

Mark schemes

- 1** (a) (i) She saw the flash first. ✓
if more than one box is ticked award no mark 1
- (ii) any **one** from
- light travels faster than sound
accept 'the flash travelled faster than the bang'
 - sound travels more slowly than light
accept 'the bang travelled more slowly than the flash'
*do **not** accept 'the flash **or** light travels very fast'*
*do **not** accept 'sound takes time to travel'* 1
- (b) It was louder. ✓
if more than one box is ticked, award no mark 1
- [3]
- 2** (a) mirror **or** something shiny
*accept 'reflector' or 'her watch' **or** any named shiny object*
*do **not** accept 'torch' **or** any named light source* 1
- (b) reflects them
accept 'bounces the light off' 1
- [2]
- 3** (a) any **one** from
- loud sounds can damage hearing
accept 'they could damage his hearing'
 - to protect his ears
accept 'loud sounds can damage the ear'
 - loud sounds can burst the eardrum
accept 'it could make him deaf'
accept 'they are very loud'
'they are loud' is insufficient as
'loud' is given in the question 1 (L3)

(b) any **one** from

- the further the sound travels the quieter it gets
*accept 'the sound **or** energy spreads out'*
- she was furthest away
*accept 'she was further away' **or** 'she was far away'*
accept 'some of the sound is absorbed'

1 (L3)

(c) any **one** from

- the speed of light is greater than the speed of sound
accept 'sound travels more slowly'
- light travels faster than sound
accept 'light travels faster'
accept 'light gets there before sound'

1 (L4)

(d) (i) • light

1 (L3)

(ii) • sound

1 (L3)

(e) gravity

accept 'weight'

1 (L4)

[6]

4

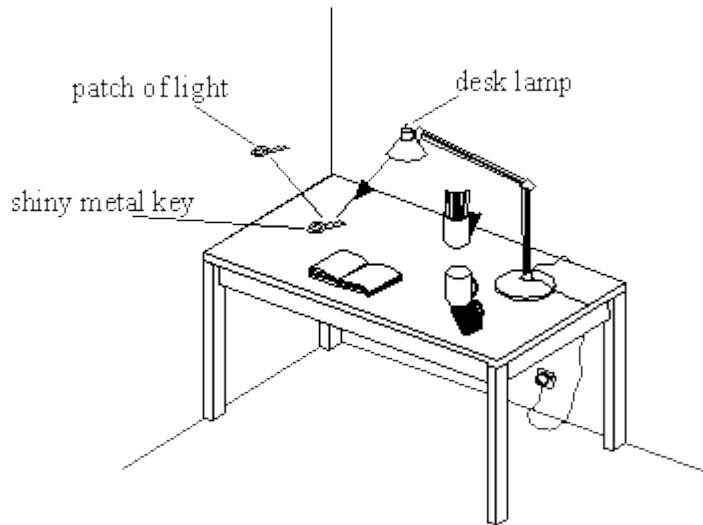
- (a) (i) the first mark is for a continuous straight line from the rim of the lamp to the key the line must reach the key

1 (L4)

the second mark is for the arrow on the line
the arrow must point away from the lamp

1 (L4)

- (ii) the mark is for a straight line from the key to the patch of light
the line must both touch the key and reach the patch of light



do **not** accept broken lines

accept the reflected ray drawn from any part of
the key irrespective of the first ray
the reflected ray need not have an arrow

1 (L4)

- (b) any **one** from

- light cannot bend around the mug
accept 'light travels in straight lines'
- light cannot go through the mug
*accept 'the mug absorbs **or** scatters the light'
or 'the mug is opaque' **or** 'the mug is in the way of the light'
do **not** accept 'light reflects off the mug'*

1 (L4)

[4]

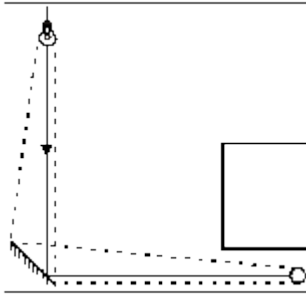
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- (a) any **one** from

- light cannot go through the cupboard
- light cannot bend round the cupboard
*accept 'the cupboard stops **or** blocks **or** absorbs the light'
do **not** accept 'the cupboard reflects the light'
accept 'light travels in straight lines'*

1 (L4)

- (b) (i) mirror symbol is at approximately 45° to the floor



*the mirror must slope downwards to the right the hatching marks must be on the underside of the mirror
do **not** accept rectangular drawings of a mirror*

1 (L4)

- (ii) **at least one arrow showing the direction of the ray is required to award both marks**

ray from bulb to any part of mirror

1 (L3)

ray from mirror to coin

1 (L3)

