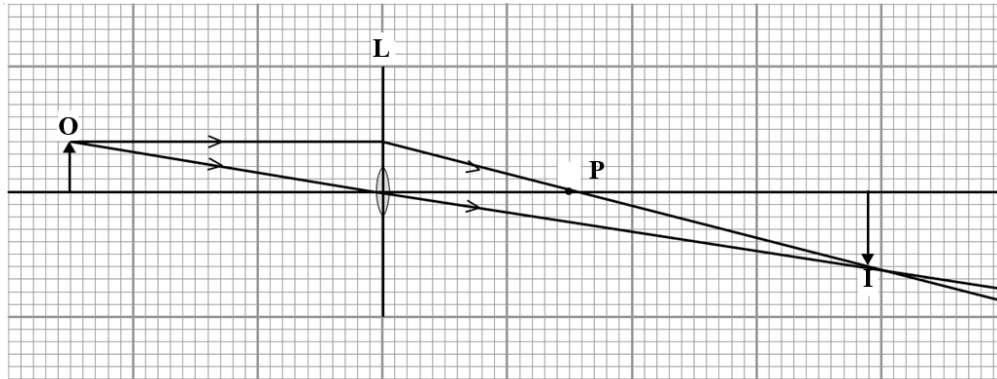


LENSES AND RAY DIAGRAM

Q1. The ray diagram shows the position and size of the image, I, of an object, O, formed by a lens, L.



(a) What type of lens is shown in the ray diagram?

(1 mark)

(b) Name the point labelled P.

(1 mark)

(c) The ray diagram has been drawn to scale.

Use the equation in the box to calculate the magnification.

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

Show clearly how you work out your answer

Magnification = _____

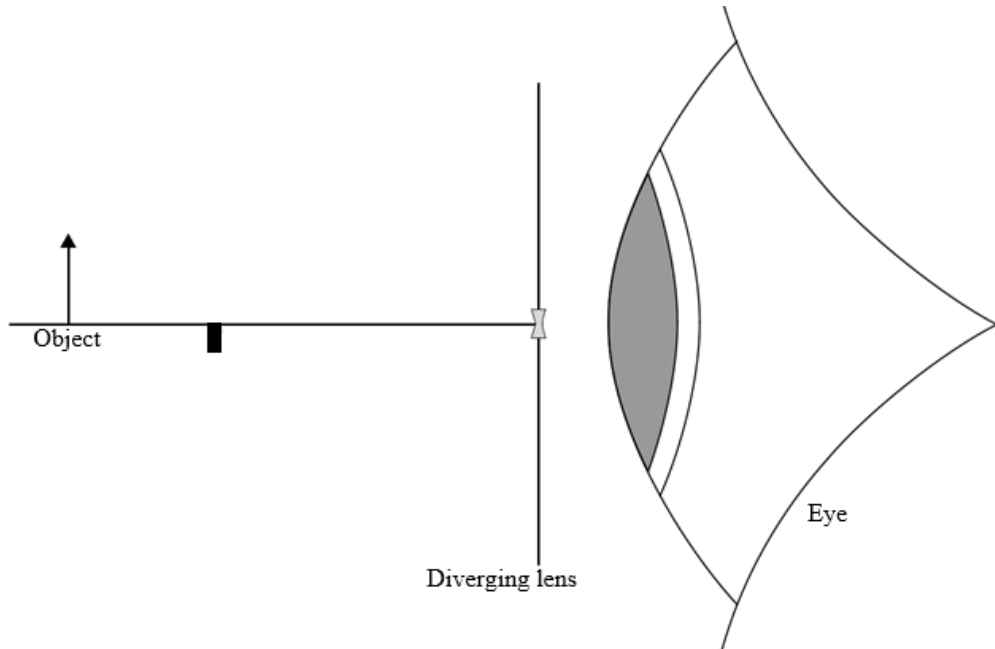
(2 marks)

(d) How can you tell from this ray diagram that the image is a real image?

(1 mark)

Q2. The diagram shows an object located vertically on the principal axis of a diverging lens. A student looks through the lens and can see an image of the object.

(a) Using a pencil and ruler to draw construction lines on the diagram, show how light from the object enters the student's eye and the size and position of the image



(3 marks)

(b) Describe the nature of the image by comparing it to the object.

