



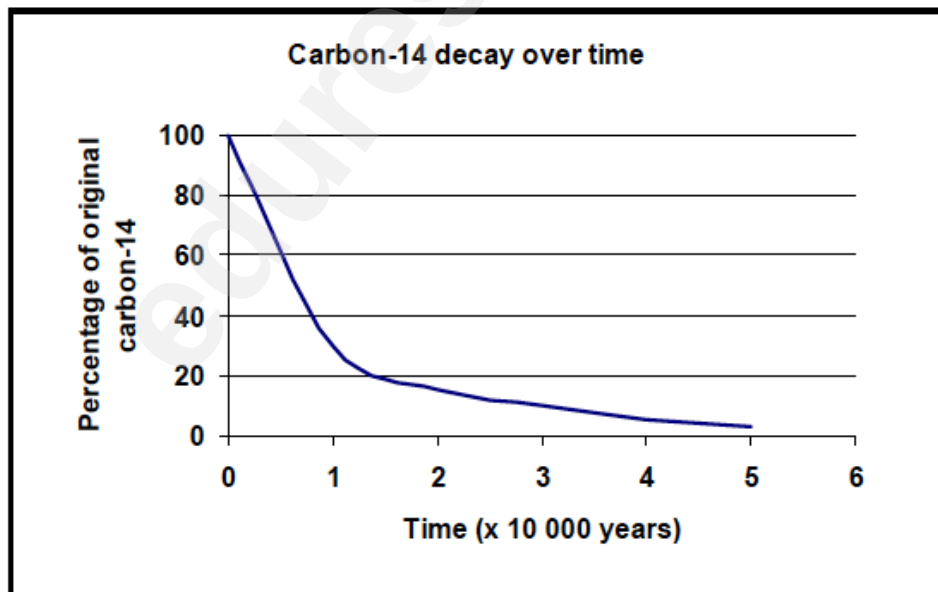
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CONSOLIDATION

Learner Note: Please ensure that you adhere to the time limits for each question. This is so that you learn to work quickly and efficiently.

SECTION A: TYPICAL EXAM QUESTIONS**Question 1: 5 minutes***(Taken from various past exam papers)*

- 1.1. According to Charles Darwin, organisms that will be most successful biologically, are those that ...
- A. are best adapted to their environment.
B. are the largest in the population.
C. reproduce the slowest.
D. do not change
- 1.2. Structures that perform similar functions but have different evolutionary origins are called structures.
- A. homologous
B. homozygous
C. analogous
D. heterozygous
- 1.3. Study the following characteristics:
- A. Olfactory brain centres reduced
B. Bare fingertips
C. Flat face (not prognathous)
D. Always bipedal
- 1.4. Which combination of characteristics makes humans different from other primates?
- A. 2, 3 and 4 only
B. 1, 2 and 3 only
C. 3 and 4 only
D. 1, 2 and 4 only
- 1.5. One way to determine the age of a fossil is to use the rate of decay of carbon-14. The graph below shows how carbon-14 decays over time.



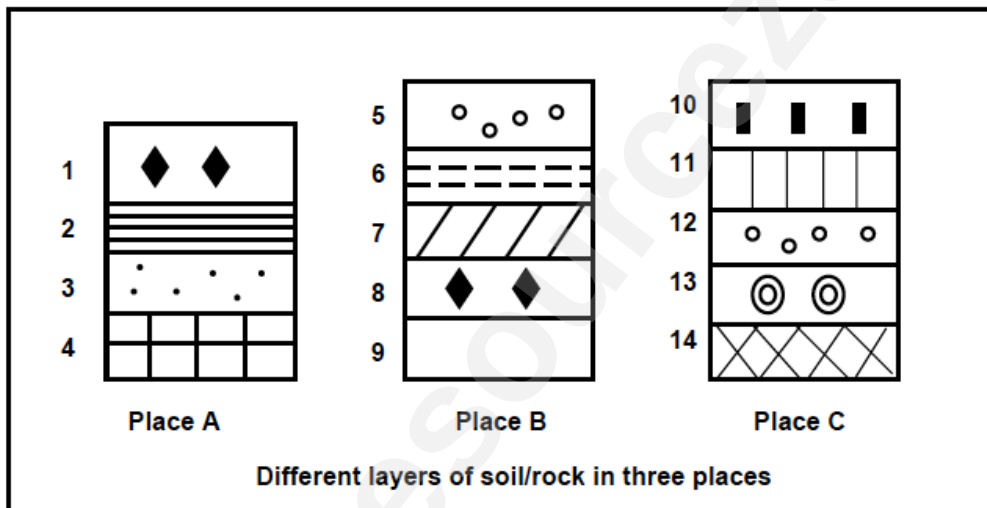
A fossil snail was found to have 30% of its carbon-14 remaining. According to the above graph, the age of the fossil is approximately ...

