

Branch B (evolution in monotremes), and either C (for evolution in placental mammals and marsupials) **or** E and D (for evolution in placental mammals and marsupials).

One mark was given for each point. There was confusion in this question, as many students, for example, correctly identified that evolution in placental mammals and monotremes occurred in C, but then incorrectly stated that it would again occur in E and D.