

NAME  
SCHOOL

INDEX NUMBER  
DATE

## THIN LENSES

1. 1995Q3b P2

An object placed in front of a convex lens of focal length 10 cm produces an image at a distance of 15 cm from the lens and on the same sides as the object

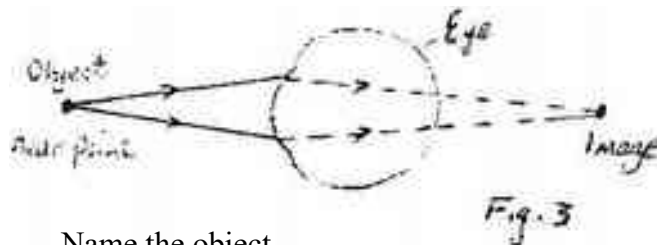
Determine the position of the object (4 marks)

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2. 1995 Q4 P2

(a) Draw a ray diagram to show how a convex lens works as a magnifying glass (5 marks)

(b) The diagram in **figure 3** shows a certain eye defect



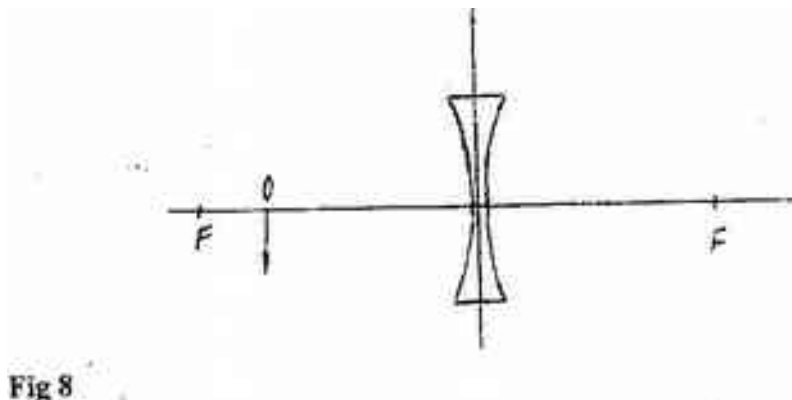
(i) Name the object

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(ii) Draw on the same diagram an arrangement to correct the defect (1 mark)

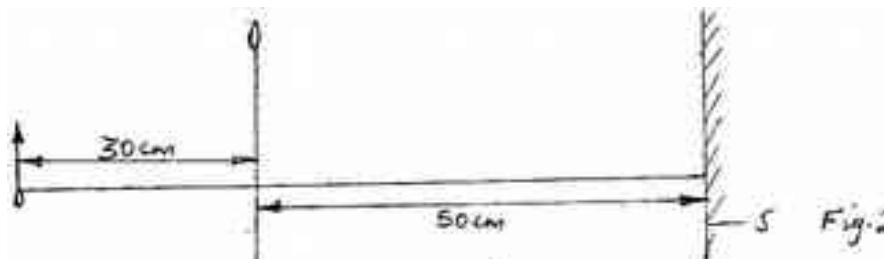
3. 1996 Q38 P1

Figure 8 shows an object O placed in front of a concave lens with principal foci F and F. Construct a ray diagram to locate the position of the image (3 marks)



4. 1998 Q6 P1

Figure 2 drawn to scale shows a lens L1 placed 30cm from an object O. The image is formed on the screen S 50cm from the lens.

