Cambridge Assessment International Education

Interactive

Interactive Example Candidate Responses

Paper 6 (May / June 2016), Question 3

Cambridge IGCSE™
Physics 0625

Version 2.0

Cambridge Pathway

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3 A student is investigating the magnification of images produced by a lens.

The apparatus is shown in Fig. 3.1.

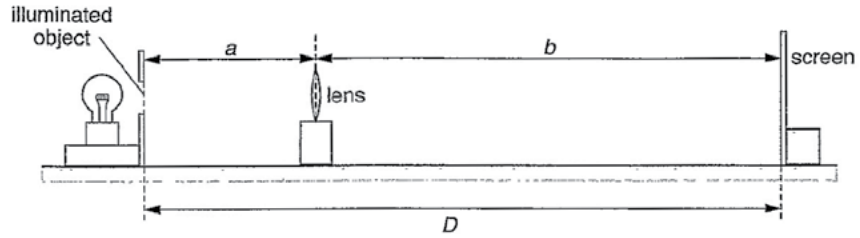

Fig. 3.1

The student places a screen at a distance $D = 80.0\,\text{cm}$ from an illuminated object. The screen and the illuminated object remain in the same positions throughout the experiment.

(a) She places the lens close to the illuminated object. She moves the lens until she sees a sharply focused, **enlarged** image of the object on the screen.

She measures the distance a from the illuminated object to the centre of the lens.

$a =$ 20.3 cm

She measures the distance b from the centre of the lens to the screen.

$b =$ 59.7 cm

Calculate the magnification m_1 of the image, using the equation $m_1 = \frac{b}{a}$.

$m_1 =$ 2.94 [1]

Select page

HIGH | MIDDLE | LOW

Your Mark

3(a)

3(b)

3(c)

3(d)

3(e)

Q3	Mark scheme
(a)	$m_1 = 2.94$
(b)	($m_2 = 0.329$ OR 0.33) m_1 and m_2 to 2 or 3 significant figures only AND both m with no unit (accept ×)
(c)	Statement, expect YES. Must match results. e.c.f .allowed Justification to include idea of within (or beyond) limits of (experimental) accuracy
(d)	Any two from: • Use of darkened room/brighter lamp/no other lights • Mark position of centre of lens on holder • Place metre rule on bench (or clamp in position) • Ensure object and centre of lens are same height from the bench • Move lens slowly/to and fro (when focusing) • Lens, object, screen vertical/perpendicular to bench • Repeat with different D • Use of graph paper/cm scale on screen to measure image
(e)	image appears well focused over a (small) range of lens positions/not all of image focused at same time/relevant reference to chromatic aberration

EXAMINER COMMENTS

MARK SCHEME

(b) The student then moves the lens towards the screen until a **smaller**, sharply focused image of the object is seen on the screen.

She measures the distance x from the illuminated object to the centre of the lens.

$x =$ 60.2 cm

She measures the distance y from the centre of the lens to the screen.

$y =$ 19.8 cm

Calculate the magnification m_2 of the image, using the equation $m_2 = \frac{y}{x}$.

$m_2 =$ 0.329 [1]

(c) A student suggests that $m_1 \times m_2$ should equal 1.

State whether the results support this suggestion. Justify your answer by reference to the results.

statement Yes

justification $m_1 \times m_2 = 0.967 < 1$, but the result is within the limit of experimental accuracy.

[2]

(d) State two precautions that you would take in this experiment to obtain reliable results.

1. Keep the object, lens and screen at the same height.

2. Do the experiment in a dark room.

[2]

(e) Suggest one reason why it is difficult, in this type of experiment, to decide on the best position of the lens to obtain a sharply focused image on the screen.

It is hard to find the best sharply focused image because of the small difference between images.

