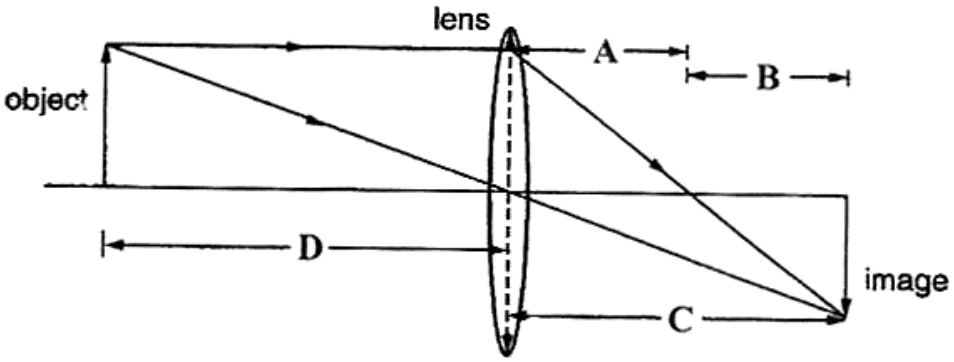
Lenses

MCQ

Ray Diagrams

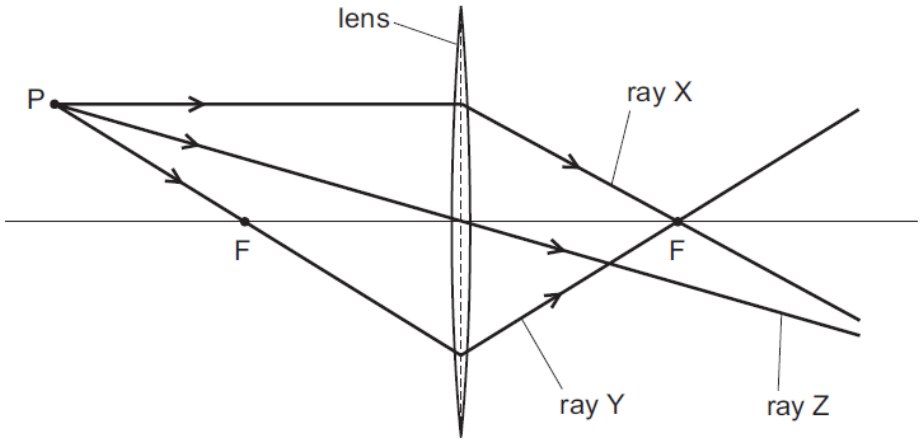
1 The ray diagram shows how a real image of an object is formed by a converging lens.



Which distance represents the focal length of the converging lens?

A A **B** B **C** C **D** D

2 A student draws a diagram representing three rays of light from point P pass through a converging lens. Each point labelled F is a principal focus of the lens

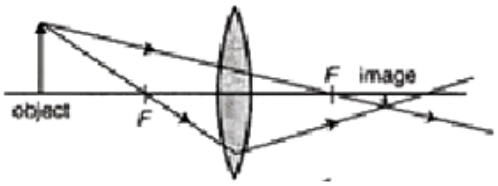


Which of the rays has the student drawn correctly?

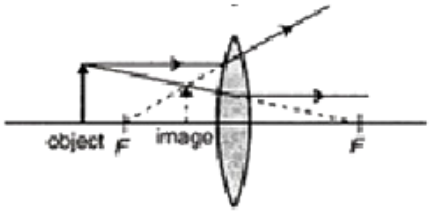
A Ray X and ray Y
B Ray X and ray Z
C Ray Y only
D Ray Z only

3 A few students end up with different ray diagrams as shown below. The converging lens has its principal focus at F. Which drawing shows the path of the light rays?

