

How light bounces, bends and is absorbed

Grade 7 science (Year 8 · Class 7) · Test answers (mark scheme)

Use these model answers with the marking notes. Give method marks when the working is correct even if the final number is wrong, and check that angles are taken from the normal and that every answer has its unit.

Level: Grade 7 science (Year 8 · Class 7) · **Curriculum:** MS-PS4-2

Question 1 Key terms (3 marks)

- a. A line drawn at right angles to the surface at the point where the ray hits.
- b. The angle of incidence equals the angle of reflection.
- c. Refraction.

Marking: 1 mark each.

Question 2 Ray at a mirror (3 marks)

- a. $i = 90^\circ - 35^\circ = 55^\circ$.
- b. $r = i = 55^\circ$.
- c. $55^\circ + 55^\circ = 110^\circ$.

Marking: 1 mark each part.

Question 3 Mirror and image (3 marks)

- a. **1.8 m** behind the mirror.
- b. $1.8 + 1.8 = 3.6 \text{ m}$.
- c. New distance from mirror = 2.4 m, so $2.4 + 2.4 = 4.8 \text{ m}$.

Marking: 1 mark each part.

Question 4 Light entering a block (3 marks)

- a. It bends **towards** the normal.
- b. Light travels more slowly in glass than in air. The change of speed at an angle makes the ray change direction towards the normal.

Marking: (a) 1 mark; (b) 1 mark for slower in glass, 1 mark for link between speed change and direction change.

Question 5 Rough and smooth (2 marks)

The rough wall gives diffuse reflection, scattering rays in all directions, so light reaches every viewer. The smooth mirror gives regular reflection in one direction, so the image is seen only where the reflected rays go.

Marking: 1 mark for diffuse scattering by the wall, 1 mark for regular reflection by the mirror.

Question 6 A red book (2 marks)

White light contains all colours. The cover reflects mostly red light into the eye and **absorbs** the other colours.

Marking: 1 mark for reflects red, 1 mark for absorbs the other colours.

Question 7 Sunlight to Earth (2 marks)

$t = d \div v = 1.5 \times 10^{11} \div 3.0 \times 10^8 = \mathbf{500\ s}$ (about 8.3 minutes).

Marking: 1 mark for the substitution, 1 mark for the answer with unit.

Question 8 Dark clothes (2 marks)

Black cloth **absorbs** most of the light energy that hits it, which warms the cloth. White cloth reflects most of the light, so it absorbs less energy.

Marking: 1 mark for black absorbs more, 1 mark for white reflects more.