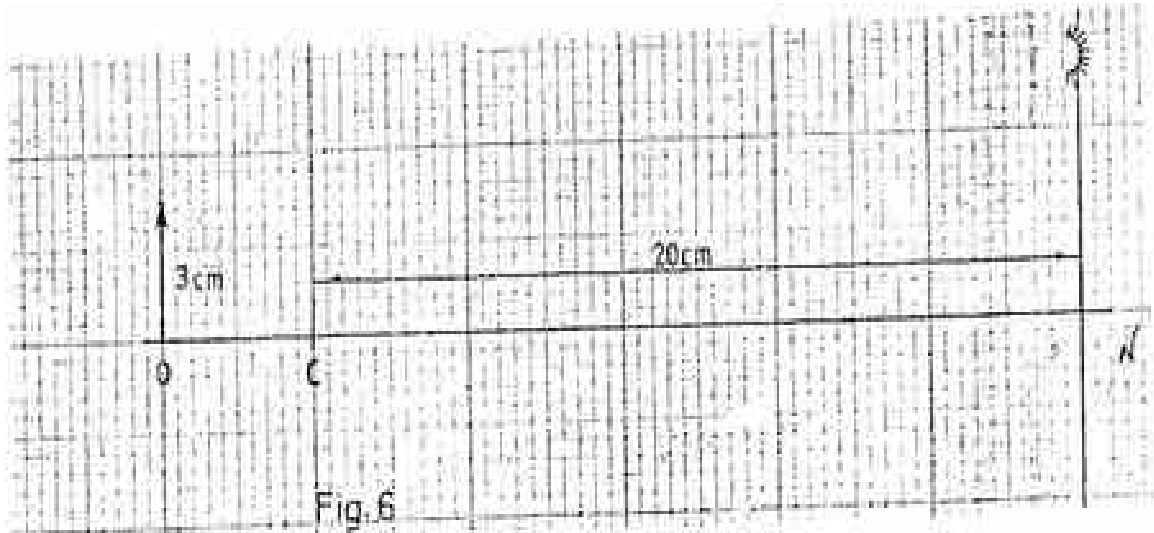


Sketch a diagram to show the position of an object, when a converging lens is used as an magnifying glass.

5. 1998 Q7 P2

- a) **Fig. 6** shows an object, 0.3cm high placed in front of a concave mirror. C is the centre of curvature of the mirror. The diagram is drawn to scale: (1cm: 2cm)

Draw a ray diagram, on **figure 6**, and determine the size of the image produced.



- b) **Table 3** shows the object distance  $u$  and the corresponding image distance  $v$ , for an object placed in front of a concave mirror.

U(cm)	20	25	30	40	50	70
V(cm)	20	16.7	15	13.3	12.0	11.6
$1/v(\text{cm}^{-1})$						
$V(\text{cm}^{-1})$						

**Table 3**

- i) Complete the table and plot a graph of  $1/v$  (y-axis) against  $1/u$  (give your answers to 3 decimal places).
- ii) From the graph, determine the focal length of the mirror.

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7. 1999 Q32 Q1

Sketch a diagram to show the position of an object, when a converging lens is used as an magnifying glass.

8. 1999 Q2 P2

a) An object O placed in front of a converging lens  $L_o$  forms an image I on the other side of the lens. Another converging lens  $L_c$  placed such that the two lenses form a compound microscope.

i) Draw a diagram of the set up and sketch the rays to show how the final image is formed.

ii) Give a reason why the focal length of  $L_o$  must be greater than that of  $L_c$ .

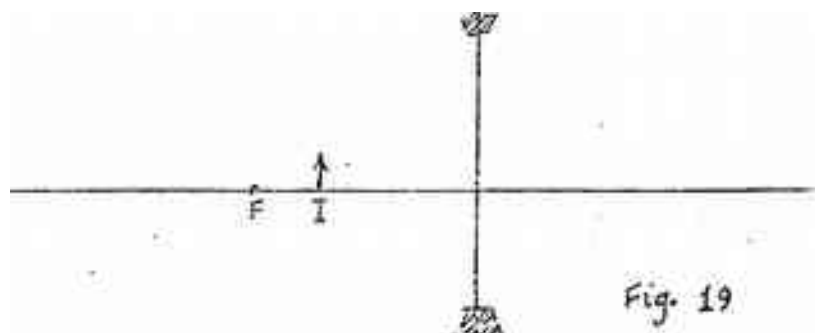
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b) An object is placed 30cm from a converging lens. A focused image is formed on a screen placed 30cm from the same lens on the other side. The screen is now moved 5cm towards the lens. Determine the distance the object must be moved so that a focused image is formed on the screen.

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9. 2000 Q31,32 P1

31. Fig (19) drawn to scale) shows the image, I, formed by a diverging lens. F is principal focus of the lens.



By drawing the appropriate rays on the same diagram, locate the position of the object.

