



Unit 11 • The Earth and Space: rocks and planets

Give the marks for the points in the marking scheme; an answer in other words that says the same is right.

1 Key words

1. igneous
2. sedimentary
3. fossils
4. metamorphic
5. solar system
6. satellite
7. asteroids
8. dwarf planet

K • 4

Each carries 0.5 mark.

2 Multiple choice

- i. d. slate

K • 1

Slate splits into thin, flat, waterproof sheets, ideal for roofs, as in Barpak and many hill villages.

- ii. b. metamorphic

K • 1

Marble is limestone changed by heat and pressure: metamorphic.

- iii. c. diamond, marble and quartzite

A • 1

Graphite → diamond, limestone → marble, sandstone → quartzite.

- iv. a. Mercury, Venus, Earth and Mars

K • 1

Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune. (A way to remember: My Very Eager Mother Just Served Us Noodles.)

- v. c. Only argument 1 is correct.

U • 1

Venus is the hottest planet, but it is pale yellowish-white, not red (the red planet is Mars), so the statement is wrong. Argument 1 is right. Argument 2 is wrong: Deimos and Phobos are the moons of Mars; Venus has none.

3 Label the diagram

1. Mercury
2. Earth
3. Venus
4. Mars

5. Jupiter
6. Saturn
7. Uranus
8. Neptune

K • 4

Each carries 0.5 mark.

4 Very short answers

- a. MARKING SCHEME

K • 1

✓ Limestone.

- b. MARKING SCHEME

K • 1

✓ Neptune.

- c. MARKING SCHEME

K • 1

✓ Mars.



- d. MARKING SCHEME A • 1
✓ Sedimentary.

5 Short answers

- a. MARKING SCHEME U • 2
✓ Any one difference, e.g. sedimentary rock forms from sediment pressed and cemented together; igneous rock from cooling magma or lava.
✓ Any second difference, e.g. sedimentary rock shows layers and may contain fossils; igneous rock has no layers and no fossils (or an example of each: sandstone; granite).
- b. MARKING SCHEME U • 2
✓ Any one difference, e.g. a star makes its own light and heat; a planet only reflects a star's light.
✓ Any second difference, e.g. a star twinkles, a planet shines steadily (or a planet moves slowly against the stars; or an example of each: the Sun; Mars).
- c. MARKING SCHEME K • 2
✓ All three are igneous rocks.
✓ Any one use of each, e.g. granite for floors and staircases, pumice for scrubbing the feet, obsidian for ornaments.
- d. MARKING SCHEME U • 2
✓ Pluto (in 2006; now a dwarf planet).
✓ Any one reason, e.g. it has not cleared its path round the Sun (its orbit crosses Neptune's, among many icy bodies), or its mass is too small.
- e. MARKING SCHEME K • 2
✓ Any one characteristic, e.g. it is the third planet from the Sun.
✓ Any second, e.g. the only planet known to have life (liquid water, oxygen), it has one satellite, the Moon, or it spins once in about 24 hours.

6 Long answer

ANSWER

U • 4

Rocks form in three ways.

- **Igneous rocks** form when magma (molten rock) cools and hardens, either slowly deep underground (granite) or quickly as lava on the surface (pumice, obsidian).
- **Sedimentary rocks** form when sediment (pieces of weathered rock, sand, mud, shells) carried by rivers and wind settles in layers at the bottoms of rivers and seas, and the layers are pressed and cemented together over a long time (limestone, sandstone, shale).
- **Metamorphic rocks** form when any rock is changed by great heat and pressure deep inside the Earth, without melting (marble from limestone, slate from shale).

MARKING SCHEME

- ✓ There are three types of rock, formed in three ways.
- ✓ Igneous: magma cools and hardens, slowly underground or quickly as lava (e.g. granite, pumice).
- ✓ Sedimentary: sediment settles in layers at the bottom of rivers and seas and is pressed and cemented over a long time (e.g. sandstone, limestone).
- ✓ Metamorphic: any rock changed by great heat and pressure deep inside the Earth, without melting (e.g. marble from limestone, slate from shale).



7 Think

ANSWER

HA - 2

Venus has a very thick atmosphere of carbon dioxide, which traps the heat of the sunlight (a runaway greenhouse effect). Mercury has almost no air, so its heat escapes into space.

MARKING SCHEME

- ✓ Venus's thick carbon dioxide atmosphere traps the heat (greenhouse effect).
- ✓ Mercury has almost no atmosphere, so its heat escapes.

8 Activity: Sort your rocks (Activity 11.2)

(not marked)

WHAT STUDENTS SHOULD FIND

Typical finds: smooth river pebbles; flat, layered stones that split into sheets (slate or shale); crumbly, sandy rocks (sandstone); hard, speckled ones (granite or gneiss). Layered rocks are usually sedimentary or metamorphic; speckled, crystal-filled rocks with no layers are usually igneous.

Marks by level	Knowledge	Understanding	Application	Higher ability	Total
Marks	18	11	2	2	33





Unit 11 • The Earth and Space: the Moon and eclipses

Give the marks for the points in the marking scheme; an answer in other words that says the same is right.

