

Name of the Student: _____

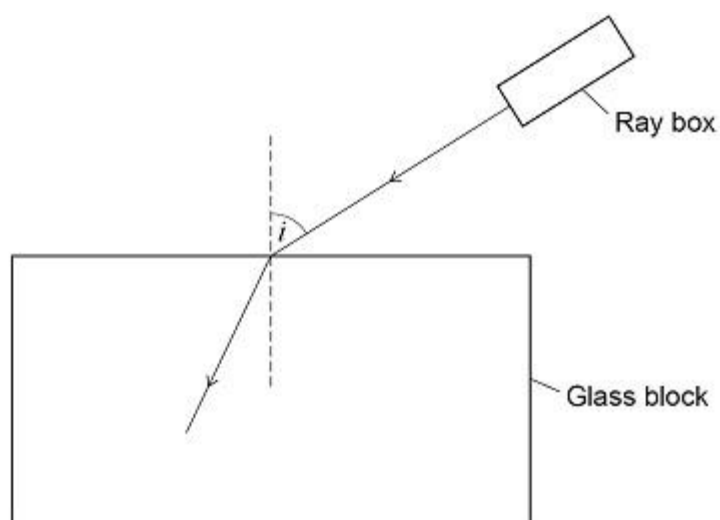
Max. Marks : 19 Marks

Time : 19 Minutes

Q1.

A student used a ray box and glass block to investigate refraction of light.

The figure below shows a ray of light entering the glass block.



- (a) In the figure, the angle of incidence is labelled with the letter i .

Label the angle of refraction in the figure with the letter r .

(1)

- (b) Measure the angle of incidence in the figure above.

Angle of incidence = _____°

(1)

- (c) Complete the figure above to show the path taken by the ray of light through the glass block and out into the air.

(3)

- (d) Complete the sentence.

Choose an answer from the box.

random	systematic	zero
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The student repeated the measurement three times and calculated the mean to

reduce the effect of _____ errors.

The following table shows the student's values for the angles of incidence and the mean angles of refraction.

Angle of incidence in degrees	Mean angle of refraction in degrees
20	13
30	19
40	X
50	31

- (e) For an angle of incidence of 40° the three measurements for the angle of refraction were:

23° 27° 25°

Calculate the value of X in the table above.

X = _____ $^\circ$

(1)

- (f) Complete the sentence.

Choose the answer from the box.

equal to	greater than	less than
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The student used the data in the table above and correctly concluded that the angle of refraction is _____ the angle of incidence used.

(1)

- (g) Why is the student's conclusion only valid for angles of incidence between 20° and 50° ?

(1)

- (h) The student repeated the investigation using a transparent plastic block.

Why did the student use a transparent block and not an opaque block?

(1)

- (i) The student wanted to compare the refraction caused by the plastic with the refraction caused by the glass.

What must the student keep the same for both the plastic block and the glass block?

Tick (✓) **one** box.

The angles of incidence tested ☐

The angles of refraction tested ☐

The number of results recorded ☐

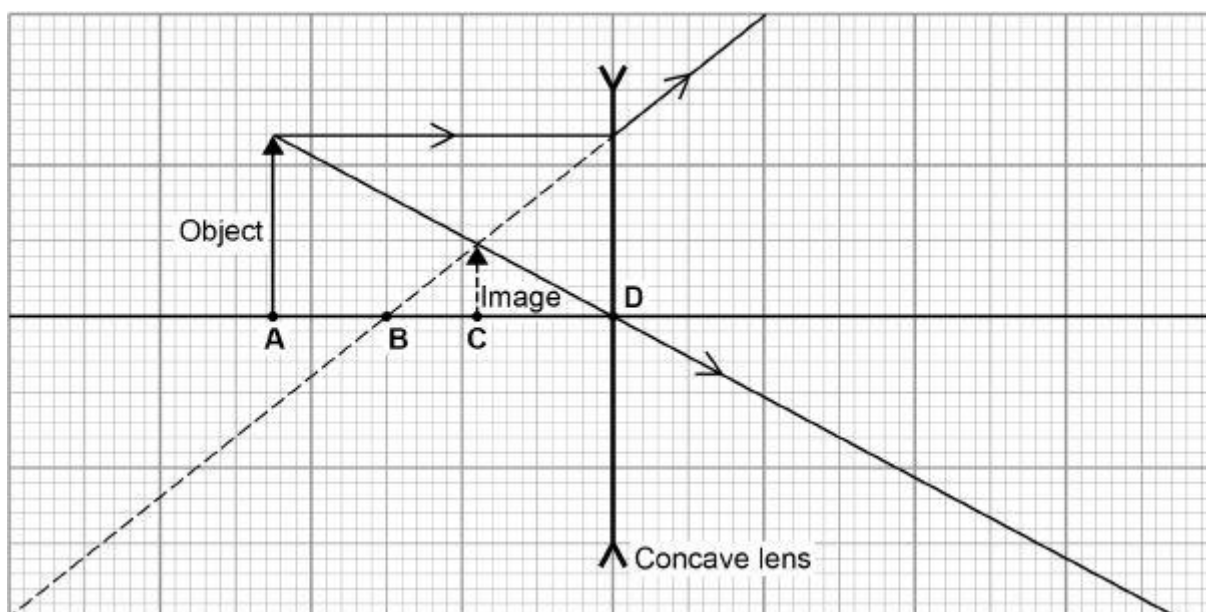
The size of the two blocks ☐

(1)

(Total 11 marks)

Q2.

The graph shows how a concave lens forms an image of an object.



- (a) Which point on the graph above marks the position of the principal focus of the lens?

Tick **one** box.

A ☐ B ☐ C ☐ D ☐

(1)

- (b) Which **two** words describe the image?

Tick **two** boxes.

Enlarged	☐
Inverted	☐
Real	☐
Upright	☐
Virtual	☐

(2)

- (c) Calculate the magnification produced by the lens.

Use the equation:

$$\text{magnification} = \frac{\text{image height}}{\text{object height}}$$

Magnification = _____

(4)

- (d) Complete the sentence.

Choose an answer from the box.

decrease	increase	not change
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As the object is moved further away from the lens, the size of the image will _____.

(1)

(Total 8 marks)