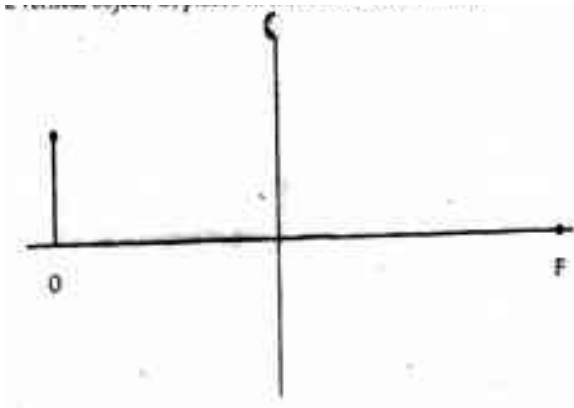
An armature composed of turns of insulated copper wire wound on laminated soft – iron core is rotated in a magnetic field to generate an e.m.f. Use this information to answer questions 32.

32. State two factors other than the speed of rotation that affect the magnitude of e.m.f generated

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10. 2002 Q28 P1

Fig. 13 represents an object O placed 10cm in front of a diverging lens is the focal point of the lens.



Draw rays to locate the position of the image. Determine the image distance.

11. 2003 Q16 P1

Figure 10 (draw to scale) shows an image I formed by a diverging lens, L.

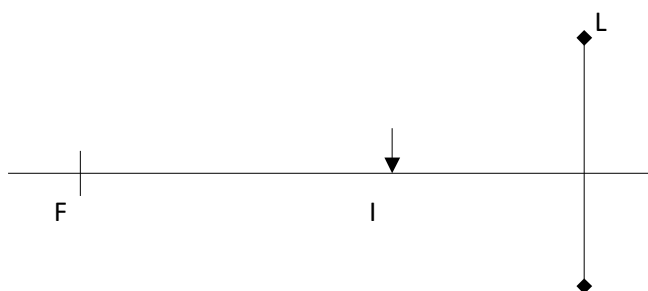


Fig 10

On the same diagram, draw appropriate rays to locate the position of object. Determine the object distance.

12. 2003 Q7 P2

- a) Fig. 8. shows an experimental set up consisting of a mounted lens. L, a screen, s, a meter rule and a candle.

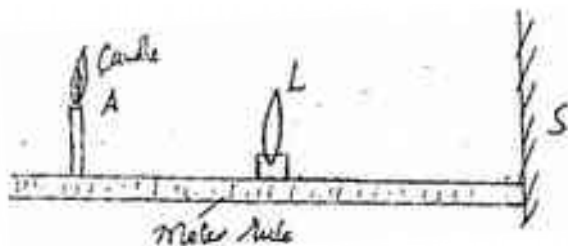


Figure 8

- (i) Describe how the set-up may be used to determine the focal length,  $f$ , of the lens.

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- (ii) State the reason why the set-up would not work if the lens were replaced with a diverging lens.

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- (b) The graph in **figure 9**. shows the relationship between  $1/u$  and  $1/v$  for converging lens where  $u$  and  $v$  are the object and image distances respectively.

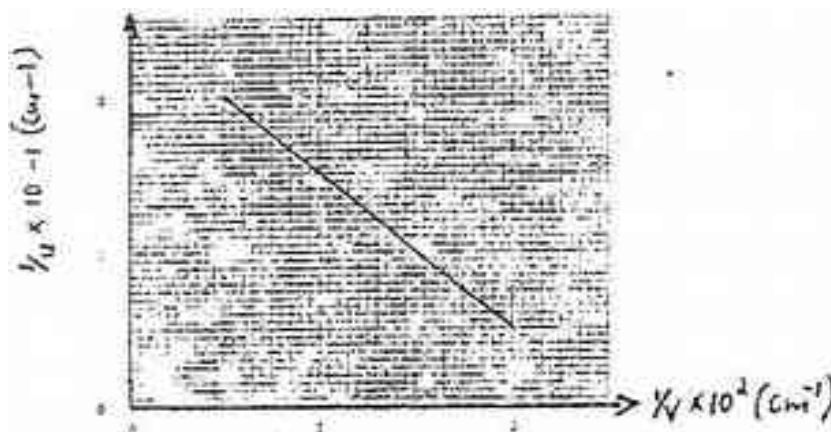


Figure 9

For the graph, determine the focal length,  $f$  of lens.

