

Shadows, Moon phases and eclipses explained

Grade 6 science (Year 7 · Class 6) · Test answers (mark scheme)

Award the marks shown. For explanations, accept equivalent wording when the key scientific idea is clear. In calculations give full marks for correct answers in any consistent units.

Level: Grade 6 science (Year 7 · Class 6) · **Curriculum:** MS-ESS1-1

Question 1 How a shadow forms (2 marks)

Light travels in straight lines and an **opaque object blocks the rays** that hit it. The rays passing its edges continue straight, so the dark region copies the object's outline.

Marking: 1 mark for straight-line travel and blocking, 1 mark for the shadow having the object's shape.

Question 2 Shadow of a model (3 marks)

- a. $25 \times 120 \div 40 = \mathbf{75 \text{ cm.}}$
- b. $25 \times 120 \div 60 = \mathbf{50 \text{ cm.}}$
- c. The shadow gets **smaller**.

Marking: 1 mark each.

Question 3 Moon positions (3 marks)

- a. **Y.**
- b. **W.** The lit half of the Moon faces away from Earth, so we see only its dark side.

Marking: (a) 1 mark. (b) 1 mark for W, 1 mark for the explanation.

Question 4 Eclipses (3 marks)

- a. **Sun, Moon, Earth.**
- b. **Full Moon.**
- c. The **umbra**.

Marking: 1 mark each.

Question 5 Not every month (3 marks)

The Moon's orbit is **tilted by about 5°** to Earth's orbit around the Sun. At most new Moons the Moon is slightly above or below the Sun-Earth line, so its shadow misses Earth.

Marking: 1 mark for the tilt, 1 mark for the Moon being off the line, 1 mark for the shadow missing Earth.

Question 6 Phases in order (2 marks)

Waning gibbous, last quarter, waning crescent, new Moon.

Marking: 2 marks for all four in order; 1 mark for three correct and in order.

Question 7 Earth's shadow (2 marks)

Earth's shadow falls on the Moon only during a **lunar eclipse**, which is rare, but phases occur every month. Phases come from the changing angle at which we see the lit half of the Moon.

Marking: 1 mark for the shadow only in eclipses, 1 mark for the viewing angle.

Question 8 Calendar (2 marks)

5 January + 29.5 days = day 34.5 of January, which is **about 3 or 4 February**.

Marking: 1 mark for using 29.5 days, 1 mark for the date.