- A 5 000 years.
- B 15 000 years.
- C 10 000 years.
- D 20 000 years.

Question 2: 7 minutes*(Taken from DoE November 2009 Paper 2)*

Some fossils are typical of a particular period of the earth's history. Fossil organisms have lived only in that period and it is then possible to tell the age of the rock in which they are found. Such fossils are called index fossils. A typical index fossil is the trilobite that lived in the oceans during the Palaeozoic era. At the end of this era they became extinct. If rock contains trilobites, we can conclude that the rock was formed during that era.

Three different strata (different layers of soil/rock) from three places in a particular area are illustrated below.



The symbols below are used to indicate the four different index fossils found in the different strata in places A, B and C.

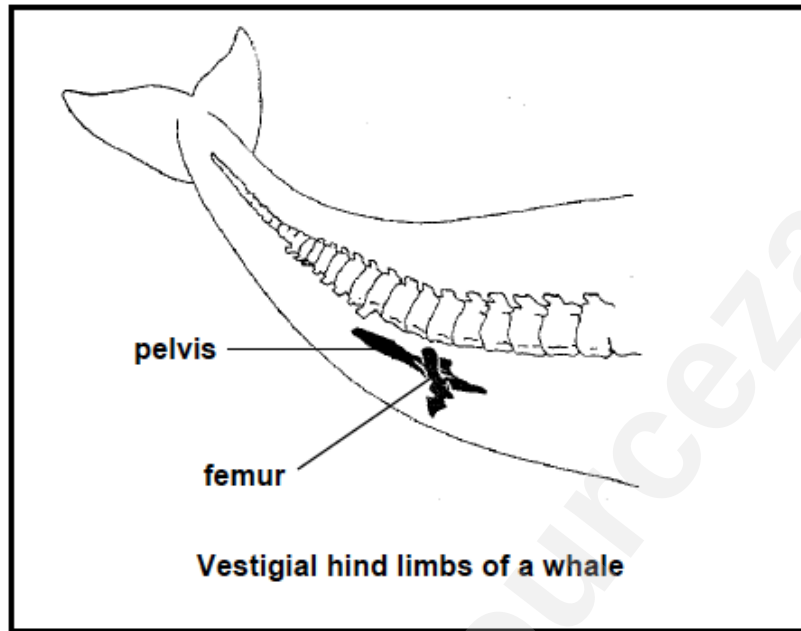


- 2.1. Explain why layers 1 and 8 are of the same geological age. (2)
- 2.2. Indicate TWO layers, other than layers 1 and 8, that have the same geological age. (2)
- 2.3. Name a method used to determine the age of a fossil. (1)
- 2.4. State TWO reasons why there are gaps or missing information in the fossil record. (2)

Question 3: 7 minutes*(Taken from DoE November 2009 Paper 2)*

Darwin said in his book: "Organs or parts which seem useless are very common in nature. In many snakes there are small bones of the pelvis and hind limbs." [*On the Origin of Species*, Darwin, 1858, p. 428]

The diagram below shows the vestigial (reduced) pelvis and femur of a whale.