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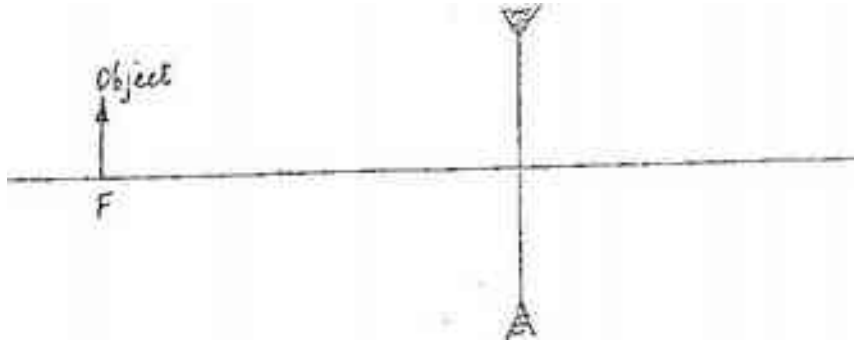
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 (c) An object placed 15cm from a convex lens is magnified two times.  
 Determine the focal length of the lens.

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**13. 2004 Q31 P1**

A vertical object is placed at the focal point F of a diverging lens as shown in Figure 16.



Sketch a ray diagram to show the image of the object.

**14. 2005 Q30 P1**

An illuminated vertical object is initially placed on the principal axis of a converging lens and 32cm from it. The focal length of the lens 15cm. The object is now placed at a point 12cm from the lens and on the same side. State two changes other than magnification that are observed on the image formed due to this change.

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**15. 2005 Q1P2**

- a) Describe with aid of a labeled diagram an experiment to determine the focal length of the lens when provided with the following; an illuminated object, convex lens, a lens, a lens holder, a plane mirror and a metre rule.

(5marks)

- b) A small vertical object is placed 28cm in front of a convex lens of focal length 12cm. On the grid provided, draw a ray diagram to locate the image. The lens position is shown.

(Use a scale; 1cm rep re 4cm)

(5marks)

Determine the image distance.

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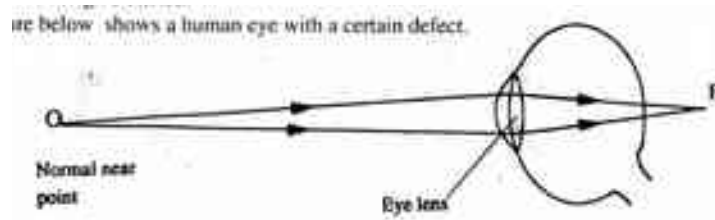
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- c) Fig 1 shows a human eye with a certain defect



- (i) Name the defect

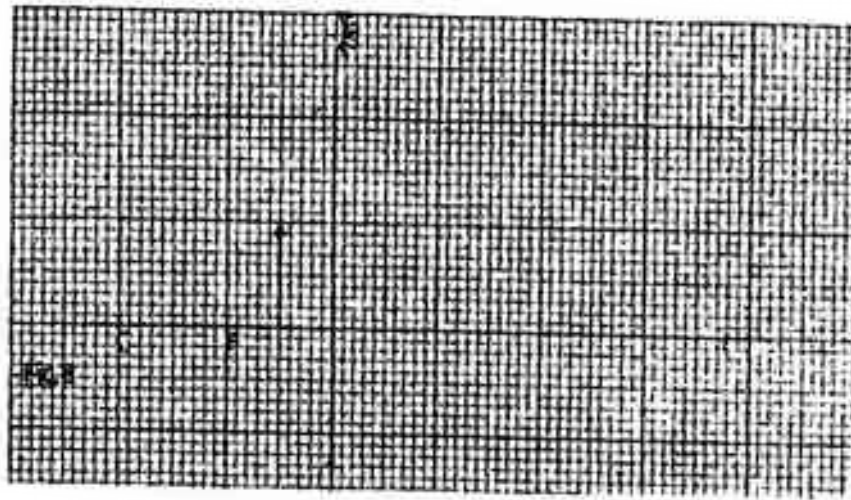
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- (ii) On the same diagram, sketch the appropriate lens to correct the defect and sketch rays to show the effect of the lens. (2marks)



16. 2006 Q18 P2

(a) **Figure 8** shows an object placed in front of a concave mirror of focal length 10cm. C is the centre of curvature.