(2 marks)

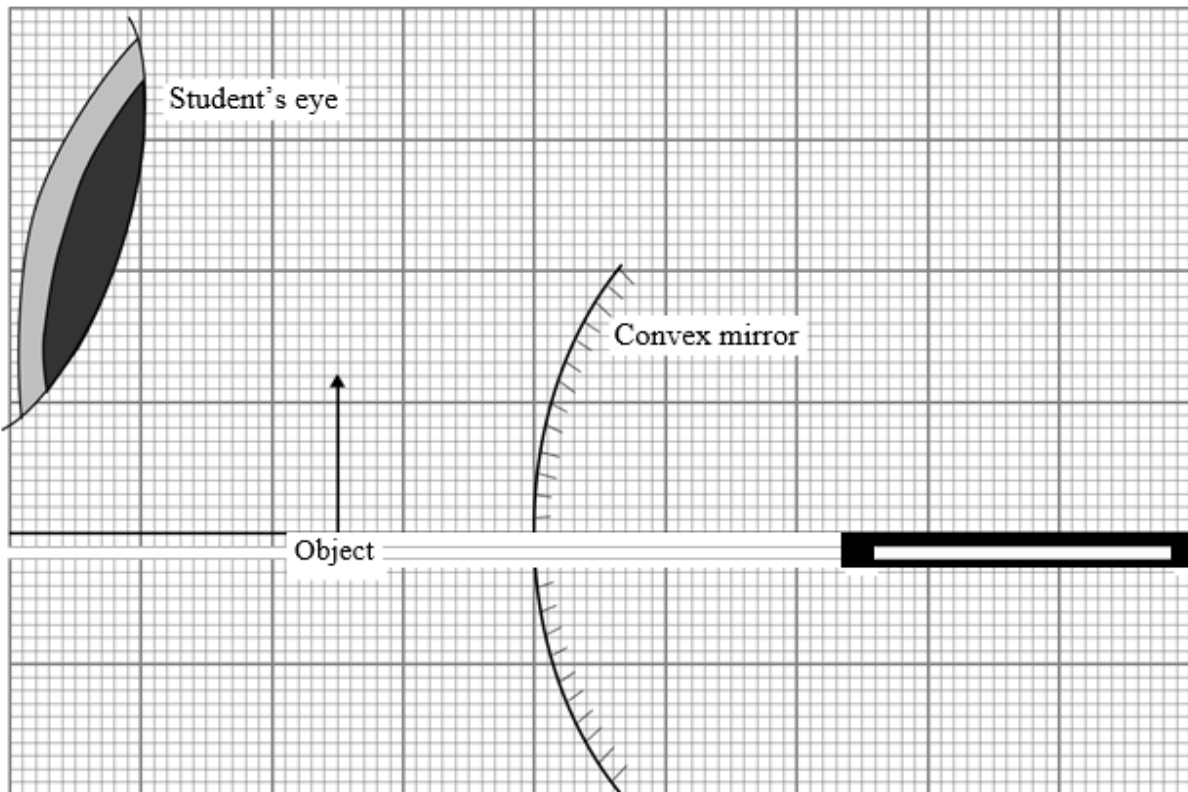
Q3. A student investigates the formation of images by a convex mirror.

In the mirror, she can see the image of an object placed in front of the mirror.

In the diagram, F is the principal focus of the mirror and C is the centre of curvature of the mirror.

(a) On the diagram, use a ruler to draw two rays from the top of the object which show the position of the image and how the student sees the image.

Mark the direction of the rays at each stage



(4 marks)

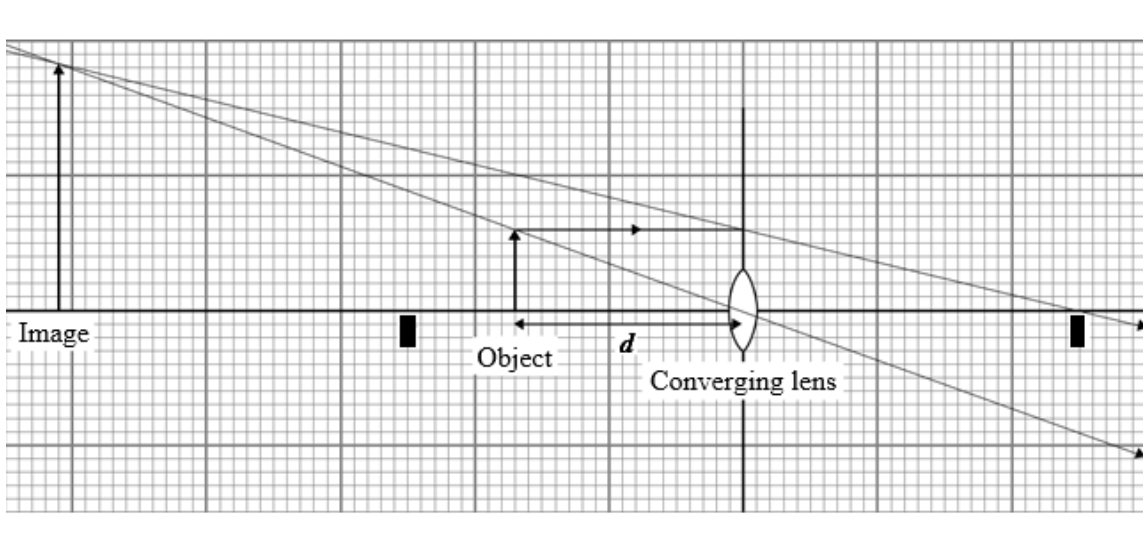
(b) The image is a virtual image.

