Unit 15 · Earth and the Universe

WORKSHEET

Full marks 46

Name _____ Class _____ Roll no. _____ Date _____ Marks _____ / 46

1 Key words [4]

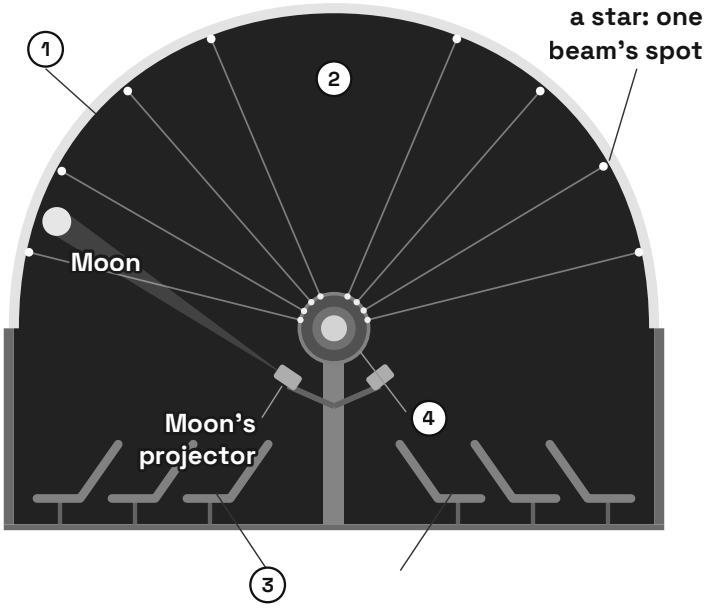
Fill in the blanks with words from the box. Two words in the box are not needed. Each blank carries 0.5 mark.

geochronology	half-life	index	lithification	observatory	paleontology	planetarium	relative	seismology	trace

The science of finding the ages of rocks and the events of the Earth's history is _____. Finding only which of two layers is older is _____ dating. The time for half of a radioactive parent to decay is its _____. The study of fossils is _____. A fossil that is common, found widely and lived for only a short span is an _____ fossil. A footprint or a burrow is a _____ fossil. The hardening of sediment into rock is called _____. A theater with a dome on which a projector shows the night sky is a _____.

2 Label the diagram [2]

The drawing shows the inside of a planetarium. Write the words that belong in place of each number. Each carries 0.5 mark.



1. _____ 2. _____

3. _____ 4. _____

3 True or false [3]

Write ✓ for a true statement and ✗ for a false one. Each carries 0.5 mark.

i. Carbon dating showed that a dinosaur bone is millions of years old. ☐

ii. Heat, pressure and chemical reactions don't change a half-life. ☐

iii. Ramapithecus is known to be an early human ancestor. ☐

iv. A crack filled with igneous rock is younger than the layers it cuts through. ☐

v. A planetarium is a place with telescopes for looking at the real sky. ☐

vi. Elephant and hippo fossils in the Kathmandu Valley show that its climate was once much warmer. ☐

4 Multiple choice [5]

Choose the correct option for each of the following questions.

i. The study of the ages of rocks and of the events of the Earth's history is called: [1]

a. geomorphology **b.** geochronology
c. paleontology **d.** seismology

ii. Which of these is a trace fossil? [1]

a. a petrified tree trunk **b.** an ant in amber
c. a dinosaur's footprint **d.** an ammonite cast

iii. Carbon-14 is formed in the atmosphere when neutrons from cosmic rays strike: [1]

a. carbon-12 **b.** oxygen-16
c. nitrogen-14 **d.** hydrogen

iv. The half-life of carbon-14 is about: [1]

a. 573 years **b.** 5,730 years
c. 57,300 years **d.** 4,470 million years

v. The first artificial satellite, Sputnik 1, was launched in: [1]

a. 1945 **b.** 1957
c. 1961 **d.** 1969

5 Very short answers [3]

Write very short answers to the following questions.

a. Name the fossils found inside shaligrams. [1]

b. What was NepaliSat-1? [1]

c. What fraction of a radioactive parent is left after three half-lives? **[1]**

6 Short answers **[8]**

Write short answers to the following questions.

a. Give a reason: most fossils are found in sedimentary rocks, not in igneous rocks. **[2]**

b. Give a reason: carbon dating can't be used for objects older than about 50,000 years. **[2]**

c. Write any two differences between a mold and a cast. **[2]**

d. Write any two differences between a planetarium and an observatory. **[2]**

7 Long answers **[8]**

Write long answers to the following questions.

a. What is a fossil? Describe how a fossil is formed. **[4]**

b. What is carbon dating? How does it work, and what are its limits? **[4]**

8 Numerical problems **[10]**

Solve the following problems. Show your working. Take the half-life of carbon-14 as 5,730 years.

a. The carbon-14 in a bone from a cave is one-sixteenth of that in a living animal's bone. Find the age of the bone. **[2]**

Answer:

b. Carbon from a living plant gives 16 counts per minute per gram. A sample of old cloth gives 2 counts per minute per gram. Find the age of the cloth. **[2]**

Answer:

c. What percentage of its carbon-14 does a piece of bone keep after 28,650 years? After how many years would only about 0.2% be left? **[3]**

Answer:

d. The Phanerozoic eon began about 539 million years ago, and the Earth is about 4,540 million years old. What percentage of the Earth's history is the Phanerozoic? If all of the Earth's history were squeezed into one 24-hour day, how many minutes before midnight would the Phanerozoic begin? **[3]**

Answer:

9 Think [3]

A geologist finds a hippo's tooth in Siwalik sandstone, with a layer of volcanic ash a few meters above it. Someone suggests carbon-dating the tooth. Explain why that won't work, and suggest how the tooth's age could be found.

10 Activity: Make a mold and a cast (not marked)

Press an oiled shell into clay and lift it out; fill the print with plaster of Paris and peel the clay away when set. Press a leaf into a second slab, and walk a toy's feet across a third. Fill in the table.

What you made	Kind of fossil	Does it show the shape, or what the animal did?
shell's print in clay		
plaster filling the print		
leaf's print		
toy's footprints		