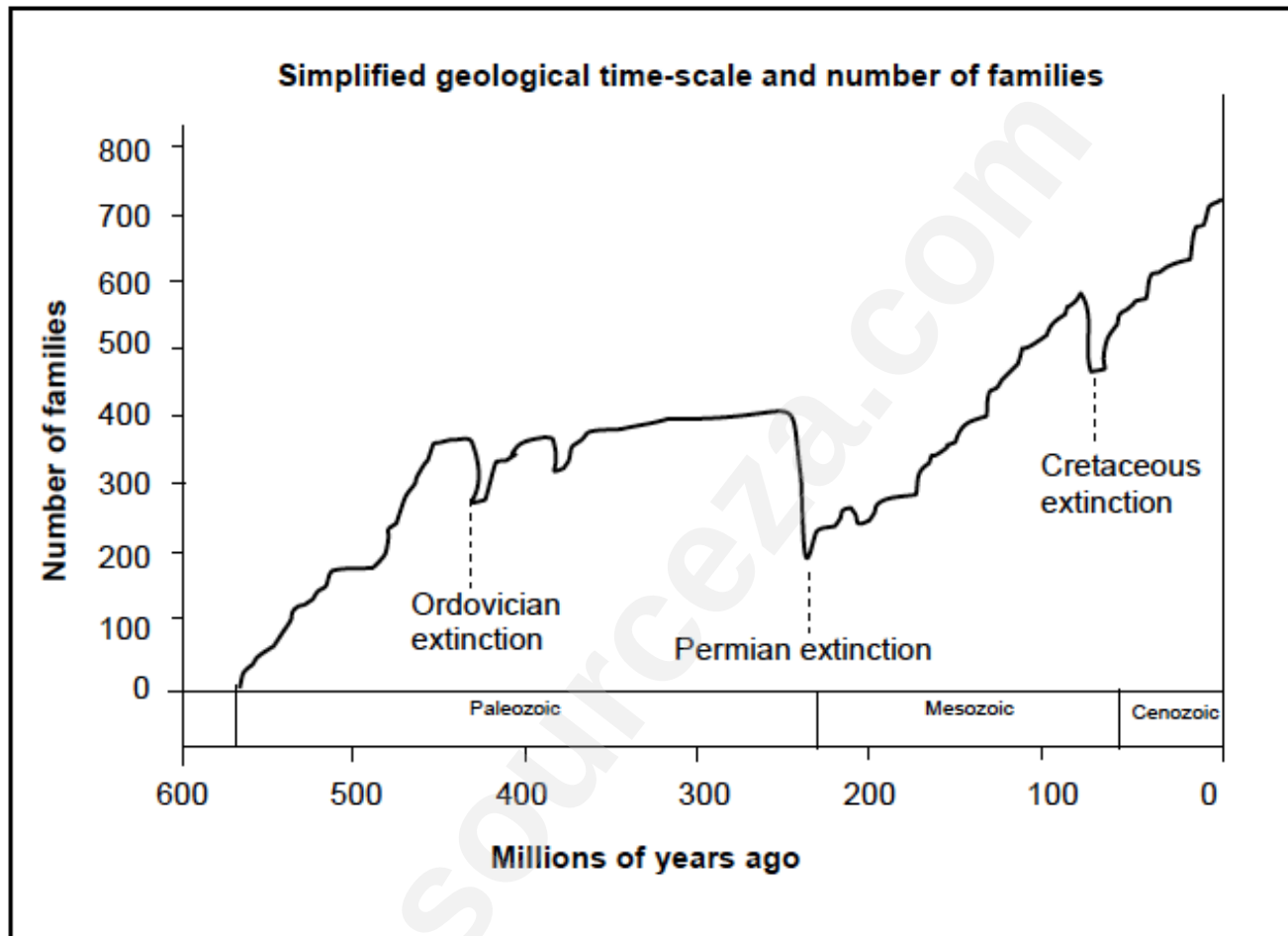


- 3.1. In terms of natural selection, explain how the pelvis and femur that were once useful to the whale's ancestor, could have become vestigial in modern whales. (5)
- 3.2 Suggest ONE reason why a vestigial structure, once it has been reduced to a certain size, may not disappear altogether. (2)

Question 4: 6 Minutes

(Taken from DoE November 2008)

The diagram below represents a simplified geological time-scale showing how the number of families (groups of related species) has changed over a period of time.



