

1

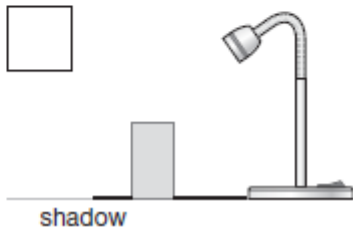
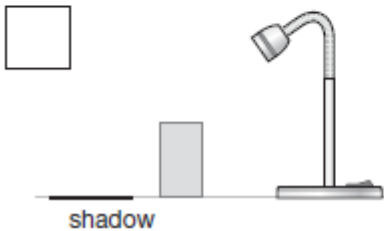
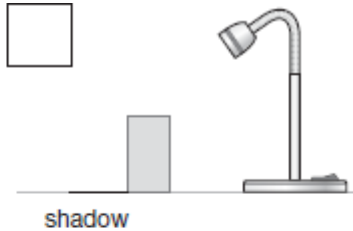
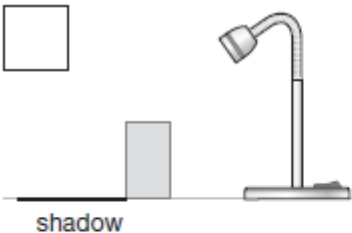
Shadows

(a) Josh is investigating shadows. He places a block on the floor. He holds a lamp and looks at the shadow the block makes.

(i) Look at the pictures below.

Which picture shows the correct length and direction of the shadow made by the block?

Tick **one**.



1 mark

(ii) Why does a shadow form when Josh shines the light on the block?



Tick **one**.

The block is grey and shiny.

The block is smooth and rigid.

The block is solid and opaque.

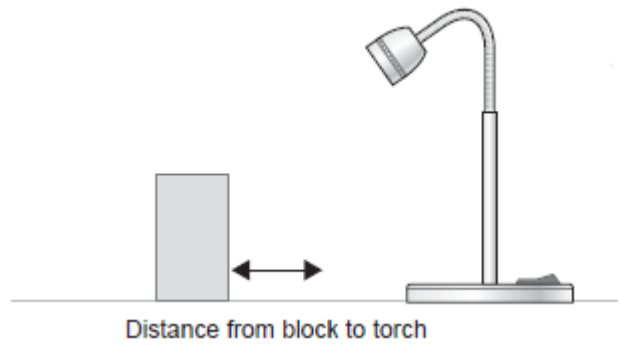
The block is hard and transparent.

1 mark

(b)

Josh investigates if the distance he puts the lamp from the block affects the length of the shadow on the floor.

Josh records his results in the table below.



Distance of lamp from block (cm)	Length of block's shadow (cm)
5	7
10	9
15	12
20	14
25	17

Describe the relationship between the **distance of the lamp** from the block and the **length of the shadow**.



1. ....

2. ....

1 mark

(c) Josh found out that the distance of the lamp from an object does affect how long the shadow is.

He wants to find out more about how to change shadow size.

Suggest **another** investigation that Josh could carry out using the same lamp and block to find out more about how the size of a shadow changes.



1. ....

2. ....

1 mark

**2** **Shadows**

(a) Two children hold some objects between a lamp and the wall.



They see that cardboard makes a **dark** shadow and a plastic sheet makes a **faint** shadow.

Explain why the shadows are different.

.....  
.....

1 mark

(b) Tick **TWO** objects which make a faint shadow.



a wooden toy

a piece of tracing paper

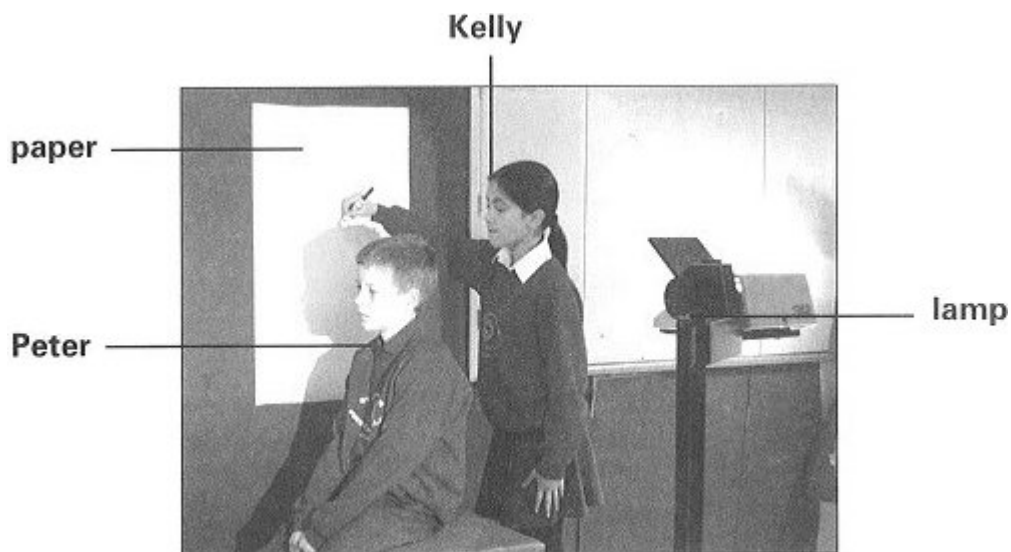
a book

a mirror

a clear plastic cup

1 mark

(c) Kelly is drawing around Peter's shadow.



How could Peter make the shadow of his head bigger?

Tick **TWO** boxes.

move closer to the paper

move closer to the lamp

use a bigger lamp

use a brighter lamp

move the lamp closer

move the lamp further away

1 mark

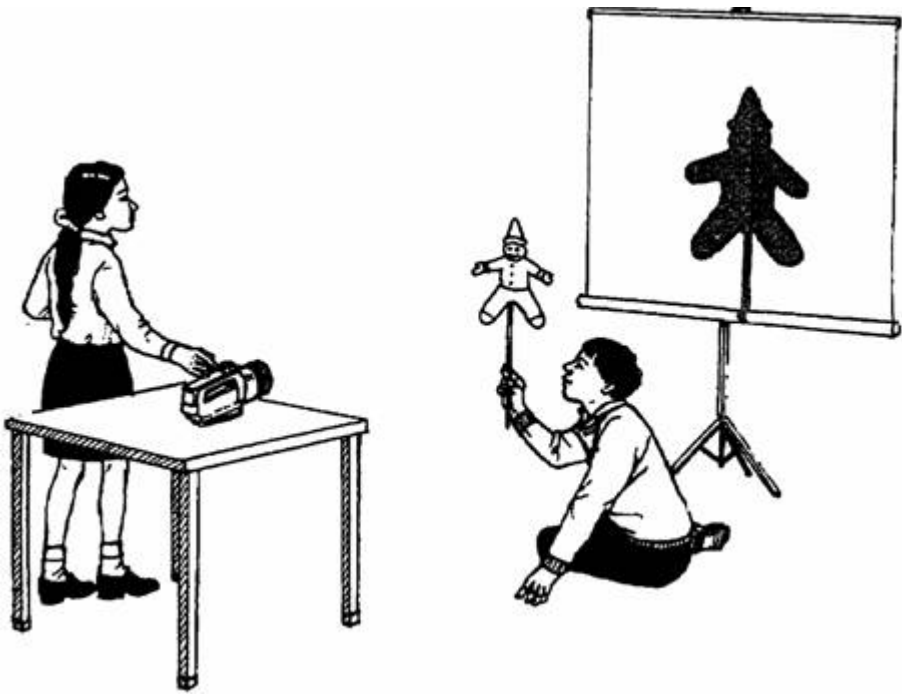
(d) Explain how Peter's shadow is formed on the paper.

