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Worksheet 11.1 Fossil evidence for evolution

Answers

Answer these questions using the information in Chapter 11 of *Human Perspectives ATAR Units 3 & 4*.

**1** Explain the difference between the following terms:

**a** A fossil and an artefact

*Answer:* A fossil is any preserved trace left by an organism (e.g. footprints); an artefact is an object deliberately made by human hand (e.g. tools).

**b** Absolute and relative dating

*Answer:* Absolute dating finds the actual age of the specimen in years; relative dating places the specimen in order of older to younger, without determining the actual age.

**c** Organic and inorganic material

*Answer:* Organic material contains carbon; inorganic material does not contain carbon.

**d** Carbon-14 and carbon-12

*Answer:* Carbon-14 is a radioactive isotope; carbon-12 is the stable isotope.

**e** The principle of superposition and correlation of rock strata

*Answer:* The principle of superposition allows for the relative dating of sedimentary rock in strata at one site. Correlation of strata allows for matching of strata from different sites and relies on index fossils.

**2** Allocate each of the dating techniques listed below to an appropriate column in the table that follows. Some may be used more than once.

* Absolute dating
* Relative dating
* Material dated must contain carbon
* Most useful to date material older than 200 000 years old
* Uses rate of decay of radioactive isotopes
* Dates rocks
* Not suitable if distortions of Earth’s crust have occurred
* Can only date material less than 70 000 years old
* The deeper the material, the older it is
* Could not be used for dating stone tools

*Answer:*

|  |  |  |
| --- | --- | --- |
| **Radio-carbon dating** | **Stratigraphy** | **Potassium-argon dating** |
| * Absolute dating * Material dated must contain carbon * Uses rate of decay of radioactive isotopes * Can only date material less than 70 000 years old * Could not be used for dating stone tools | * Relative dating * Not suitable if distortions of Earth’s crust have occurred * The deeper the material, the older it is * Could not be used for dating stone tools | * Absolute dating * Most useful to date material older than 200 000 years old * Uses rate of decay of radioactive isotopes * Dates rocks |

**3** Define the term ‘half-life’. Explain why it is necessary to know the half-life of carbon-14 for radiocarbon dating.

*Answer:* Half-life is the time taken for a radioactive isotope to decay by half.

The half-life for carbon-14 is 5730 ±40 years. Knowing this, scientists are able to measure the amount of C-14 present in a sample and compare it to the amount of C-12 in the same sample.

By measuring the ratio, scientists can determine the amount of decay and then the age of the sample.

**4** Explain why the fossil record is incomplete.

*Answer:* There are specific conditions required for fossil formation, and these are difficult to ensure.

Fossils are hard to find – only a small proportion of the fossils that do exist have ever been found.

Fossils may not have been recognised, or have been destroyed through human activity.

Fossils are difficult to date accurately, and may be incorrectly placed on the fossil record.