- 4.1. When did the Cenozoic era begin? (2)
- 4.2. Which mass extinction took place towards the end of the Paleozoic era? (1)
- 4.3. Approximately how many families of species died out at the end of the Paleozoic era?
Show ALL working. (3)

Question 5: 15 Minutes

(Taken from DoE November 2008 Paper 1)

The following two questions refer to the characteristics of *Homo sapiens* and other primates.

- 5.1 State FOUR structural characteristics of *Homo sapiens* that are similar to other primates. (4)
- 5.2 Tabulate FOUR structural differences between the skull of *Homo sapiens* and that of other primates. (9)
- 5.3 State TWO characteristics shown by embryos of different vertebrates that scientists use as evidence that these animals might have a common ancestor. (2)

SECTION C: ADDITIONAL CONTENT NOTES

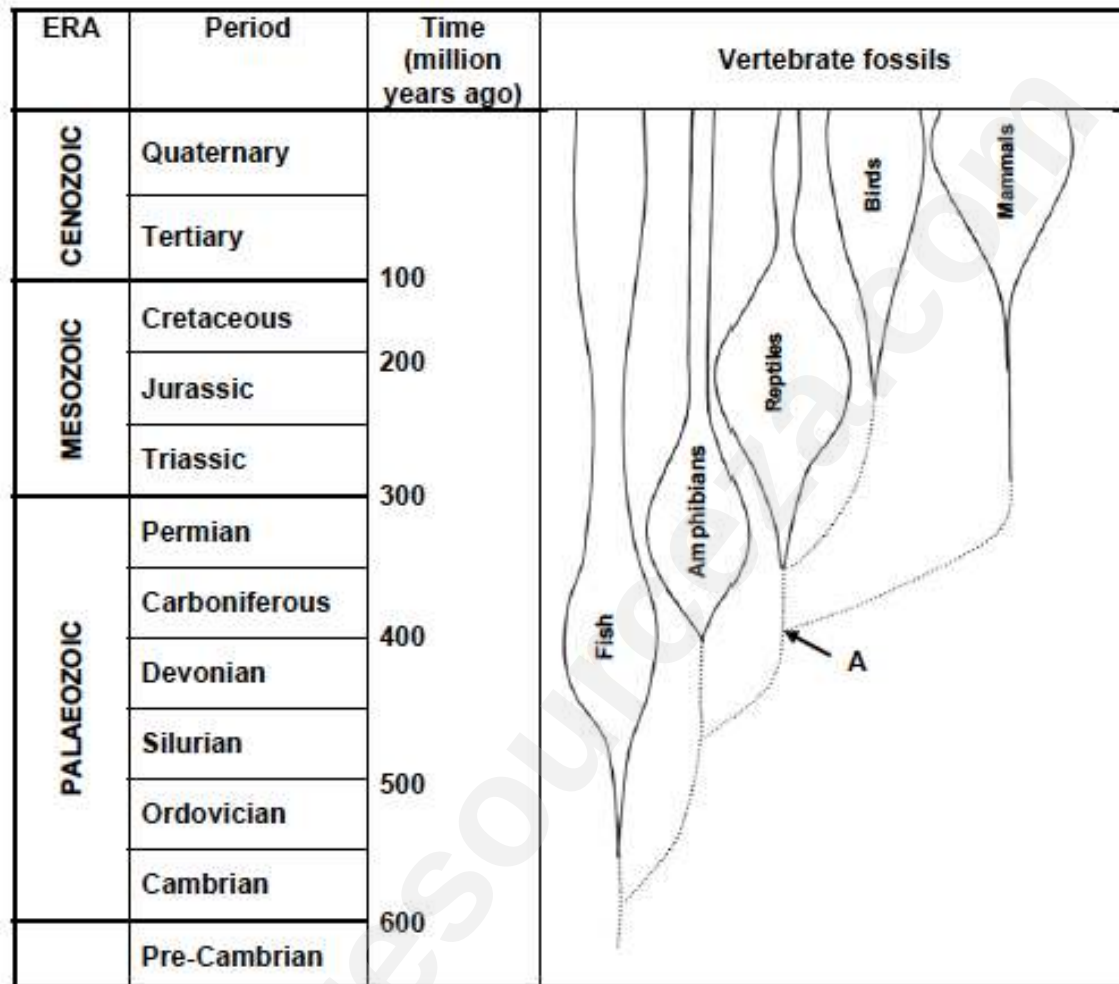
The Geological Time Scale:

There is a natural loss of some plant and animal species over time. This is normal and the natural rate of extinction is called **background extinction**. New species develop through speciation that replace those that have become extinct. When many species become extinct at the same time, it is called **mass extinction**. Scientists generally agree that there have been **six mass extinction** events in the history of life on earth. They use fossil records to determine the geological timeline. This is the measurement of time on earth, over the past millions on years. Below is an example of the structure of a geological time scale showing major events in each period:

ERA	PERIOD	TIME (millions of years)	MAJOR EVENTS
Cenozoic	Pleistocene		
	Pleiocene		
	Oligocene		
	Eocene		
Mesozoic	Cretaceous	100	End Cretaceous extinction – 65 million years ago (This is when the dinosaurs became extinct)
	Jurassic	200	
	Triassic		Late Triassic extinction 208 million years ago
Paleozoic	Permian	300	Late Permian extinction – 245 million years ago (this was the largest extinction as almost 96% of marine species disappeared and 75% of land species died.
	Carboniferous		
	Devonian	400	Late Devonian extinction – 365 million years ago
	Silurian		
	Ordovician	500	Late Ordovician extinction – 440 million years ago
	Cambrian		Late Cambrian extinction – 500 million years ago
	PreCambrian	600	

A more specific geographical time scale to show the the formation of vertebrates on the planet.

This diagram is adapted from the DoE November 2009 exam paper 2.



From this diagram, you can see the origin of each of the vertebrates groups. The larger size of the bubble represents when most of the species lived. Most fish species were in the Devonian period. Most amphibian species were present in the Permian period, reptiles were the Jurassic period and so on. Point A on the schematic diagram shows the common ancestor split giving rise to mammals and the line that leads to the common ancestor that gave rise to birds and reptiles.

When a schematic representation is used to show the links between common ancestors it is called a phylogenetic tree. This tree will show how all the species are linked genetically based on the phylum of each species.

What Caused Mass extinction?

There are many theories and we have covered these in Session 22, but just to recap some of the theories:

MAIN THEORIES:	WHAT IT CAUSED:
Continental drift	All land masses were joined to form one super-continent called Pangea . Pangea split into Laurasia (North) and Gondwanaland (South). Later, these two continents split further to form the continents today.
Volcanic theory	During the Cretaceous era, there was a lot of volcanic activity. Dust and ash from the volcanic eruptions blocked out sunlight. Plants need sunlight to photosynthesise food and produce oxygen. Plants would have died and animals would have eventually starved. Lack of sunlight would also have caused climate changes etc.
Extra-terrestrial theory	The impact of large meteorites and asteroids (very large meteorites) with the earth. Scientists theorise that the extinction at the end of the Cretaceous era was because of a huge asteroid smashing into the earth. This is called the asteroid impact theory . This would have caused tsunamis, acid rain, incredible heat waves, volcanic eruptions causing chemical changes to the earth's atmosphere. With the lack of oxygen and huge amounts of dust that blocked out sunlight would have killed many plants and animals. It would also have decreased the temperature causing climate change.
Star Explosions	When a star explodes, it is called a supernova explosion resulting in cosmic radiation (Cosmos = our universe and beyond) that impacted earth. This radiation would have caused DNA damage in the plants and animals causing mass extinction. (Think of the Atom Bomb that was dropped on Hiroshima and Nagasaki during the 2 nd World War – people are still seeing deformities from the radiation fall-out 80 years later).
6th Extinction	Human impact on the environment, pollution, disease pandemics are thought possibly to bring about the earth's sixth extinction. Many scientists believe that our continued abuse of our planet will cause the our own final destruction of life on this planet as we know it.