.....  
.....

1 mark

3

Light



(a) Tim and Sue have a torch and a shadow puppet.

What does the light from the torch shine on?

Tick **TWO** boxes.



the front of the puppet

the back of the puppet

the shadow of the puppet

the screen

1 mark

(b) Explain how a shadow is formed.

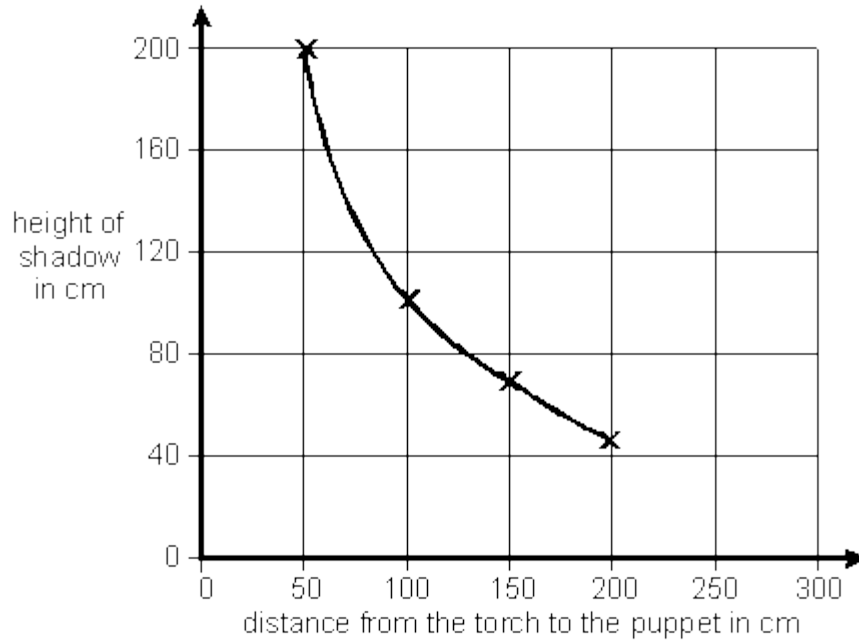


.....  
.....

1 mark

(c) The height of the puppet is 20 cm.

The graph below shows how the height of the shadow on the screen changed when the puppet was moved away from the torch.



Continue the line graph to show what the height of the shadow will be when the puppet is 250 cm and 300 cm from the torch.

2 marks

(d) Look at the graph.

What was the height of the shadow when the puppet was 50 cm from the torch?

..... cm.

1 mark

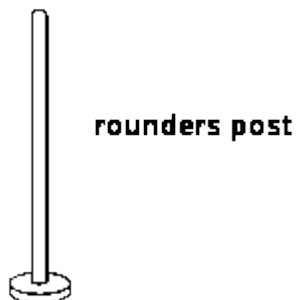
(e) Describe how the height of the shadow changed as the distance from the torch to the puppet changed.

.....  
.....

2 marks

**4** **Shadows**

(a) One sunny day, some children use a rounders post to make shadows in their playground.



When light shines on the rounders post, a shadow forms.

Where does the light come from?

.....

1 mark

(b) The rounders post makes a dark shadow.

Tick **ONE** box to complete the sentence below.

The rounders post makes a **dark** shadow because it is...

opaque.

smooth.

solid.

transparent.

tall.

heavy.

1 mark

- (c) The children draw round the shadow of the rounders post every half hour from 9:30 until 12 noon.



They measure the length of each shadow and record their results in this table:

Time (am)	Length of shadow (cm)
9:30	146
10:00	130
10:30	116
11:00	109
11:30	106
12:00	103

What happened to the length of the shadow during the morning?

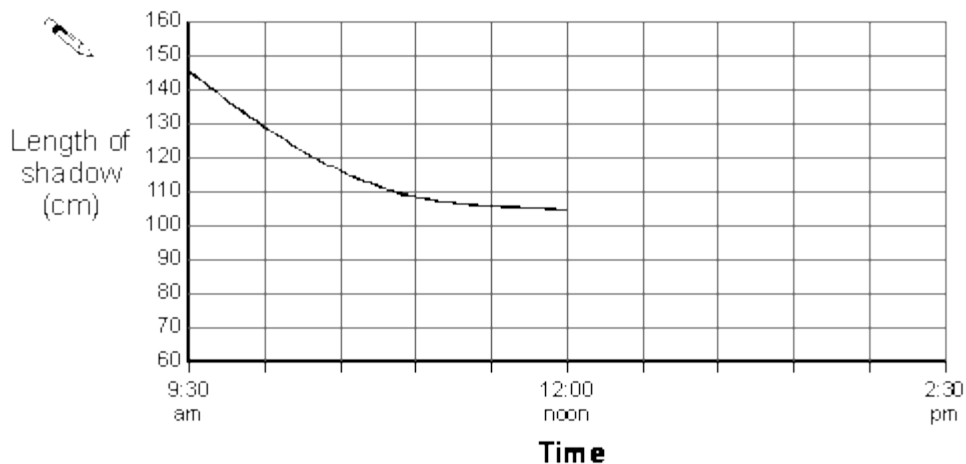
.....

1 mark



(d) The children make a line graph to show the results from the morning.

Continue the line on the graph to show how the length of the shadow would change between 12 noon and 2:30 pm.

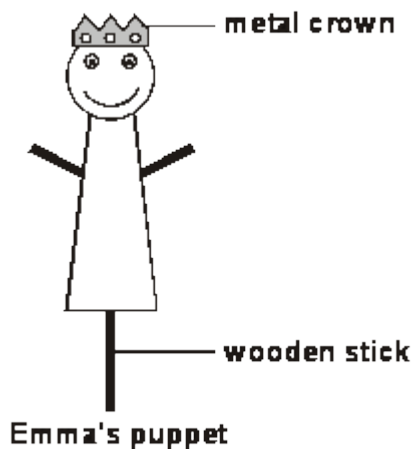


1 mark

**5** Puppet show

(a) Emma makes a stick puppet. She draws a face on it.

The puppet has a metal crown. When Emma shines a light on the puppet, the crown looks shiny.



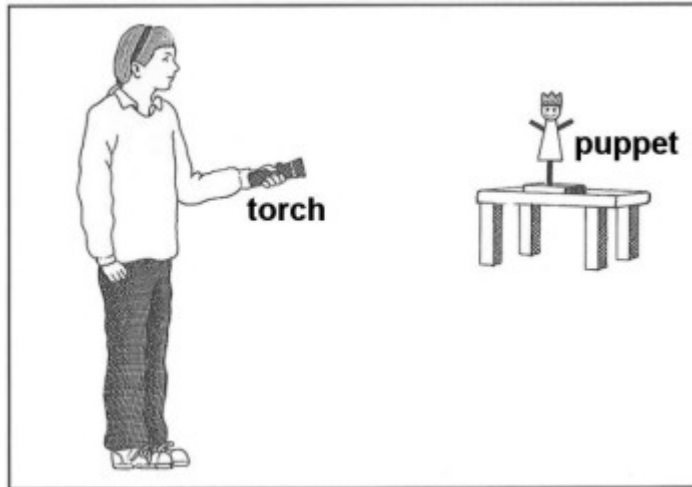
Why does the metal crown look shiny when the light is on it?

.....

.....