How can you tell from the rays you have drawn on the diagram that the image is a virtual image?

(1 mark)

Q4. A student investigates how the magnification of an object changes at different distances from a converging lens.

The diagram shows an object at distance d from a converging lens.



(a)(i) The height of the object and the height of its image are drawn to scale.

Use the equation in the box to calculate the magnification produced by the lens shown in the diagram.

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

Show clearly how you work out your answer

Magnification = _____

(2 marks)

(a) (ii) The points F are at equal distances on either side of the centre of the lens.

State the name of these points.

(1 marks)

(a)(iii) Explain how you can tell, from the diagram, that the image is virtual.

(1 mark)

(b) The student now uses a different converging lens. He places the object between the lens and point F on the left.

The table shows the set of results that he gets for the distance d and for the magnification produced.

Distance d measured in cm	Magnification
5	1.2
10	1.5
15	2.0
20	3.0
25	6.0

His friend looks at the table and observes that when the distance doubles from 10 cm to 20 cm, the magnification doubles from 1.5 to 3.0.

His friend's conclusion is that:

The magnification is directly proportional to the distance of the object from the lens.

His friend's observation is correct but his friend's conclusion is **not** correct.

(b)(i) Explain, with an example, why his friend's conclusion is not correct.

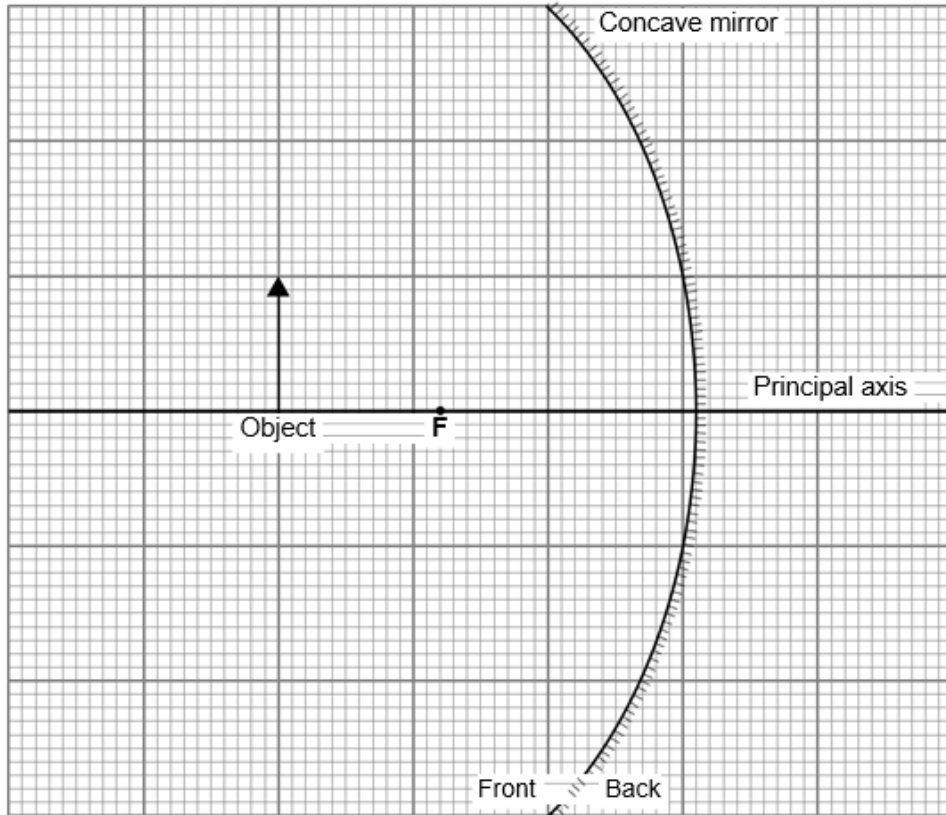
(2 marks)

(b)(ii) Write a correct conclusion.