**Figure 8**

(i) On the same figure draw a ray diagram showing the location of the image (4 marks)

Use the ray diagram drawn in (i) above to determine the

(ii) Image distance (2 marks)

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(iii) Magnification (2 marks)

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(b) A vertical object is placed 20cm in front of a convex lens of focal length 5 cm

(i) Determine  
I. The image distance (3 marks)

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II. The magnification (2 marks)

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(ii) State two characteristics of the image (2 marks)

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17. 2007 Q4 P2

Figure 3 shows an object, O in front of a concave mirror and its image, I formed after reflection.

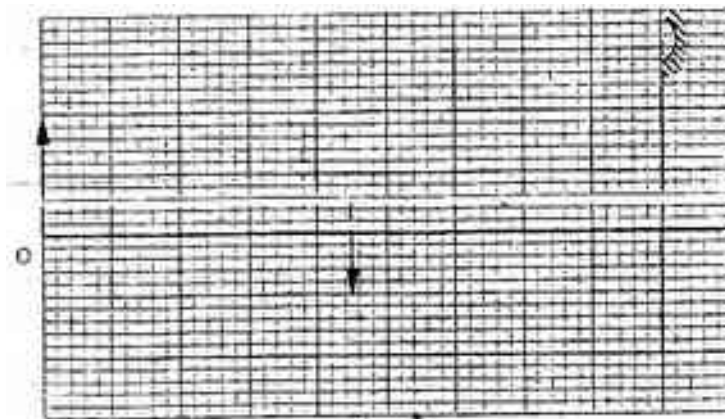


Figure 3

(a) On the same diagram draw appropriate ray (s) to locate the principal focus, F, of the mirror. (2 marks)

(b) Determine the focal length of the mirror (scale 1: 5) (1 mark)

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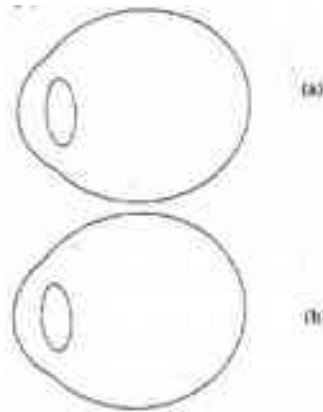
18. 2007 Q10 P2

State what is meant by the term accommodation as applied to the human eye. (1 mark)

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19. 2007 Q16 P2

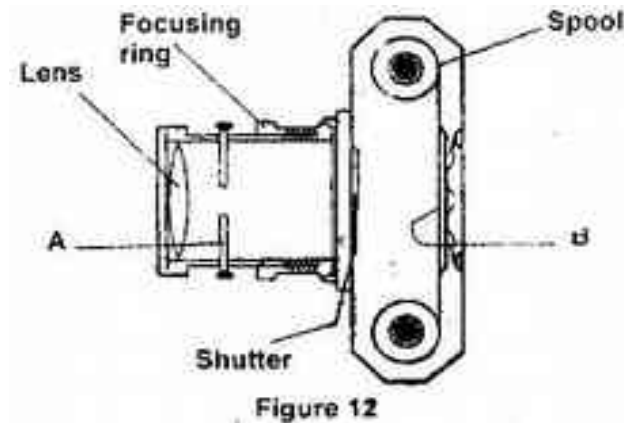
(a) **Figures 11** (a) and (b) show diagrams of the human eye



**Fig 11**

- (i) Sketch in **figure 11** (a) a ray diagram to show shortsightedness (1 mark)
- (ii) Sketch in figure 11 (b) a ray diagram to show how a lens can be used to correct the shortsightedness (2 marks)

(b) **Figure 12** shows the features of a simple camera



- (i) Name the parts labeled A and B (2 marks)

A.....  
 B.....

- (ii) A still object is placed at a certain distance from the camera. Explain the adjustments necessary for a clear image of the object to be formed.

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(iii) State the functions of the shutter and the parts labeled A and B  
(3marks)

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(c) A lens forms a clear image on a screen when the distance between the screen and the object is 80cm. If the image is 3 times the height of the object, determine.

(i) The distance of the image from the lens (3 marks)

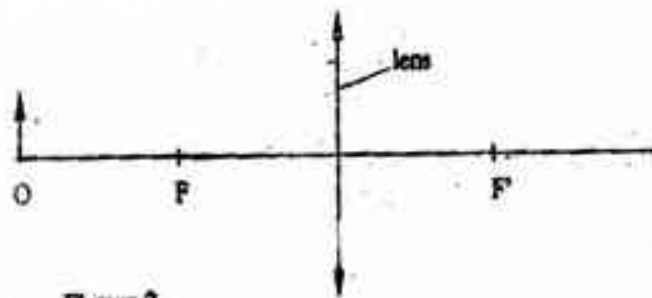
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(ii) The focal length of the lens (2 marks)

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**20. 2008 Q5 P2**

The diagram in **figure 2** shows an object O placed in front of a converging lens. F and F' are the principal foci for the lens.