[1]

[Total: 7]

Select page

HIGH MIDDLE LOW

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3(a)	
3(b)	
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3(e)	

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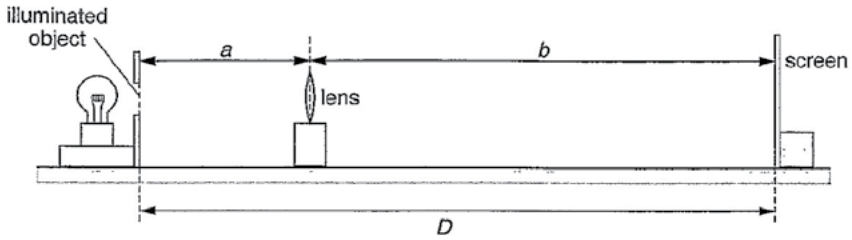

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(a) She places the lens close to the illuminated object. She moves the lens until she sees a sharply focused, **enlarged** image of the object on the screen.

She measures the distance a from the illuminated object to the centre of the lens.

$a =$ 20.3 cm

She measures the distance b from the centre of the lens to the screen.

$b =$ 59.7 cm

Calculate the magnification m_1 of the image, using the equation $m_1 = \frac{b}{a}$.

$m_1 =$ 2.94 [1]

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EXAMINER COMMENTS

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(b) The student then moves the lens towards the screen until a **smaller**, sharply focused image of the object is seen on the screen.

She measures the distance x from the illuminated object to the centre of the lens.

$x =$ 60.2 cm

She measures the distance y from the centre of the lens to the screen.

$y =$ 19.8 cm

Calculate the magnification m_2 of the image, using the equation $m_2 = \frac{y}{x}$.

$m_2 =$ 0.33 [1]

(c) A student suggests that $m_1 \times m_2$ should equal 1.

State whether the results support this suggestion. Justify your answer by reference to the results.

statement the magnification of the image is ~~the same~~ not the same

justification The magnification wouldn't be the same ~~no matter where~~ the len is placed because it can change according to where the lens is placed 2.94 x 0.33 = 0.97 [2]

(d) State two precautions that you would take in this experiment to obtain reliable results.

1. adjust the lens back and forth until it show clear and sharp image

2. make the experiment in a dark room.

[2]

(e) Suggest one reason why it is difficult, in this type of experiment, to decide on the best position of the lens to obtain a sharply focused image on the screen.

Because the size of the object also make the experiment difficult [1]

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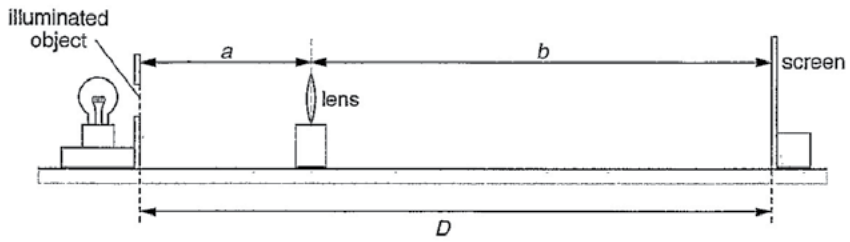

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(a) She places the lens close to the illuminated object. She moves the lens until she sees a sharply focused, **enlarged** image of the object on the screen.

She measures the distance *a* from the illuminated object to the centre of the lens.

$a =$ 20.3 cm

She measures the distance *b* from the centre of the lens to the screen.

$b =$ 59.7 cm

Calculate the magnification m_1 of the image, using the equation $m_1 = \frac{b}{a}$.

$m_1 =$ x 1.94 [1]

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She measures the distance x from the illuminated object to the centre of the lens.

$x =$ 60.2 cm

She measures the distance y from the centre of the lens to the screen.

$y =$ 19.8 cm

Calculate the magnification m_2 of the image, using the equation $m_2 = \frac{y}{x}$.

$m_2 =$ X 0·3 [1]

(c) A student suggests that $m_1 \times m_2$ should equal 1.

State whether the results support this suggestion. Justify your answer by reference to the results.

statement NO

justification It is because the distance from the centre of lens and from illuminated object is vice versa in the two experiments therefore magnifications are also different.

[2]

(d) State two precautions that you would take in this experiment to obtain reliable results.

1. Use a bright light bulb so that image formed can be clearer.

2. Carry out this experiment in a dark room with no other light.

[2]

(e) Suggest one reason why it is difficult, in this type of experiment, to decide on the best position of the lens to obtain a sharply focused image on the screen.

It is because the lens is adjusted by hand.

[1]

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EXAMINER COMMENTS

MARK SCHEME

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