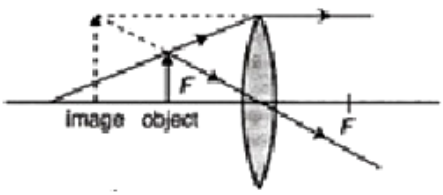
A



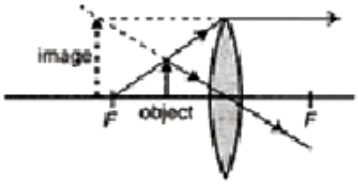
B



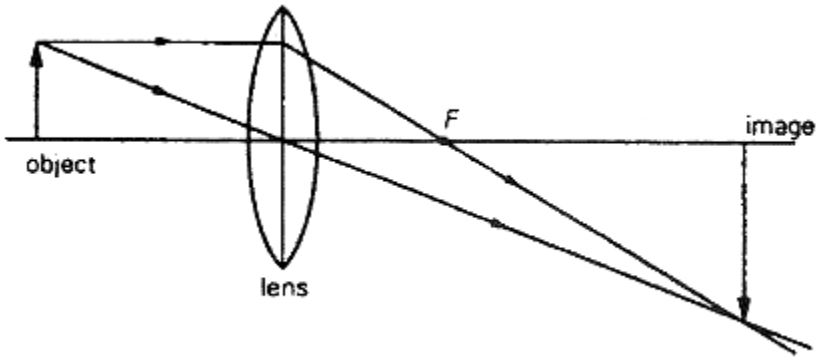
C



D



4 The diagram shows how a converging lens forms an image of an object.



Which statement describes the image?

A It is real, erect and magnified.
B It is real, inverted and diminished.
C It is virtual, erect and magnified.
D It is real, inverted and magnified.

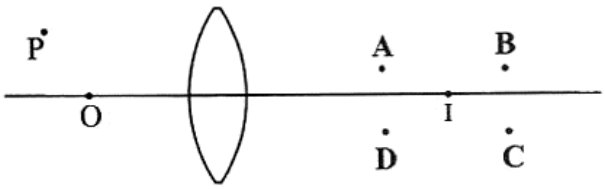
5 Which of the following correctly describes the images formed by a thin converging lens when used as a magnifying glass?

A Real, inverted, magnified
B Virtual, upright, magnified
C Real, upright, magnified
D Virtual, inverted, magnified

6 If an object is placed 21 cm from a converging lens, the image formed is slightly smaller than the object. If the object is placed 19 cm from the lens, the image formed is slightly larger than the object. What is the approximate focal length of the lens?

A 5 cm **B** 10 cm **C** 18 cm **D** 20 cm

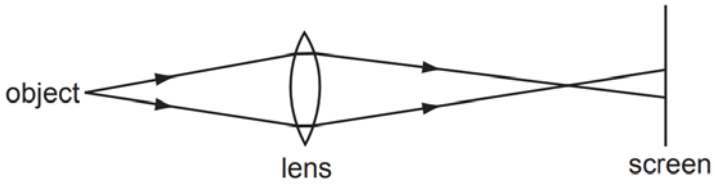
7 A lens forms an image at I of an object at O.



Where does the lens form an image of an object at P?

A A **B** B **C** C **D** D

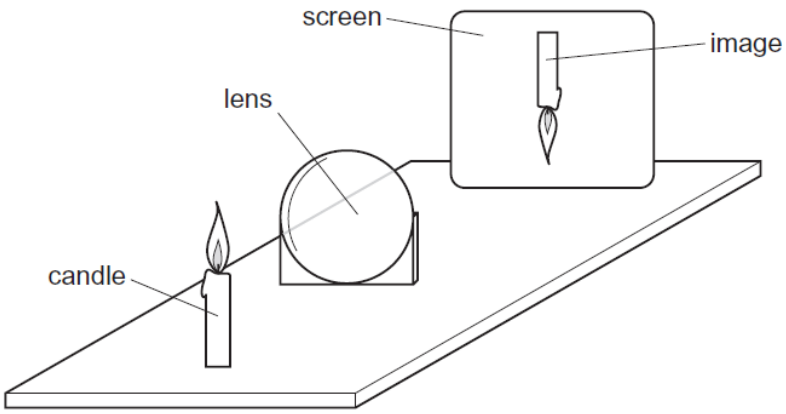
8 A lens forms a blurred image of an object on a screen.



How can the image be focused on the screen?

A By moving the object away from the lens and screen
B By moving the screen away from the lens and object
C By using a brighter object at the same position
D By using a lens of longer focal length at the same position

9 A thin converging lens is used to produce, on a screen, a focused image of a candle.



Various focused images are produced on the screen by moving the lens and the screen backwards and forwards. Which statement is always correct?

