



Textbook

6.4 Reflection

- 1** A, H, I, M, O, T, U, V, W, X, Y
- 2** left eye
- 3** The word 'ambulance' is laterally inverted on the front of an ambulance because people in cars in front of the ambulance will see it in their rear-view mirrors. It needs to be laterally inverted so that they can read it. Most people behind the ambulance will be looking at it directly, not in mirrors, and so the word does not need to be inverted.
- 4a** Shiny metal reflects light well, so you can see your face in it like you would in a mirror.
 - b** Smooth and shiny surfaces reflects light in a regular way, so you can sometimes see a reflection in them.
 - c** A painted white wall is relatively rough, the light is not reflected in a regular way so it is not possible to see your reflection.



6.5 Making measurements: the law of reflection

- 1 They drew two dots on the paper to measure their results. They make sure the ray hits the mirror where the normal is drawn.
- 2 They could repeat each measurement 3 times and use the average.
- 3 Each angle of incidence and reflection is 45° .
- 4a $90^\circ - 30^\circ = 60^\circ$
 - b The angle of reflection is equal to the angle of incidence = 60° .

6.6 Refraction: air and water

- 1a Their speed would still slow down.
 - b Their direction would not change.
- 2 If they dived at an angle the change in their speed would change the direction of their dive making it more difficult to aim.
- 3 Below – as light changes direction at the boundary of water and air it makes objects in the water appear closer than they are.

6.7 Refraction: air and glass

- 2 As the ray enters the glass block it slows down and changes direction, when it leaves the glass block it speeds up by the same amount that it slowed down by before. The angle of refraction when it leaves the block is the same as the angle of incidence when it enters the block and the rays are parallel.
- 3 In his diagram the angles of incidence and reflection where the ray hits the boundary are not equal.

Workbook

6.4 Reflection

- 1a F – The image you see in a mirror is a virtual image.
- b F – if you look in a mirror your image looks as if left and right are swapped over.
- c F – The reflection of light from a mirror is regular reflection.
- d T
- e F – your mirror image appears the same distance from the mirror as you.

2a

Things that are the same about you and your mirror image.	Things that are different about you and your mirror image.
Size, colours, up and down, distance from the mirror.	Left and right are reversed.

- b 100 cm

6.5 Making measurements: the law of reflection

- 1a Measurement for the angle 40° .
 - b It is not in line with the other results.
 - c Through points for 0, 20, 60 and 80 degrees.
 - d They show that the angle of incidence is always the same as the angle of reflection.
 - e A white screen absorbs more light than a mirror, which means less is reflected.
- 2 Statement A – F, Statement B – T, Statement C – F, Statement D – T, Statement E – T

6.6 Refraction: air and water

- 1a** Light travels in straight lines. She is standing where light travelling from the coin cannot reach her eye, so she cannot see it.
- b** Light is refracted, changes speed and direction, when it moves between mediums of different density. Light from the coin is bent as it leaves the water and enters the air. It can now reach her eye and she can see the coin.
- c** Students show draw a ray that is diffracted toward the eye at the surface of the water.
- 2a** Students should draw a straight line from the eye to the road.
- b** less dense
- c** The ray bends away from the normal as it speeds up in the less dense air.

6.7 Refraction: air and glass

- 1** Missing words in order: refracted, incidence, incident, refraction, refracted, denser, slowly, quickly, parallel.
- 2a** 0°
- b** Result for the angel of incidence 30° .