1 mark

- (b) Draw **TWO** arrows on the diagram below to show how Emma can see the light shining on the puppet's crown.



2 marks

- (c) When the light shines on the puppet, Emma can see a shadow of the puppet on the wall behind.

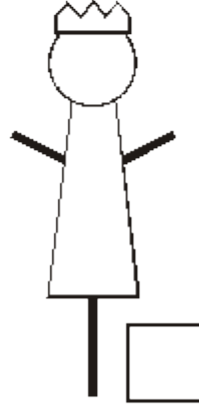
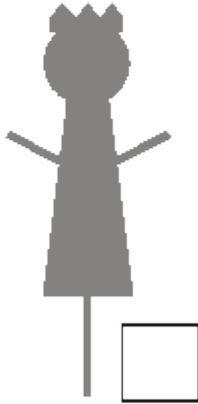
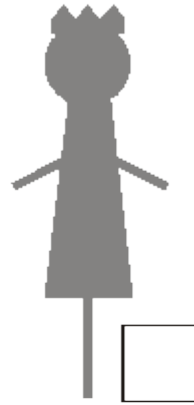
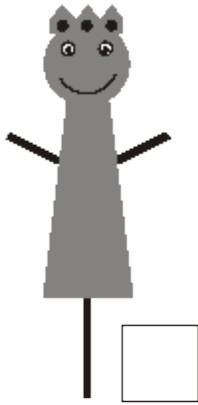
Why does a shadow form behind the puppet when the light shines on it?

.....  
.....

1 mark

(d) Which of the following shows the correct shadow of Emma's puppet?

Tick **ONE** box.

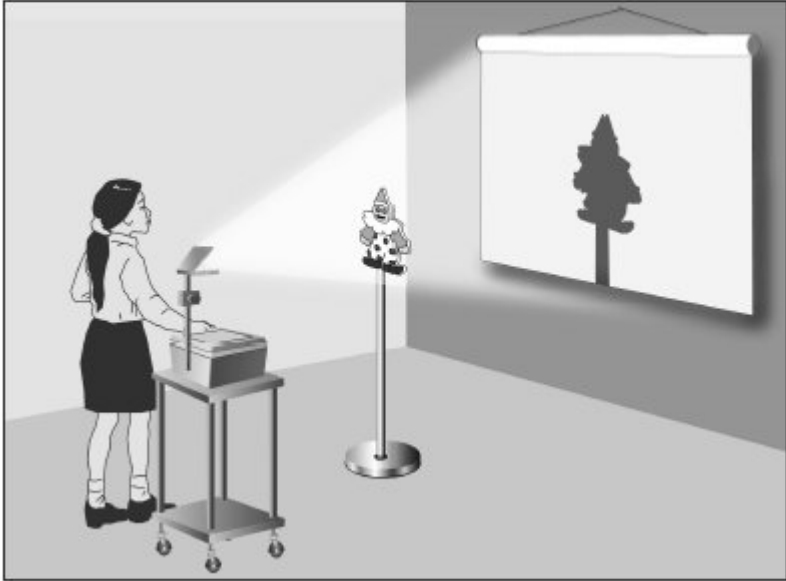


1 mark

**6**

**Shadows**

- (a) Lucy makes a shadow of a puppet on a screen. She investigates how changing the distance of the light from the puppet affects the size of the shadow.



What equipment should she use to measure the distance of the light from the puppet?

.....

1 mark

- (b) What unit of measurement should she use to measure the distance of the light from the puppet?

Tick **ONE** box.

.....

g       °C       cm       km       N

1 mark

(c) What factor should she change as she carries out her test?

Tick **ONE** box.

where the children sit	<input type="checkbox"/>	colour of the screen	<input type="checkbox"/>
brightness of the light	<input type="checkbox"/>	position of the light	<input type="checkbox"/>
position of the screen	<input type="checkbox"/>	the size of the puppet	<input type="checkbox"/>

1 mark

(d) What factor should she measure to collect her results?

Tick **ONE** box.

The height of the...

light	<input type="checkbox"/>	shadow	<input type="checkbox"/>	table	<input type="checkbox"/>
puppet	<input type="checkbox"/>	screen	<input type="checkbox"/>	reflection	<input type="checkbox"/>

1 mark

(e) What factors must she keep the same as she carries out her test?

Tick **THREE** boxes.

where the children sit	<input type="checkbox"/>	colour of the screen	<input type="checkbox"/>
position of the puppet	<input type="checkbox"/>	position of the light	<input type="checkbox"/>
position of the screen	<input type="checkbox"/>	size of the puppet	<input type="checkbox"/>

2 marks

7

**Light sensor**

(a) The light in a classroom comes from different sources.

Tick **ONE** box below to show one possible source of light in a classroom.

plant

mirror

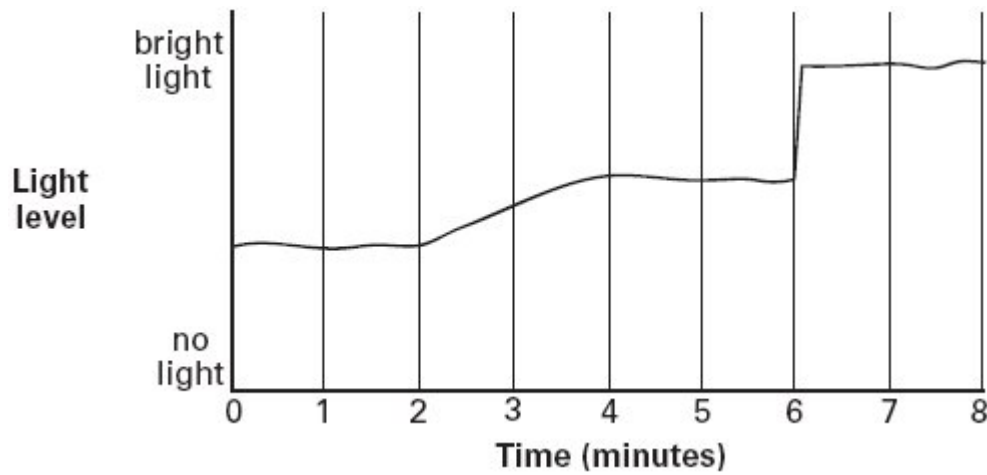
radiator

computer screen

1 mark

(b) Some children place a light sensor in the middle of the classroom.

The graph below shows how the light level changed over time.



Describe what happened to the light level between two and four minutes on the graph.

.....

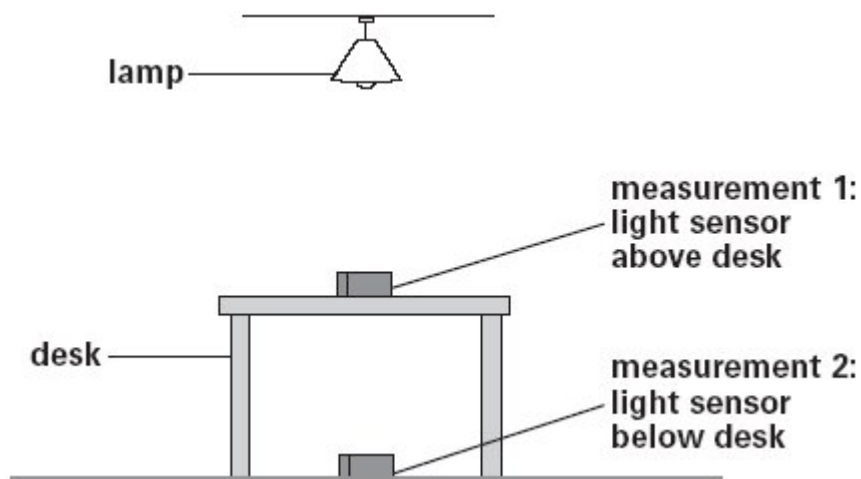
1 mark

(c) Describe **ONE** thing that could have happened in the classroom at six minutes to make the light level suddenly change.