A The image is at the principal focus (focal point) of the lens.
B The image is bigger than the object.
C The image is closer to the lens than the object is.
D The image is inverted.

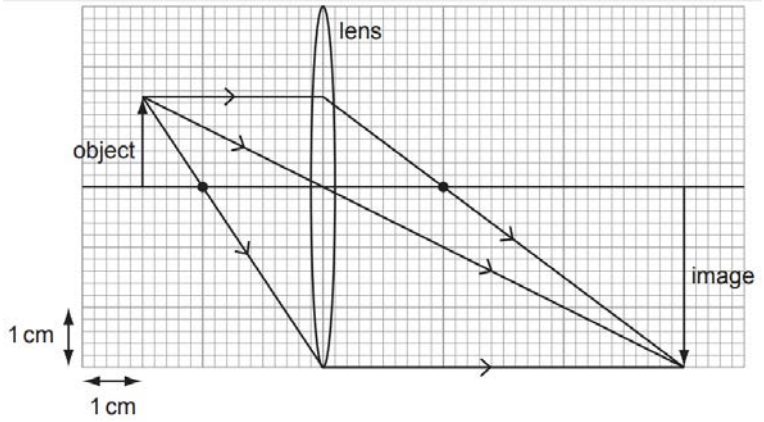
10 Which of the following statement(s) is/are always true?

(I) If an object is placed exactly at the principal focus of a convex lens, the image form on a nearby screen will not be in focus.
(II) If an object is placed two focal lengths from a convex lens, the image formed will be identical in size to the object.
(III) A virtual image cannot be photographed because it cannot be projected onto the camera film.

A II only **B** I and II only **C** I and III only **D** I, II and III

Lens Formula

11 An object of height 1.5 cm is placed in front of a converging lens of focal length 2.0 cm as shown below.



What is the linear magnification produced by the lens?

A 2.0 **B** 3.0 **C** 4.0 **D** 6.0

12 A thin, convergent lens has a focal length of 8.0 cm. If a real, inverted image is located 12.0 cm to the right of the lens, where is the object located?

A 18.0 cm to the right of the lens
B 24.0 cm to the right of the lens
C 18.0 cm to the left of the lens
D 24.0 cm to the left of the lens

13 The height of an apple is about 12.0 cm and it is placed 2.0 m away from a student. What is the height of the image of the apple that is projected onto his retina if the focal length of the lens in his eye is 20 mm?

A 0.12 cm **B** 0.18 cm **C** 1.2 cm **D** 1.8 cm

14 An object 5.0 cm high is placed 2.0 cm from a converging lens which is being used as a magnifying glass. The image produced is 15.0 cm high. What is the focal length of the lens?

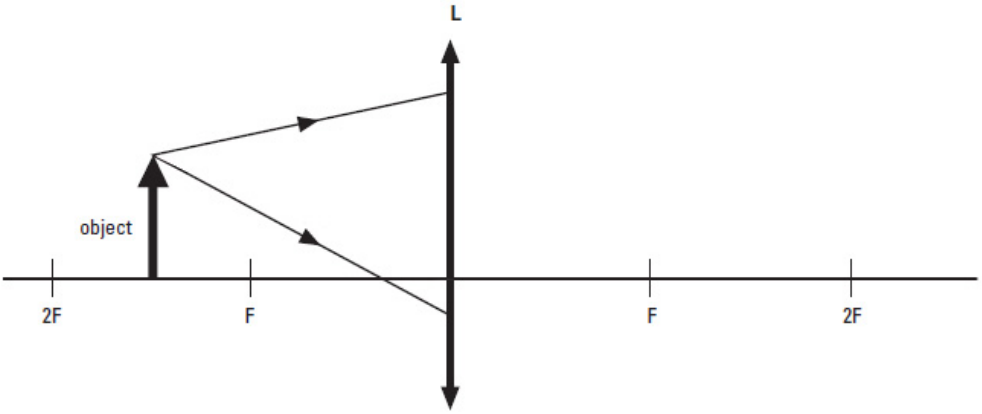
A 1.5 cm **B** 2.0 cm **C** 3.0 cm **D** 4.0 cm

15 For a convex lens of focal length 3.0 cm, where will the image of an object appear if the magnification is 2.0? Assume that the image is real.