(1 mark)

Q5. The diagram shows an object in front of a concave mirror. Complete the diagram to show the position of the image.

Complete the diagram to show the position of the image.



(3 marks)

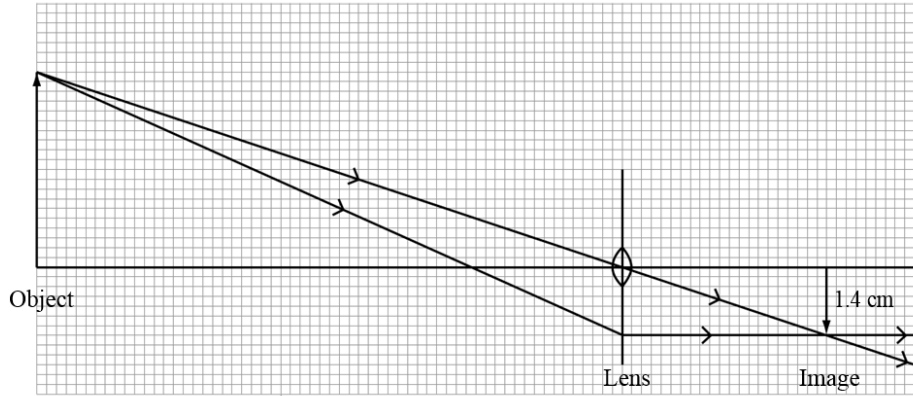
Q6. A camera uses a lens to produce an image which falls on a light detector



(a) Name a light detecting device which may be used in a camera.

(1 mark)

(b) The diagram shows the position of an image formed in a camera.



(i) What type of lens is shown in the diagram?

(1 mark)

(ii) Use the equation in the box to calculate the magnification.

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

Show clearly how you work out your answer.

Magnification =

(2 marks)

(c) Why does the image formed in a camera have to be a real image?

(1 mark)

Q7. In the diagram below, a frog sits on a rock in a pond.

(a) Complete the following sentences by drawing a ring around the correct line in the box.

(i) The frog can see its image in the pond because the surface of the pond acts

like a

Concave
convex
plane

 mirror.

(1 mark)

(ii) Draw a ring around each of two words from the box below to describe the image in the pond.

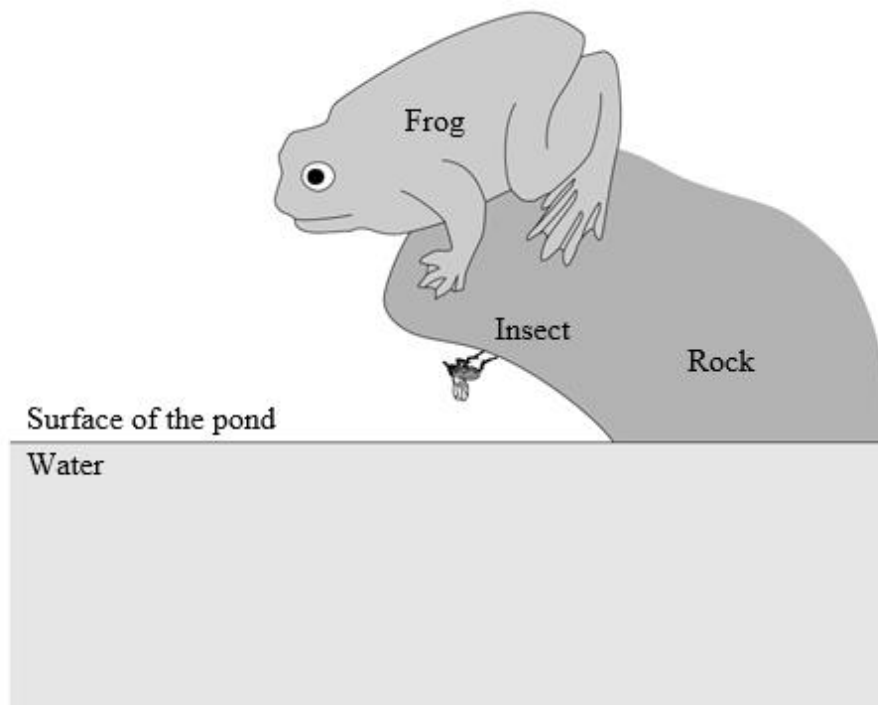
Bigger	inverted	real	smaller	upright	virtual
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(2 marks)

(b) There is an insect underneath the rock.

Use a ruler to draw rays of light on the diagram to show how the frog uses reflection to see the insect.

Mark the direction of the rays.



(3marks)

Total Marks 36 marks