.....

1 mark


(d) The children measure the light above a desk and below a desk.



George says: 'When the light sensor is under the desk, the reading on the sensor goes down.'

Write **true** or **false** next to each sentence below.


**True or false?**

-  The light source is above the desk. ....
- The light cannot pass through the desk. ....
- There is a shadow underneath the desk. ....

1 mark

(e) Complete the sentence using a word from the box below.

impermeable   opaque   transparent   solid

 The sensor reading is lower when it is below the desk because the desk is .....

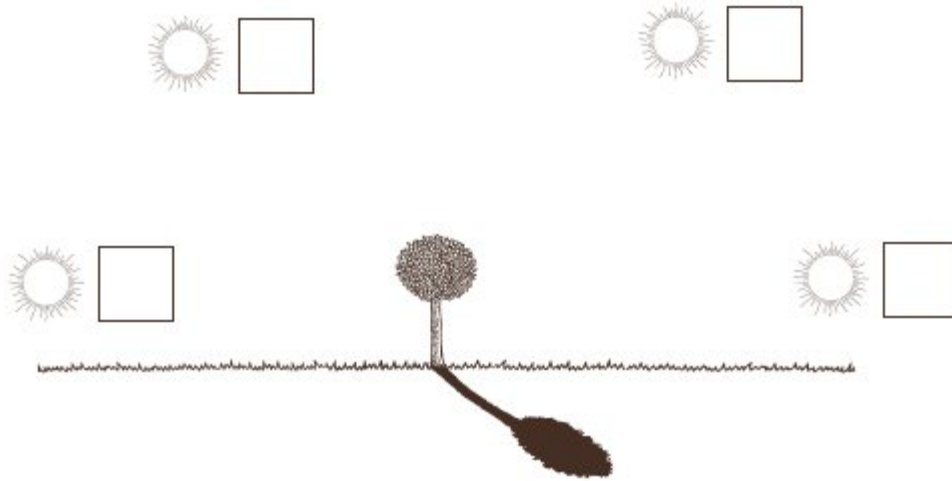
1 mark

8

Tree shadow

(a) Alex looks at a tree on a sunny day.

Tick **ONE** box to show where the Sun was when it caused this shadow of the tree.



1 mark

(b) Explain why a shadow forms behind the tree.

.....

1 mark

(c) Alex looks at the shadow of the tree at different times of the day. He observes that the shadow is in a different position each time.

The position of the shadow changes because the Sun appears to move across the sky.

Tick **One** box to explain why the Sun appears to move across the sky each day.



The Earth orbits the Sun.

The Earth spins on its axis.

The Sun orbits the Earth.

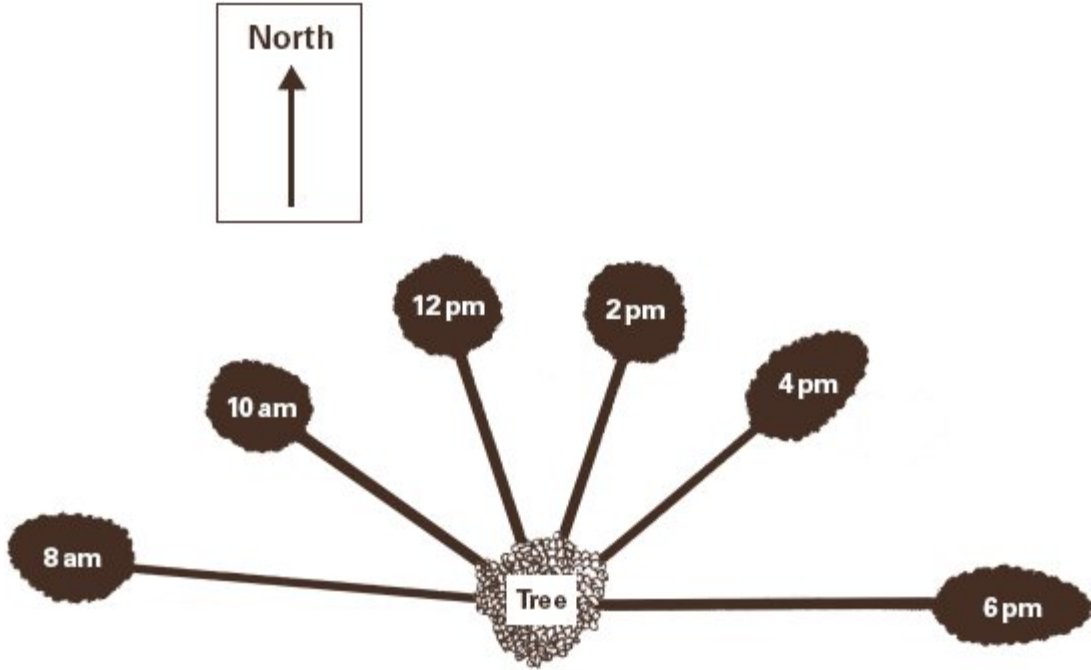
The Sun spins on its axis.

1 mark



(d) Alex looks at the tree's shadow every two hours. He draws the position of the shadows on the ground.

The diagram below shows his results.



At 8 pm there is no shadow of the tree on the ground.

Why is there no shadow of the tree on the ground at 8 pm?

.....  
 .....

1 mark

(e) Use Alex's diagram to estimate what time the shadow was pointing north.

..... pm

1 mark

**9 Shadows and space**

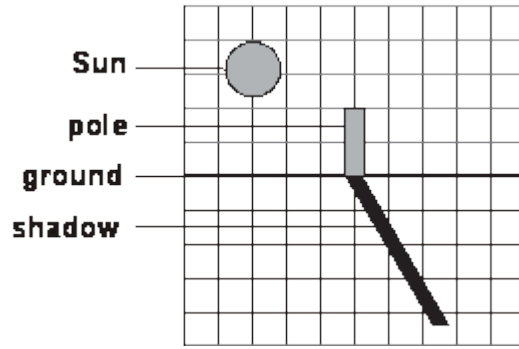
(a) Jimmy stands a pole in the playground.  
 There is a shadow of the pole on the playground.

Why does the pole cause a shadow on the playground?

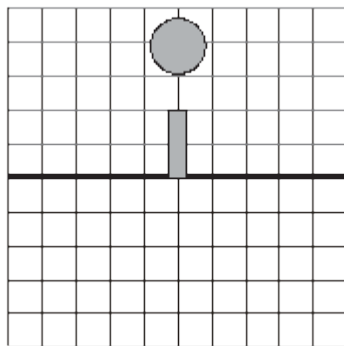
.....

1 mark

- (b) Jimmy records the shadow at 10 am.  
He draws his results on squared paper.



Draw the shadow of the pole at 12 noon.



1 mark

- (c) Tick **ONE** box to show which movement in space causes the shadows to change on Earth during a day.