- (iii) reflected

*the ray must be straight and must touch both the bulb and the mirror the ray need not be vertical
consequential marking applies*

accept a ray drawn to the mirror regardless of where the mirror has been drawn

the ray must be straight and must touch both the mirror and the coin

the ray must touch the mirror at the same point as the ray from the bulb

consequential marking applies

accept a ray drawn from the mirror regardless of where the mirror has been drawn

accept 'reflecting'

*do **not** accept 'scattered' or 'absorbed'*

or 'refracted' or 'bounced off'

1 (L3)

[5]

6

- (a) (i)



*if more than **one** box is ticked, award no mark*

1 (L3)

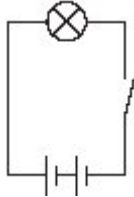
(ii) It is reflected
accept 'it reflects'
accept 'it bounces off' 1 (L4)

(b) (i) • bulb
accept 'lamp' or 'light' 1 (L3)

• battery **or** cells
accept 'cell' 1 (L3)

• switch
answers must be in the correct order 1

(ii) a series circuit drawn with the correct symbols such as



accept '—|—' for '—||—'
accept '—||—' or '—|---|—'
accept curved wires

1 (L4)

[6]

7

(a) (i) any **one** from

- it is reflected
accept 'bounces off'
- it is scattered
accept 'it is absorbed by the air'
*do **not** accept 'it is absorbed by the glass'*
***or** 'it is absorbed' or 'it goes into the air'*

1 (L5)

(ii) refraction 1 (L5)

- (b) green
blue
violet

all three colours in the correct order are required for the mark accept 'orange, yellow, green, blue, indigo, violet' in the correct order

1 (L5)

- (c) The green part of the spectrum stays the same, but the other colours disappear. ✓

i.e. a tick in the third box if more than one box is ticked, award no mark

1 (L6)

[4]

8

- (a) (i) B

1

- (ii) any **one** from

- light travels in straight lines
- light will not pass through the cardboard

accept 'the cardboard blocks the light' or 'the cardboard is opaque'

- they are in the shadow of the cardboard

do not accept 'they are in the shadow'

1

- (b) green

1

- (c) Q

1

[4]

9

- (a) one mark for a ray from coin to eye, bending at the surface of the water, and not passing through the mug

both parts of the ray must slope upwards to the left accept small discontinuities in the ray accept rays which are almost straight but which may have not been drawn with a ruler

1

one mark for accurately drawing the correct ray

*do **not** award this mark unless the first mark was also awarded the ray must touch the coin, touch the pupil of the eye, and must be continuous both parts of the ray must be drawn with a ruler*

1

one mark for an arrow showing that the light enters the eye

1

(b) red light passes through

*answers may be in either order accept 'the filter or drink does not affect the red light' do **not** accept 'it reflects red light'*

1

the other colours are absorbed

*accept 'only the red light passes through the filter' or 'every colour except red is absorbed' for both marks do **not** accept 'the light turns red'*

1

[5]

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(a) it is reflected

accept 'it is scattered' accept 'it reflects or bounces off'

1 (L5)

(b) one mark is for a ray from the headlamp to the light-coloured clothes and from them to the driver's eye

***both** parts of the ray are required accept small discontinuities in the ray accept rays which are almost straight but which have not been drawn with a ruler do **not** accept dotted lines*

1 (L5)

• one mark is for accurately drawing the correct ray

*this is a dependent mark do **not** award this mark unless the first mark was also awarded the ray must touch the headlamp, touch the cyclist's clothes, and touch the driver's eye the ray must be continuous both parts of the ray must be drawn with a ruler*

1 (L5)

• an arrow showing that the light enters the eye or leaves the headlamp

accept a correct arrow on an incomplete line

1 (L5)

(c) it is absorbed

accept 'it absorbs'

accept 'most is absorbed'

accept 'it is not reflected'

accept 'only some is reflected'

1 (L5)

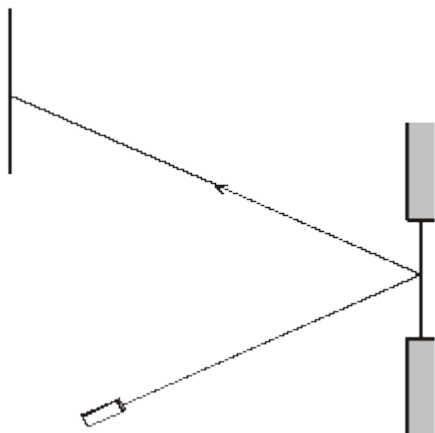
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(a) the angles of incidence and reflection must be equal