1 Key words

1. phases
2. bright half
3. dark half
4. sidereal month
5. adhik maas
6. umbra
7. penumbra
8. lunar eclipse

K • 4

Each carries 0.5 mark.

2 Multiple choice

- i. b. pratipada and full moon

K • 1

The bright half begins with pratipada, the day after the new moon, and ends with the full moon (purnima).

- ii. c. 15 d, 15 d, $27\frac{1}{3}$ d and 29.5 d

K • 1

Each half is about 15 days; the sidereal month (once round the Earth) is about $27\frac{1}{3}$ days; the synodic month (new moon to new moon) is about 29.5 days.

- iii. d. full moon, first quarter and crescent

A • 1

Full moon: the whole disc bright. First quarter: half bright. Crescent: only a thin edge bright. (At the new moon nothing is bright.)

- iv. d. Sun, Earth and Moon

K • 1

In a lunar eclipse the Earth is in the middle, casting its shadow on the Moon. (Sun, Moon, Earth is a solar eclipse.)

- v. b. partial solar

A • 1

From the Moon's penumbra on the Earth, only part of the Sun is hidden: a partial solar eclipse. (A partial lunar eclipse is caused by the Earth's umbra covering part of the Moon.)

3 Label the diagram

- | | |
|--------------------|-------------------|
| 1. new moon | 5. first quarter |
| 2. last quarter | 6. waning gibbous |
| 3. waning crescent | 7. full moon |
| 4. waxing crescent | 8. waxing gibbous |

U • 4

Each carries 0.5 mark.

4 Very short answers

- a. MARKING SCHEME

K • 1

✓ About 29.5 days.

- b. MARKING SCHEME

K • 1

✓ Aunsi (the new moon).

- c. MARKING SCHEME

K • 1

✓ Dim and coppery red.



- d. MARKING SCHEME U · 1
✓ It reflects sunlight.

5 Short answers

- a. MARKING SCHEME U · 2
✓ Any one difference, e.g. the dark half runs from the full moon to the new moon; the bright half from the new moon to the full moon.
✓ Any second difference, e.g. in the dark half the bright part shrinks every day, in the bright half it grows (or the dark half ends with auni, the bright half with purnima).
- b. MARKING SCHEME U · 2
✓ Any one difference, e.g. the umbra is the dark central part of a shadow; the penumbra the paler outer part.
✓ Any second difference, e.g. in the umbra the light is blocked completely, in the penumbra partly (or the umbra causes a total eclipse, the penumbra a partial one).
- c. MARKING SCHEME U · 2
✓ A lunar eclipse needs the Earth between the Sun and the Moon, in a straight line, so its shadow falls on the Moon.
✓ The Moon is on the far side of the Earth from the Sun only at the full moon.
- d. MARKING SCHEME U · 2
✓ A solar eclipse needs the Moon between the Sun and the Earth, in a straight line, so its shadow falls on the Earth.
✓ The Moon is between the Sun and the Earth only at the new moon.
- e. MARKING SCHEME K · 2
✓ The time from one new moon to the next, about 29.5 days.
✓ One importance, e.g. festivals and rituals are fixed by its tithis (Dashain, Buddha Jayanti).

6 Long answer

ANSWER

U · 4

A **lunar eclipse**. The Sun, the Earth and the Moon are in a straight line with the Earth in the middle, so the Earth blocks the sunlight and its shadow falls on the full Moon. The Moon, which shines only by reflected sunlight, goes dim. If the whole Moon is in the Earth's umbra, it is a total lunar eclipse; if part of it is, a partial lunar eclipse. It happens only on a full moon, and can be seen from the whole night side of the Earth.

Diagram: as in the figure in the book: the Sun, the Earth, the Earth's umbra and penumbra behind it, and the Moon in the umbra, all labeled.

MARKING SCHEME

- ✓ A lunar eclipse.
- ✓ The Sun, the Earth and the Moon are in a straight line with the Earth in the middle, on a full moon.
- ✓ The Earth blocks the sunlight and its shadow falls on the Moon, which goes dim (total if the whole Moon is in the umbra, partial if only part).
- ✓ A labeled diagram: the Sun, the Earth, its umbra and penumbra, and the Moon in the umbra.



7 Think

ANSWER

HA · 2

In a lunar eclipse the shadow is the Earth's, which is wide, so the Moon takes a long time (over an hour) to cross its umbra. In a solar eclipse the shadow is the small Moon's: its umbra is a small patch on the Earth that races across the ground, so a place is in it for only a few minutes.

MARKING SCHEME

- ✓ The Earth's umbra is wide (about two and a half Moons across), so the Moon takes a long time to cross it.
- ✓ The Moon's umbra on the Earth is a small patch moving fast, so any place is in it for only a few minutes.

8 Activity: A shadow with two parts (Activity 11.6)

(not marked)

WHAT STUDENTS SHOULD FIND

The shadow has a dark middle (the umbra) and a paler edge (the penumbra). Close to the screen the dark middle is sharper and bigger; close to the light the shadow is bigger but blurrier, with a wider pale edge.

Marks by level	Knowledge	Understanding	Application	Higher ability	Total
Marks	12	17	2	2	33

