**Review Worksheet Answers Transition to Modern Humans**

1: Which hominin is currently thought to be the most likely common ancestor of both *Homo neanderthalensis* and *Homo sapiens* and what was its likely geographical range?

(2 marks)

*The likely common ancestor is Homo heidelbergensis (1) and the geographical range was Africa and Europe (1).*

2: What environmental event caused *heidelbergensis* to diverge into the two species and what was the effect of the event on the environment and selection pressures in Europe and Africa.

(4 marks)

*An ice age (1) caused different environmental conditions in Europe and Africa. In Europe the ice age caused extreme cold, snow and ice (1). In Africa the ice age caused extreme drought (1). This created different selection pressures (1) for heidelbergensis in Europe and Africa, leading to divergence into two species.*

3: What was the time frame for existence of *Homo neanderthalensis* and what was their geographical range?

(2 marks)

*H. neanderthalensis existed between 400 000 years BP to 40 000 years BP (1), and their range was across Europe and into Western Asia (1).*

4: List the anatomical features of *H. neanderthalensis* that were similar to, and different from *Homo sapiens:*

(4 marks)

|  |  |
| --- | --- |
| **Neanderthals were different to humans because… (3.5)** | **Neanderthals were similar to humans because… (0.5)** |
| *Heavy brow ridges* | *Similar general skeletal structure* |
| *No defined chin* |  |
| *Prominent, wide nose* |  |
| *Shorter and stockier* |  |
| *Low forehead* |  |
| *“occipital bun” at back of skull* |  |
| *Cheeks swept back* |  |

5: Describe the diet of *Homo neanderthalensis* and give reasons for their dietary adaptations.

(4 marks)

*H. neanderthalensis had a diet high in meat (1). This is likely because big game animals (eg mammoth) were available to hunt (1), but vegetation they were able to eat was not as available (1). They also needed the energy from animal fats to survive in the cold environment (1).*

6: What major changes can be seen in the tool making of *Homo neanderthalensis* that were not evident in previous extinct hominins?

(6 marks)

*Previous hominins used generalised tools (1), for example simple Oldowan choppers and Acheulean hand axes (1). Neanderthals made a variety of tools (1) for specific purposes (1), eg scrapers, piercers and spear points, and were the first to flake many tools off a single stone core (1). They were also the first to haft stone tools to wood to make spears (1)*

7: What is the name given to the Neanderthal tool industry?

(1 mark)

*Mousterian Industry*

8: Tick to show which of the following aspects are known to be features of Neanderthal culture and lifestyle:

(2 marks completely correct table)

|  |  |
| --- | --- |
| **Feature** | **Tick if it applies to Neanderthals** |
| Made art on the walls of caves |  |
| Buried their dead |  |
| Wore clothing |  |
| Had language |  |
| Hunted |  |
| Made tools from ivory, bone and antler |  |
| Made and used fire |  |

9: When are *Homo sapiens* first thought to have arisen as a species?

(1 mark)

*Around 300 000 years ago.*

10: Describe the steps involved in Sanger sequencing:

(18 marks)

*1: DNA of interest is heated (0.5)so that it is denatured into separate strands (0.5). The template strand will be used. (0.5)*

*2: Primer is added to the template strand (0.5) to provide a starting point for future addition of nucleotides. (0.5)*

*3: Four reaction mixtures are set up, one for each base type. (1)*

*4: Many copies (0.5) of the template strand with the annealed primer (0.5) are added to each reaction mixture (0.5)*

*5: DNA polymerase (0.5) is added to each reaction mixture (0.5) to assist with the addition of nucleotides to the template strand.(0.5)*

*6: Free nucleotides (dNTPs) (0.5)are added to each reaction mixture (0.5) so they can be added to the template strand. (0.5)*

*7: Modified nucleotides / terminator bases /ddNTPs (0.5) are added to the reaction mixtures (0.5). Only one type is added to each reaction mixture (0.5), so each has a ddNTP for one of the four nucleotide types (0.5). These lack the hydroxyl (OH) group (0.5) so no more nucleotides can attach.(0.5) This terminates the chain (0.5) when they are added by the DNA polymerase. (0.5)*

*8: Gel electrophoresis (0.5) is used to separate the different length strands by size (0.5). Four wells are made in the gel (0.5), and one reaction mixture is added to each (0.5). This forms four lanes in the gel (0.5). An electrical current is passed through the gel (0.5). The negatively charged DNA moves towards the positive terminal (0.5). The smaller lengths move faster (0.5), so the strands are organised in size order, in their lanes (0.5). The sequence can then be read by reading from smallest to largest (0.5) across the lanes (0.5), as each strand terminates with the modified nucleotide specific to each reaction mixture. (0.5)*