1 (L5)

the ray must be continuous and straight with an arrow in the correct direction



accept one arrow in the correct direction on either the incident or the reflected ray

the ray must hit the screen in the middle 2 cm

1 (L5)

(b) (i) any **one** from

- sound waves travel to the window **or** glass

accept 'sound travels to the window'

- vibrations pass through the air

- sound waves **or** vibrations hit the window

accept 'sound hits the window'

1 (L5)

(ii) the beam will vibrate **or** move **or** jump about

accept 'scatter' for vibrate

accept 'it would go to other places in the room'

accept 'it would go in different directions'

*accept 'it shakes' **or** 'it wobbles'*

*do **not** accept 'it is blurred'*

'it goes in a different direction' is insufficient

1 (L5)

(c) B ✓

if more than one box is ticked, award no mark

1 (L6)

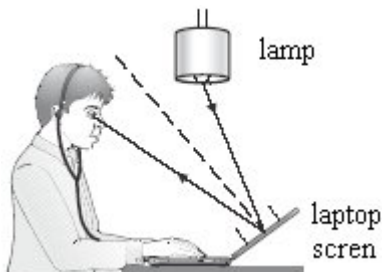
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(a) (i) • a continuous straight line from the lamp to the screen **and** from the screen to George's eye

1 (L5)

• angle of incidence approximately equal to the angle of reflection



accept a reflection anywhere between the dotted lines on the laptop screen

1 (L5)

• arrows in the correct direction on the incident and reflected ray
accept one arrow on a continuous ray showing reflection

1 (L5)

(ii) the reflected ray **or** the light image misses George's eyes

accept 'the ray of light is reflected at a different angle'

accept 'it moves down'

'the lamp is not shining in his eye's is insufficient

*do **not** accept responses referring to scattering*

'it changes' is insufficient

*do **not** accept 'the ray of light is reflected above his eye'*

1 (L6)

(b) *from electrical energy to sound energy*

***both** answers are required for the mark*

answers must be in the correct order

1 (L5)

[5]

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- (a) • a straight line from the snail to the surface and from the surface to the fish

the line must reach the fish within the tolerance shown below the ray must be continuous ignore an incident ray towards the snail ignore rays refracted at the surface

1 (L5)

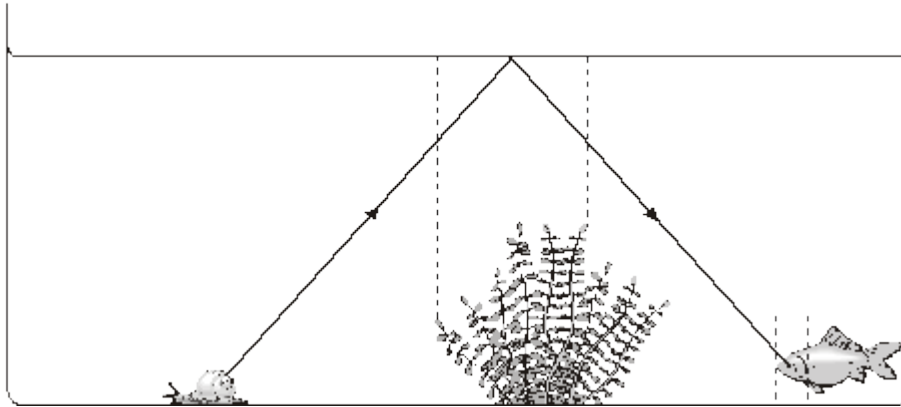
- the angle of incidence should be approximately equal to the angle of reflection

the line must reach the surface of the water within the tolerance shown below

1 (L6)

- arrow pointing towards the fish **or** away from the snail

*accept a single arrow in the correct direction on either the incident **or** the reflected ray if two arrows are drawn, they must both be in the correct direction*