*Handwritten mark*

the Sun spinning

the Earth orbiting the Sun

the Earth spinning

the Moon orbiting the Earth

1 mark

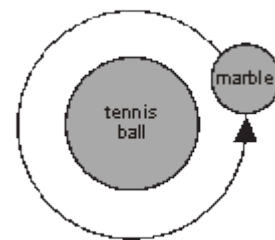
(d) Jimmy and his friends use different sized balls to model the Sun, Earth and Moon.



a football models the Sun

a tennis ball models the Earth

a marble models the Moon



The marble is moved around the tennis ball.

Which movement is modelled by the marble and the tennis ball?

Tick **ONE** box.

the Moon orbiting the Earth

the Earth orbiting the Moon

the Moon spinning on its axis

the Earth spinning on its axis

1 mark

(e) The children use the tennis ball and the football to model an orbit. This orbit takes one year.

How should the children move the tennis ball and the football to model the orbit that takes one year?

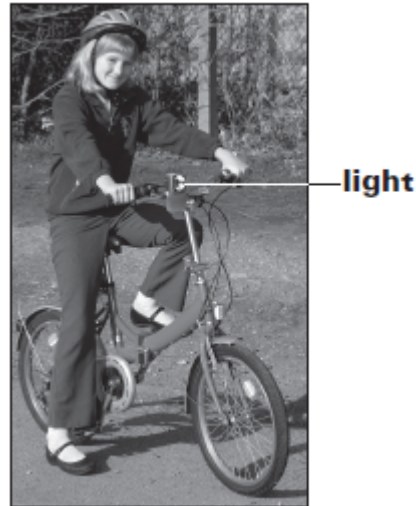
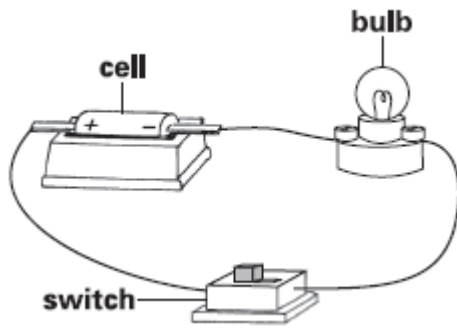
.....

.....

1 mark

**10** Road safety

- (a) Julia has a bike with a light.  
The picture below shows the circuit in Julia's light.



- (i) Draw a circuit diagram to show the circuit in Julia's light.  
Use symbols in your drawing.



2 marks

- (ii) What should Julia add to her circuit to make the light brighter?



Julia should add .....

1 mark

- (b) It is important for people riding bikes to be seen in the dark. The pictures below show what two jackets look like when Julia shines a torch on each of them.



**Jacket A**



**Jacket B**

Julia can see jacket **B** better than jacket **A**.

Explain what happens to the light from the torch for Julia to see jacket **B** better than jacket **A**.

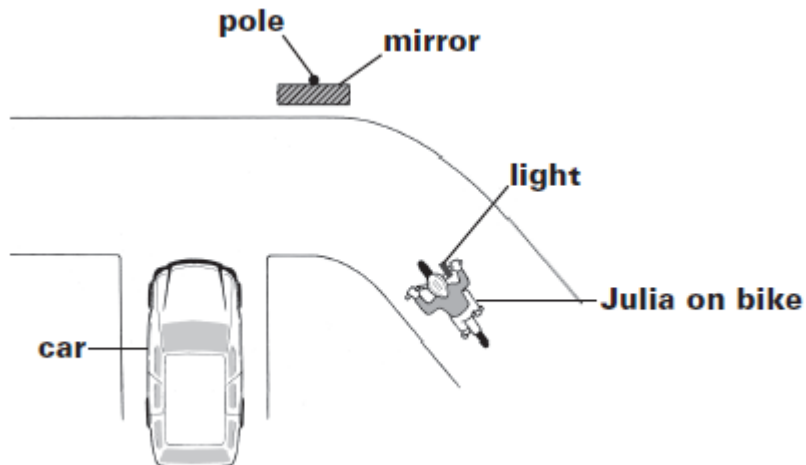


.....  
.....

1 mark

- (c) Julia's house is near a bend in the road. There is a mirror on a pole so car drivers can see people coming round the bend.

Draw **TWO** arrows on the diagram below to show the direction light travels for the car driver to see the light on Julia's bike.



2 marks

11

### Torch light

- (a) Sanna is investigating which materials are good reflectors of light. She shines a torch on different objects from a distance of 20 cm.



She looks at the objects to see how well each reflects light.

Tick **TWO** boxes to show which objects are the **best** reflectors.

Handwritten mark: ٧٠



Paper book



Metal spoon



Wooden spoon



Woolly hat



Glass jar



Compact disc

2 marks

(b) Tick **ONE** box to show which of Sanna's objects does **not** make a dark shadow.

السؤال

metal spoon

wooden spoon

woolly hat

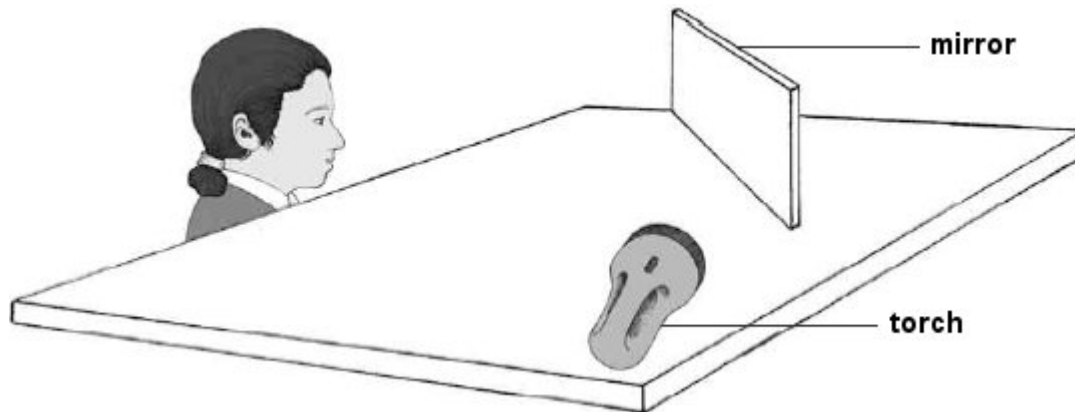
glass jar

1 mark

(c) The picture below shows Sanna looking at the torch light reflected in a mirror.

Draw **TWO arrows** to show the direction the light must travel for Sanna to see light from the torch in the mirror.

السؤال



2 marks

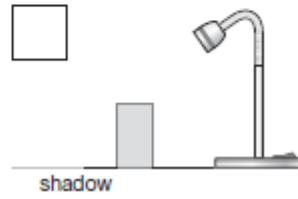
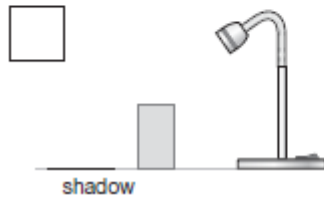
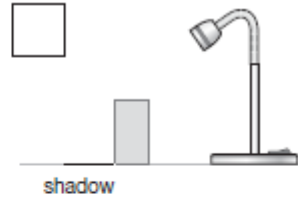
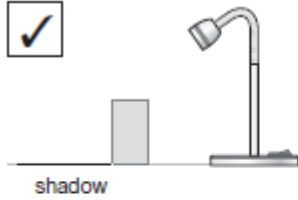
# Mark schemes

1

(a) (i) Award **ONE** mark for:



Tick **one**.



1

(ii) Award **ONE** mark for:

The block is grey and shiny.



The block is smooth and rigid.



The block is solid and opaque.



The block is hard and transparent.