SECTION D: HOMEWORK

Learner Note: As you attempt attempt the homework, you MUST stick to the time frames. If you get stuck refer to either the additional notes or your class teacher.

Question 1: 10 minutes

(Taken from various DoE exams Paper 2)

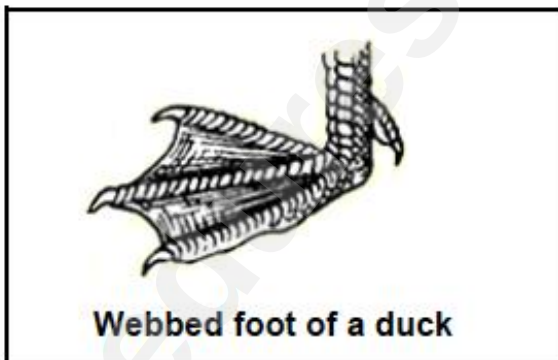
Give the correct biological term for each of the following descriptions. Write only the term next to the question number (1.2.1 – 1.2.7).

- 1.1. The theory that includes the idea that all continents were originally one big super continent called Pangaea
- 1.2. Method of dating fossils by radioactive decay
- 1.3. The study of fossils
- 1.4. Chemical energy from organisms that lived in the past
- 1.5. Differences among organisms of the same species
- 1.6. The remains or traces of prehistoric life preserved in rocks of the Earth's crust
- 1.7. Remains of non-functional organs in certain organisms
- 1.8. A diagrammatic representation of possible ancestral relationships between organisms
- 1.9. The process that causes a sudden and unpredictable change in the genetic information of an organism
- 1.10. The exchange of genes between homologous chromosomes that brings about variation (1x10=10)

Question 2: 13 Minutes

(Taken from DoE Feb/March 2010 Paper 2)

Study the diagram of a duck's foot below.



- 2.1. Ancestors of ducks did not have webbed feet. In terms of natural selection, explain how the webbed feet could have evolved. (7)
- 2.2. The following questions refer to Lamarck's explanation of evolution:
 - 2.2.1 Describe the idea proposed by Lamarck to explain evolution. (4)
 - 2.2.2. State why Lamarck's explanation is not accepted by most scientists today. (2)

SECTION E: SOLUTIONS TO SESSION 26 HOMEWORK

- 1.1. The site contains fossils and evidence of the origin of humankind ✓
- 1.2. Taung child - Australopithecus africanus ✓
Little Foot - Australopithecus afarensis ✓
- 1.3. Evidence proves that humans moved from Africa to Europe at the time of the glacial period. ✓ Some of the people underwent a process of bleaching which resulted in the fair-skinned, light eyed, blonde-haired people of Britain, Scandinavia and Germany. ✓ (Remember that these countries are cold – so the need for melanin in the skin and hair decreased over the years.)
- 2.1. 580 mm³ ✓
- 2.2. Neanderthal ✓
- 2.3. They were larger than modern man because they lived in the Stone Age and competed with other large animals. ✓ They lived a very physical life and needed to be bigger and more powerful. ✓
- 2.4. The early form ✓
- 2.5. Archaeologist ✓
- 3.1 No tails present / tails are absent (2)
- 3.2 (a) Bipedal (1)
(b) Quadrupedal (1)
- 3.3 Their view of surroundings would have been limited. ☐
They would have been slow in moving (in their current environment)
(Any reasonable answer = 2)

3.4

MAN	CHIMPANZEES
Straight finger bones	Curved finger bones
Fully opposable thumbs	Longer thumbs
Legs longer than arms	Arms longer than legs
Legs and spine almost straight	Spine rectangular to legs
Reduced snout (nose) - s-shaped	Noticeable snout – c shaped
Smaller teeth	Bigger teeth

(any) 5x2=[10]

- 3.5 Makes branchiation (swinging from branches) ☐ more difficult ☐ (2)
(Any reasonable and logical answer)