**Figure 2**

The object is now moved along the principal axis until a virtual image is produced. On the same diagram:

- (i) Draw the object O in the new position along the principal axis;
- (ii) Sketch rays to show formation of the virtual image (1mark)

21. 2008 Q11 P2

Figure 7 shows how rays from a distant and a near object are focused inside a human eye with a certain defect.

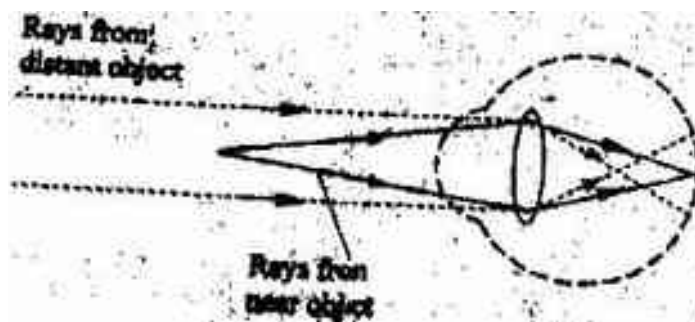


Figure 7

Name the defect and state the cause of this defect. (1mark)

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22. 2009 Q9 P2

In an experiment, pin, converging lens and a plain mirror are arranged as shown in figure 4. The distance between the pin and the plain mirror is 1 cm while the distance between the lens and the plain mirror is  $q$  cm. The position of the pin is adjusted until its tip coincides with its real image.

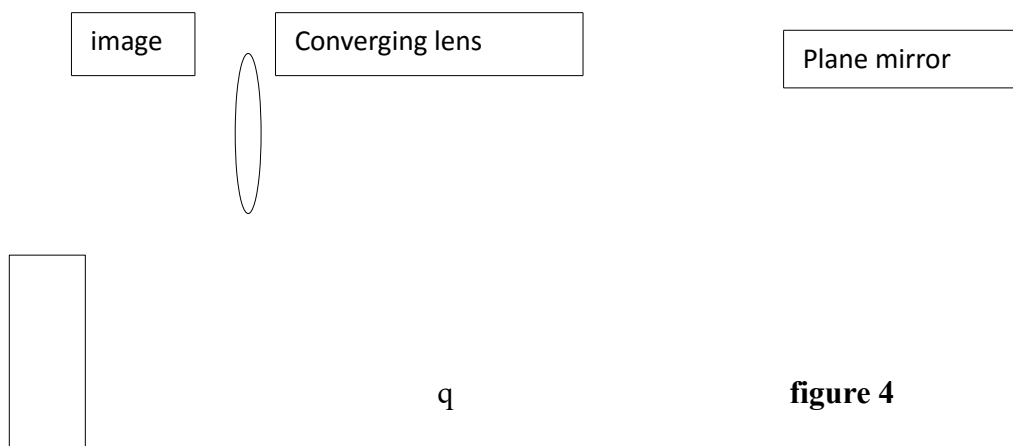


figure 4

State the focal length of the lens (1mark)

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21. 2011 Q16 P2

(a) State the meaning of the term "principal focus" as applied in lenses. (1mark)

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(b) You are provided with the following apparatus to determine the focal length of a lens:

- a biconvex lens and a lens holder
- a lit candle
- a white screen
- a meter rule

(i) Draw a diagram to show how you would arrange the above apparatus to determine the focal length of the lenses (1mark)

(ii) Describe the procedure you would follow (1mark)

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(iii) State two measurements you would take. (2marks)

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(iv) Explain how the measurements in (iii) would be used to determine the focal length. (2marks)

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(c) an object is placed 30cm in front of a concave lens of focal length 20cm.  
Determine the magnification of the image produced. (4marks)

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22. 2012 Q9 P2

**Figure 8**, shows an object O placed in front of a diverging lens whose principal focus is F.

On the figure, draw a ray diagram to locate the image formed (3marks)