1



(b) Award **ONE** mark for a response giving a general comparison describing the relationship between the two variables of **distance** from the lamp and **length** of the shadow:

- the further the lamp from the block, the longer the shadow
- the greater the distance the longer the shadow
- the closer the lamp, the shorter the shadow.

**ONE mark** may be awarded for a response giving two single comparisons:

- when the lamp is near, the shadow is short and when it is far, the shadow is longer.

**ONE mark** may be awarded for:

- the further, the longer.

**Do not** give credit for an incorrect response that changes one or both of the variables:

- the further the lamp the bigger the shadow [only looking at the dimension of length of the shadow in the table].

1

(c) Award **ONE** mark for any credible investigation that could be done to explore shadow size using the same block and torch that clearly identifies the independent variable, eg:

- does the direction the lamp is pointing affect the shadow size?
- will the shadow length change if the block is sideways or upright?
- will the distance of the block from the table affect the shadow size?
- how will shadow size change if I hold the block in front of a wall and move it towards the lamp?

**ONE** mark may be awarded for an investigation where the dependent variable is not stated [given in question stem] but the independent variable is explicit, eg:

- change the angle of the lamp to the block.

**Do not** give credit for an insufficient response that does not indicate the independent

variable, eg:

- how can I make the shadow wider? [shadow size is the dependent variable and is given].

**Do not** give credit for an insufficient response that is ambiguous as could imply it is the distance of the lamp from the block that is being changed as in the original investigation, eg:

- change the lamp position and see how big the shadow is.

2

(a) Award **ONE** mark for a **comparison** (explicit or implied) of the amount of light passing through the given materials and/or reference to related properties:

- translucent materials let through more light than opaque materials;
- the plastic sheet is translucent, but cardboard is opaque;
- the plastic sheet lets through more light (than cardboard);
- cardboard doesn't let light through, but the plastic sheet lets (some) light through;
- the plastic sheet is see-through, but cardboard is not;
- the plastic sheet is see-through and lets through more light (than cardboard);
- the cardboard lets through less light.

**Allow:**

- cardboard does not let (any) light through.  
*Do not give credit for an insufficient response describing the properties of the materials:*
  - cardboard is thick/thicker but the plastic sheet is thin/thinner;
  - cardboard is thick.*Do not give credit for a response that includes incorrect science:*
  - the plastic sheet has holes in it that let the light through.

1

(b) Award **ONE** mark for **both** objects identified correctly:

- a piece of tracing paper
- a piece of tracing paper
- a piece of tracing paper
- a piece of tracing paper
- a clear plastic cup

*Do not give credit for only one object identified correctly.*

1

(c) Award **ONE** mark for **both** options identified correctly:

• move closer to the lamp

• move the lamp closer

1

(d) Award **ONE** mark for an explanation including knowledge that light cannot pass through opaque objects.

The response **must** make reference to **light** or **opacity**:

- the light cannot pass through Peter;
- Peter blocks the light from the lamp;
- the light cannot go through Peter;
- Peter is opaque.

*Do not give credit for an insufficient response that does not explain shadow formation:*

- *light cannot get past Peter;*
- *Peter is sitting in front of the light;*
- *the light (only) shines on Peter's back;*
- *Peter's head is in the way of the light;*
- *light travels in straight lines.*

*Do not give credit for a response that includes incorrect science;*

- *light goes around Peter.*

1

[4]

3

(a) Award **ONE** mark for:

the front of the puppet

the screen

1

(b) Award **ONE** mark for an awareness that a shadow is formed when light is blocked by an object:

- the light is blocked/stopped/can't pass through.

**Allow:**

- the sun/sunlight is blocked.

**Do not** give credit for:

- *a shadow is a place where there is no/little light [not an explanation of how a shadow is formed].*

1

(c) (i),(ii) To be considered as creditworthy, the response **MUST** continue the drawn curve and show no net rise.

Award **ONE** mark for each of:

- the curve extending to a point where  $x$  equals 300;
- the curve drawn to a point where  $y$  is no less than 20 and no more than 40.

1

1

(d) Award **ONE** mark for:

- 200

1

(e) (i),(ii) Award **TWO** marks for generalisations (consistent with the data) about the relationship between the two variables of distance and height, which use two comparatives:

- the **nearer** the puppet to the torch, the **larger** the shadow;
- the **further** the puppet from the torch, the **smaller** the shadow;
- the **further** the puppet from the screen, the **larger** the shadow;
- the **nearer** the puppet to the screen, the **smaller** the shadow.

2

or

If you are unable to award these **TWO** marks, use the following requirements to check if the response should be awarded **ONE** mark.

Award **ONE** mark for describing one point on the curve:

- when the puppet is near(est) to the torch the shadow is big(gest);
- when the puppet is far(the)st from the torch the shadow is small(est);
- when the puppet is far(the)st from the screen the shadow is big(gest);
- when the puppet is near(est) to the screen the shadow is small(est).

**Do not** give **TWO** marks for simply describing two points on the curve.

1

[7]

4

(a) Award **ONE** mark for:

- the Sun;
- sunlight.

**Allow:**

- daylight.

**Do not** give credit for a response that includes incorrect science describing the use of artificial light sources [they would not produce a dark shadow on a sunny day]:

- spotlights.

**Do not** give credit for an insufficient response:

- the sky [this is the location of the source, not the source itself].

1(L3)

(b) Award **ONE** mark for:

- opaque.

1(L4)

(c) Award **ONE** mark for an indication that the shadow became shorter:

- the shadow kept getting shorter;
- it got shorter.

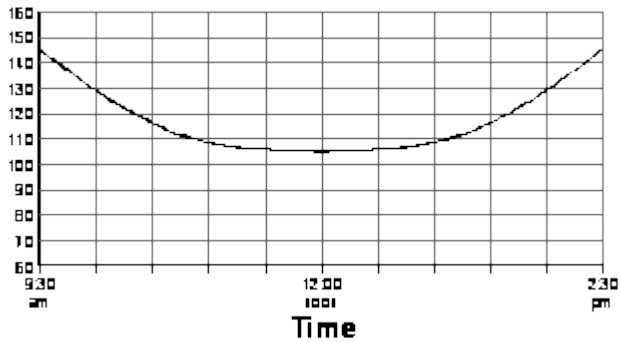
**Allow:**

- it was less long at lunchtime;
- it was longer at first.

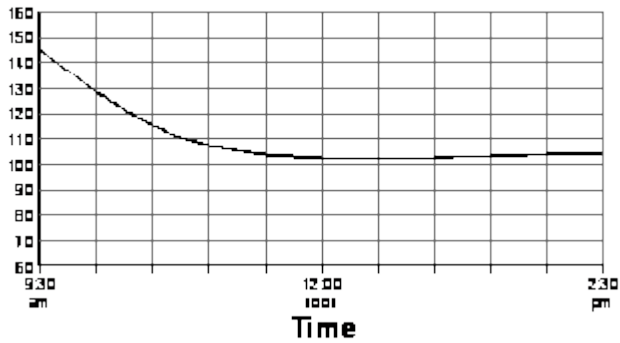
1(L3)

- (d) Award **ONE** mark for a graph with a minimum point of no lower than 95cm, occurring between noon and 1pm. Following the minimum point, the graph should go upwards to a maximum point of no more than 160cm and no less than 105cm.

**Minimum at noon**



**Minimum at 1pm**



*Do not give credit for an insufficient response where the line remains level or gets lower at any time after 1pm.*

1(L5)

[4]

5

(a) Award **ONE** mark for an awareness that light reflects off a shiny surface:

- the metal/crown reflects the light;
- light bounces on/off the metal/crown;
- it acts like a mirror.

