**CHAPTER 9 - EVOLUTION BY NATURAL SELECTION**

**EVIDENCE FOR EVOLUTION**

**QUESTION 1**

1. Evolution

2. Paleontology

3. Hypothesis

4. Theory

5. Biogeography

6. Pentadactyl limb

7. Discontinuous variation

8. Phylogenetic tree

9. Continuous variation

10. Homologous

**QUESTION 2**

1. E

2. E

3. As a result of evolution organisms become increasingly complex over time. Simple organisms evolved first and are found in the oldest strata. Complex organisms evolved later and are found in the upper rock layers.

4. Punctuated equilibrium-long periods of time species did not change/very little change, this alternated with periods of rapid change through natural selection resulting in the formation of new species in a short period of time. Therefore, there would be very few transitional fossils also a small percentage of organisms fossilized

**QUESTION 3**

1. Pentadactyl limb

2. a) Prominent thumb which is able to form a pincer grip so that the monkey can grip onto branches/ phalanges are long and thin to form fingers which can go around and grip branches

b) Scapula is broad and flat for the attachment of strong swimming muscles/ humerus, radius and ulna are thick and strong for muscles to attach to, they are shorter to streamline the body for faster swimming/ metacarpals and phalanges are longer and spread out to form a broad paddle

c) Radius and ulna are elongates to increase wingspan/ scapula is large and flat to give large surface area for the attachment of muscles/ humerus is elongated to increase wingspan/ metacarpals and phalanges are elongates and spread out so that the membranes of the skin can be stretched between them to form the wing

d) Number of phalanges are reduced to one which forms the hoof to allow the horse to gallop fast/ ulna is thicker and stronger than the radius to support most of the weight/ humerus and ulna are elongated to make the limb longer to take longer strides/ scapula points downwards towards the ground so that it is in line with the ulna and humerus/ scapula is larger and flat for the attachment of muscles

e) Radius and ulna are fused to make them stronger for digging/ carpal and metacarpals are short and thick to provide strength during digging/ joints are modified so that the paws face backwards to push the soil backwards while digging/ broader phalanges so that the paw is shaped like a shovel/ short humerus so that the paws are close to the body to allow the mole to move easily through tunnels

**QUESTION 4**

1. Biogeography

2. The ancestral Glossopteris evolved in the Southern Hemisphere after Pangaea had separated but before Gondwana split up and the continents started moving apart which is why fossils have been found in the souther hemisphere.

3. Baobabs flightless birds

**QUESTION 5**

1. *Lemur*

2. *Lagothrix*, they have a common ancestor.

3. *Macaca*

4. Crossing over, random arrangement of chromosomes, random fertilsiation, mutation and random mating.

5. Cladogram