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 ° – 30 ° = 60 °

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.

6.8 Dispersion

1 Twice

2 The spectrum is continuous because all of the wavelengths have been refracted by different amounts. The refracted wavelengths can have any value between the longest wavelength, at the start of the red light, to the shortest wavelength at the end of the violet light.

3 Light can be refracted, for example in through a rectangular glass block, without being diffracted. For the spectrum to be visible, diffractions, all of the wavelength must be refracted by different amounts so that the different colours spread out – it will not be visible if this does not happen.

4 Red light travels the fastest in glass. Red light is refracted the least, which means it is slowed down the least.

6.9 Colour

1 A green filter only transmits green light – all other colours of light will be absorbed.

2

Combining …	Makes …
red + blue	magenta
cyan + red	white
blue + yellow	white

3 This is not correct. White light is made up of every colour of light combined, filters absorb some wavelengths of light so that only one colour is visible.

4 No light is transmitted. A blue filter absorbs red and green light transmitting blue light. A yellow filter absorbs blue light. It would transmit red and green light but they have already been absorbed, so no light is transmitted.

6.10 Presenting conclusions: more on colour

1 A yellow flower looks yellow because it absorbs blue light and reflects red and green light, which combine to make yellow light.

2 A combination of red, yellow, and blue paint looks black because red, green, and blue light are all absorbed and none of the light is reflected.

3a Red shirt and red shorts.

b Green shirt and green shorts.

c Black shirt and blue shorts.

4 The red object will also appear red in yellow light, so this evidence does not support Aru's conclusion that a red object will only look red in red or white light.

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°.

6.8 Dispersion

1a F – the spectrum is made up of seven colours.

b T

c T

d F – light is refracted as it goes through a prism.

2a R at the top, V at the bottom of the spectrum.

b The points where the light enters and leaves the prism.

c An inverted triangle (the prism) should be added between the prism and the surface.

3 C, B, A, F, D, E

6.9 Colour

1 Missing words in order: primary, blue, green, secondary, magenta, cyan, yellow, primary, blue, green, red, filter, transmits, absorbs, transparent.

2a In order: blue, cyan, no, no, red.

b it will be less bright as some of the light has been absorbed.

6.10 Presenting conclusions: more on colour

1 Correct words in order: reflect, absorb, reflect, absorb, absorb, reflect.

2 Answers in order: green, blue, red, blue, no light/ appear black, blue.

3 Correct answers in order: black, blue, green or blue, green