**Allow:**

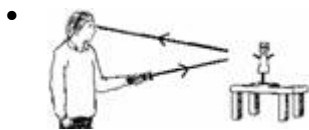
- light reflects on/off the metal/crown;
- it reflects/is a reflection;
- the light is scattering off the metal crown.

**Do not give credit for an insufficient response:**

- *because the metal/crown is shiny;*
- *because the light is shining on it [restatement of the stem];*
- *the light reflects on to the crown [implies light is reflected from another surface on to the crown but not off it again].*

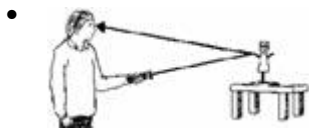
1(L4)

(b) Award **TWO** marks for **two** arrows showing the correct path [lines] and direction of light [arrowheads]. The arrows must point from the torch to the crown/puppet and from the crown/puppet to Emma's eyes/head:



**Allow:**

a response showing one continuous reflected arrow:



2(L5)

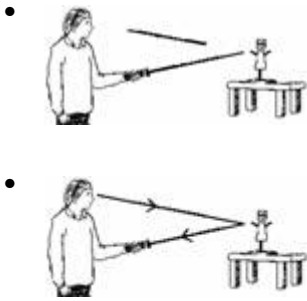
**or**

If you are unable to award two marks, award **ONE** mark for a response showing two lines (or one continuous reflected line) indicating the correct path:

OR

- a response showing **two** arrowheads pointing unambiguously in the correct directions:

### Correct lines



### Correct arrowheads



**Do not** give credit for an insufficient response showing only one correct arrow:



1

(c) Award **ONE** mark for an awareness that the puppet is made from materials that light cannot pass through. The response must make reference to blocked light or opacity:

- the (material of the) puppet is opaque;
- the light cannot pass through the puppet;
- the puppet stops/blocks the light;
- the light cannot get to the wall behind because the puppet is in the way;
- the light is blocked.


**Do not** give credit for an insufficient response that does not explain shadow formation:

- light goes round the puppet;
- light travels in straight lines;
- light cannot get past the puppet [it passes on either side];
- the puppet is solid [a solid object can be transparent];
- the puppet is in the way of the light [does not necessarily mean it is blocking the light];
- light cannot get behind the puppet;
- light cannot get to the wall [do not say why].

1(L4)



(d) Award **ONE** mark for:

	<input type="checkbox"/>	<input type="checkbox"/>
• 	<input checked="" type="checkbox"/>	<input type="checkbox"/>

1(L4)

[5]

6

(a) Award **ONE** mark for identifying the appropriate measuring equipment:

- ruler;
- metre rule;
- tape measure.

**ONE** mark may be awarded for:

- *measurement stick*;
- *metre stick*.

**Do not** give credit for an insufficient response which could not be used to quantify distance:

- *a piece of string*.

1(L4)

(b) Award **ONE** mark for:

•   cm

1(L4)

(c) Award **ONE** mark for identifying the independent variable (IV):

	<input type="checkbox"/>	<input type="checkbox"/>
•	<input type="checkbox"/>	position of the light <input checked="" type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>

1(L4)

(d) Award **ONE** mark for identifying the dependent variable (DV):

- shadow
- 

1(L4)

(e) Award **TWO** marks for **all three** ticks correctly placed:

- 
- position of the puppet
- position of the screen  size of the puppet

2(L4)

**or**

If you are unable to award two marks, award **ONE** mark for **any two** correct.

1

[6]

7

(a) Award **ONE** mark for:

- 
- Computer screen

1(L4)

(b) Award **ONE** mark for a description of the light level increasing:

- the light level increased;
- there was gradually more light;
- it got lighter/brighter.

**ONE** mark may be awarded for a response that may either refer to the graph or the light level:

- *it went up/got higher;*
- *it went up smoothly/evenly/steadily.*

**Do not** give credit for an insufficient response explicitly referring to the graph line going up rather than the light level:

- *the line went up.*

1(L4)

(c) Award **ONE** mark for a description of an event that could result in a sudden increase in the light level:

- a light was turned on;
- the Sun came out from behind a cloud;
- someone pulled the blind up;
- they moved a lamp next to the sensor.

**ONE** mark may be awarded for a response indicating that the sudden rise in the graph means the light has got brighter/there is more light, but with no description of what could have caused this:

- *light from the Sun made it brighter;*
- *the light suddenly increased;*
- *it became brighter (outside);*
- *more light came into the classroom.*

**Do not** give credit for an insufficient response which describes an event which would not necessarily result in a **sudden** increase in light:

- *the Sun shone through the windows;*
- *the Sun shone in a different direction;*
- *the Sun came up;*
- *the Sun moved.*

1(L5)

(d) Award **ONE** mark for **all three** sentences correctly classified:

- The light source is above the desk. **..True..**
- The light cannot pass through the desk. **..True..**
- There is a shadow underneath the desk. **..True..**

1(L4)

(e) Award **ONE** mark for:

- The sensor reading is lower when it is below the desk because the desk is **opaque**.

*Do not give credit for an insufficient response giving an alternative term for opaque:*

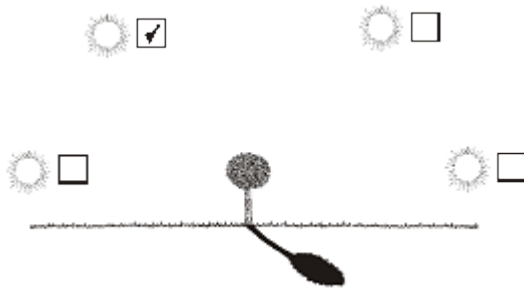
- *not see through.*

1(L4)

[5]

8

(a) Award **ONE** mark for:



1(L3)

(b) Award **ONE** mark for an awareness that light cannot pass through the tree. The response must make reference to the blocked light or opacity:

- the tree is opaque
- the light cannot pass through the tree
- the tree stops/blocks the light
- the light is blocked.

*Do not give credit for an insufficient response that does not necessarily explain shadow formation:*

- *the light goes round the tree*
- *light travels in straight lines*
- *the light cannot get past the tree [it passes on either side]*
- *the tree is solid [a solid object can be transparent]*
- *the tree is in the way of the light [does not necessarily mean it is blocking the light]*
- *light cannot get behind the tree*
- *the sun cannot get through the tree [does not refer to light].*

1(L4)

(c) Award **ONE** mark for:

- The Earth spins on its axis
- 

1(L4)

(d) Award **ONE** mark for an indication that the Sun has set:

- the Sun has set
- it is night (time)
- the Earth has rotated and now the Sun is below the horizon.

**ONE** mark may be awarded for:

- *the Sun has gone down/in*
- *there is a cloud in front of the Sun*
- *there is no Sun shining*
- *shadows only form when there is light*
- *it is too dark (for a shadow to form)*
- *there is no light (to form a shadow).*

**Do not** give credit for a response that includes incorrect science indicating explicitly that the Sun moves or has disappeared:

- *the Sun has moved away*
- *there is no Sun.*

**Do not** give credit for an insufficient response:

- *the Earth has spun/rotated around [it may have spun completely around]*
- *the Moon is out*
- *it was too late.*

1(L4)

(e) Award **ONE** mark for any time between 12.45 pm and 1.15 pm inclusive:

- *1 pm*

**One** mark may be awarded for a correct response that does not agree with the 'pm' units:

- *13:10 [given in 24-hour time]*
- *1 o'clock.*

1(L5)

[5]

9

(a) Award **ONE** mark for an indication that a shadow is formed because the pole is opaque/blocks the light:

- because it is opaque
- the (sun)light cannot pass through the pole
- the pole stops /blocks the light.