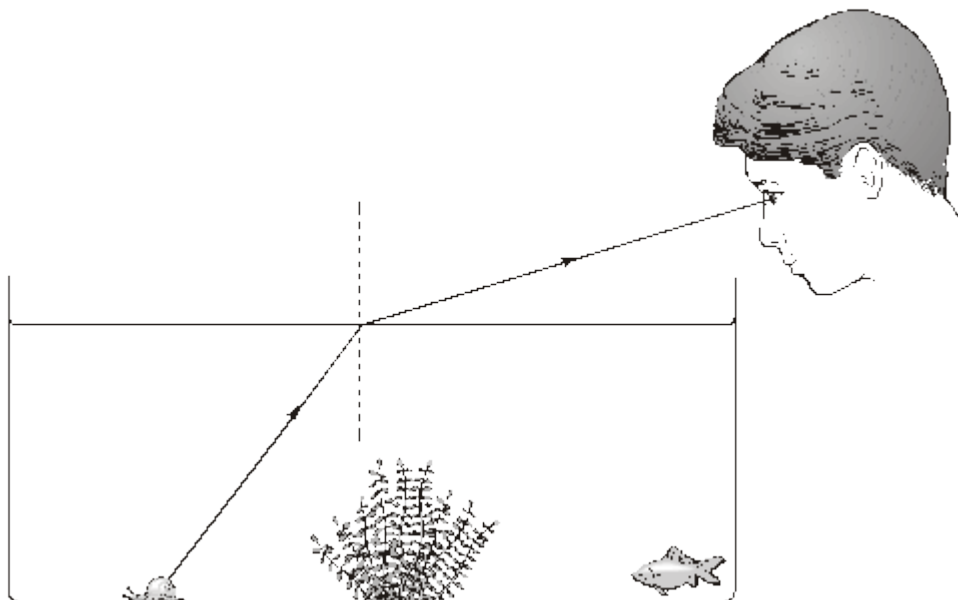


1 (L5)

- (b) (i) • a ray from the snail to Andrew's eye bending at the surface
both parts of the ray must be straight and must slope upwards and to the right
the ray must be continuous
ignore any incident rays drawn towards the snail
the ray must bend further away from the normal at the surface as it goes from water to air

1 (L6)

- an arrow pointing towards Andrew on any part of the ray
if two arrows are drawn, they must both be in the correct direction



1 (L6)

- (ii) • refraction

1 (L6)

[6]

14

- (a) (i) • only red light passes through the filter
accept 'the other colours are filtered out or absorbed'
'red light passes through' is insufficient
*a mark for this answer may be awarded **in either a i or a ii** provided there is no contradiction*

1 (L7)

- the ball reflects red light
accept 'white objects reflect all colours'

1 (L7)

- (ii) black
accept 'you cannot see it'

1 (L7)

any **one** from

- the green ball does not reflect red light or the light that passes through the filter
- the ball absorbs red light
accept 'no green light reaches the ball'

1 (L7)

- (b) two red spots

accept 'red black red'
'two spots' is insufficient
'red spots' is insufficient
*do **not** accept 'only red light'*

1 (L7)

[5]

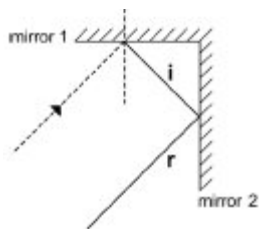
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- (a) • true false

*for **all four** correct, award two marks*
*for **any two** or **three** correct, award one mark*
*for **one** correct answer, award no marks*
if more than one box is ticked in any row, do not give credit for that row

2 (L6)

(b) (i) •



award one mark for approximately equal angles of incidence and reflection at mirror 1

award one mark for a continuous ray that is reflected off mirror 1 and mirror 2

both rays are required for the mark rays must be drawn as straight lines

ignore any arrows

2 (L7)

(ii) • rays 'i' and 'r' correctly labelled on diagram as shown above

both rays, correctly labelled, are required for the mark

1 (L7)

(c) any **two** from

- white light is a mixture of colours
- the red book absorbs all of the colours of light except red
accept 'the other colours are absorbed'
- only red light is reflected
'red light is reflected' is insufficient

2 (L7)

(d) •

	red	green	black
red filter	✓		
green filter			✓

both ticks are required for the mark

if more than one tick is placed in any row, award no mark

1 (L7)

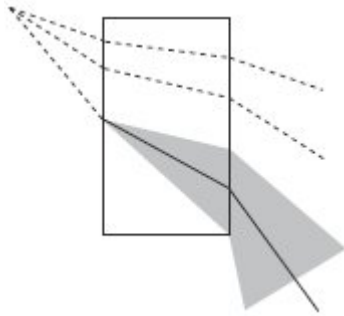
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(a) refraction **or** refracting

1 (L6)

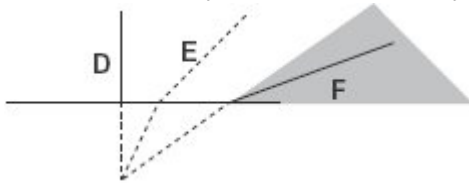
- (b) • a ray bending towards the normal at the first surface
accept a ray that is within the shaded area
both sections of the ray must be straight and continuous
ignore any arrows
- an emerging ray bending away from the normal at the second surface



accept an emerging ray that is within the shaded area
the emergent ray does not have to be parallel to the incident ray

2 (L7)

- (c) • a continuous straight line for ray D
ignore any arrows
ignore any reflected rays
- a continuous ray F that bends away from the normal



accept a ray drawn within the shaded area
 do **not** accept an emergent ray that does not refract

2 (L7)

[5]