**ONE** mark may be awarded for:

- *the light is blocked.*

**Do not** give credit for an insufficient response that does not fully explain shadow formation:

- *light goes round the pole*
- *light travels in straight lines*
- *light cannot get past the pole [it passes on either side]*
- *the pole is solid [a solid object can be transparent]*
- *the pole is in the way of the light*
- *light cannot get to the playground behind the pole [does not explain why].*

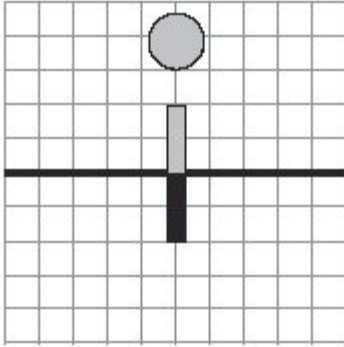
**Do not** give credit for an insufficient response saying the pole blocks the Sun without an indication of light:

- *the pole blocks the Sun/Sun's rays/sunshine*
- *it blocks the Sun's path.*

1(L4)

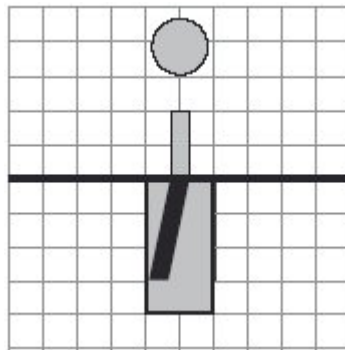
- (b) Award **ONE** mark for a vertical shadow starting at the base of the pole that is four grid squares long or shorter:

•



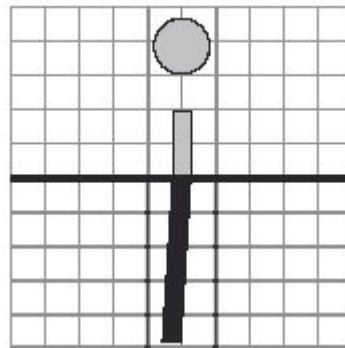
**ONE** mark may be awarded for a straight line shadow that falls within the shaded area under the pole as indicated below:

•



**Do not** give credit for a straight line shadow that falls entirely between the grid lines indicated, but extends beyond four grid squares:

•



1(L5)

(c) Award **ONE** mark for:

- the Earth spinning

1(L5)

(d) Award **ONE** mark for:

- the Moon orbiting the Earth

1(L3)

(e) Award **ONE** mark for an indication that the tennis ball should be moved around the football:

- the football is still while the tennis ball goes around it
- the tennis ball orbits the football.

**ONE** mark may be awarded for:

- *the Earth goes around the Sun*
- *the football is still while the Earth goes around.*

**ONE** mark may be awarded for a response describing the Earth /tennis ball spinning as it orbits the Sun /football:

- *the tennis ball must go around the football, spinning as it goes.*

**Do not** give credit for an insufficient response:

- *they must run around each other*
- *move them slowly.*

1(L5)

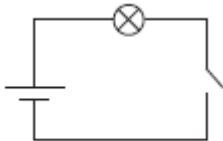
[5]



10

(a) (i) Award **TWO** marks for all of the components present and correctly drawn:

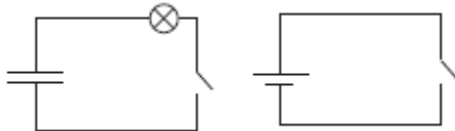
•



2

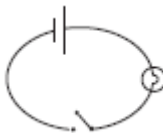
**or** If you are unable to award two marks, award **ONE** mark for a circuit which contains one error or omission in the drawing of the symbols:

•



**TWO** marks may still be awarded if obsolete symbols **or** a non-rectilinear circuit are used:

•

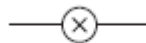


**Do not** give credit for a response that includes incorrect science where a bulb or switch has been incorrectly drawn:

•



•

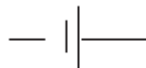


•



**Do not** give credit for a response that includes incorrect science with gaps between the wires and components of more than 2 mm:

•



1

(ii) Award **ONE** mark for an indication of a cell or a battery.

**Do not** give credit for a response that includes incorrect science:

- a bulb.

1

(b) Award **ONE** mark for an explanation that jacket B reflects more light than jacket A:

- Jacket B reflects light better than jacket A
- Jacket A is not such a good reflector of light as jacket B.

**Give credit** for a correct response that goes beyond the key stage 2 programme of study:

- Jacket A absorbs more light than jacket B.

**ONE** mark may be awarded for an absolute response:

- jacket B reflects the light
- it reflects (light)
- light bounces off jacket B
- light reflects on jacket B.

**Do not** give credit for a response that includes incorrect science:

- jacket B reflects light but jacket A does not
- jacket B makes more light.

**Do not** give credit for an insufficient response:

- light reflects onto jacket B
- jacket B is a lighter colour
- jacket A is darker.

1

- (c) Award **TWO** marks for **two** lines and **two** arrowheads showing the correct path and direction of light. Award the marks as indicated below:

Award **ONE** mark for **two** lines (with or without correct arrowheads) showing the correct path of light. The lines must go from between Julia's hands on her bike to the mirror and then to the car windscreen:

- 



(1 mark - lines)

1

**ONE** mark may be awarded for **one** continuous line even where the arrowhead is incorrect:

- 



(1 mark - line)

**Do not** give credit for an insufficient response where the direction of travel is shown only by one arrow:

- 



Award **ONE** mark for **two** arrowheads accurately showing the direction of light. The arrows must go from between Julia's hands on her bike to the mirror and then to the car windscreen:

- 



(1 mark - lines and 1 mark - arrowheads)

- 



(1 mark - arrowheads)

**ONE** mark may be awarded for just **one** correct arrowhead on a continuous line:



(1 mark - line and 1 mark arrowhead)

**Do not** give credit for an insufficient response where only one line is drawn:



[6]

11

(a) Award **TWO** marks for **both** correct boxes ticked:



2(L3)

**or**

If you are unable to award two marks, award **ONE** mark for **any one** correct box ticked.

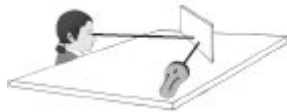
1(L3)

(b) Award **ONE** mark for:

- 
- glass jar

1(L4)

(c) (i) Award **ONE** mark for **two** lines (with or without the correct arrowheads) showing the correct path of light. The lines must go from the torch to the mirror and from the mirror to Sanna's eyes (between tip of nose and hairline on forehead):



[1 mark]

**ONE** mark may be awarded for one continuous line even where the arrowhead is incorrect:



[1 mark]

**Do not** give credit for an insufficient response where the direction of travel is shown only by one non-reflected arrow:



1(L5)

- (ii) Award **ONE** mark for **two** arrowheads showing the direction of light travel from the torch to the mirror and from the mirror to Sanna's eyes (between tip of nose and hairline on forehead):

•



[1 mark]

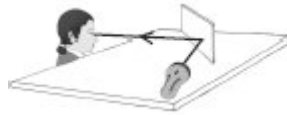
•



[1 mark]

**ONE** mark may be awarded for **one** correct arrowhead together with **ONE** mark for a continuous line:

•



[2 marks]

1(L5)

[5]