A 1.5 cm **B** 3.0 cm **C** 4.5 cm **D** 9.0 cm

Structured Questions

16 An object of height 2 cm is placed 15 cm from a thin converging lens of focal length 10 cm as shown in the figure below (not to scale).



(a) By drawing rays on the figure, locate the position of the image.

(b) **(i)** Describe the type of image formed.

(ii) Name one use for such a lens arrangement

(c) Complete the paths of the two rays on the figure to show their passage through the lens to the image formed

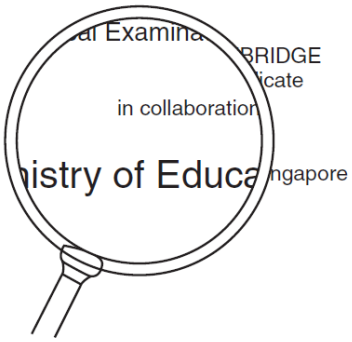
(d) **(i)** The object is now moved to a distance of 5 cm from the lens. In the space provided below, sketch the ray diagram to locate the image position and size.

(ii) Describe the type of image formed.

(iii) What is the magnification?

(iv) Name one use for this type of lens arrangement

17 The figure on the left shows words seen through a lens. The figure on the right shows *the same words* without the lens.



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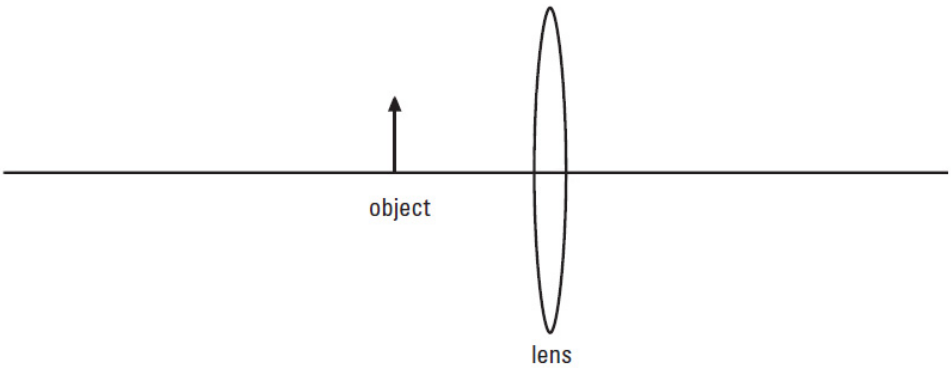
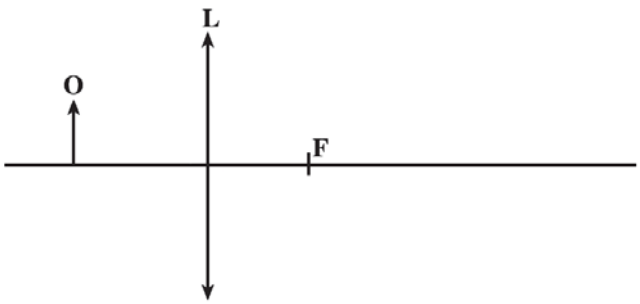
(a) State three properties of the image formed by the lens.

(b) On the figure below, sketch a ray diagram to show how the image in the figure above on the right was formed by the lens. Mark clearly the focal length of the lens and the image formed.



18 The figure below shows an object **O** placed in front of a converging lens **L**, which can be used to produce a real image on a screen.



(a) Draw construction rays to locate the image of **O**. Label it as **I**.

(b) State the characteristics of the image formed.

19 A transparent photographic slide is placed in front of converging lens with a focal length of 2.44 cm. The lens forms an image of the slide 12.9 cm from it.

(a) **(i)** How far is the lens from the slide if the image is *real*?

(ii) Determine the magnification for this image.

(b) **(i)** How far is the lens from the slide if the image is *virtual*?

(ii) Determine the magnification for this image.

20 A certain LCD projector contains a single thin lens. An object 24.0 mm high is to be projected so that its image fills a screen 1.80 m high. The object-to-screen distance is 3.00 m. Determine the focal length of the projection lens.

Answers

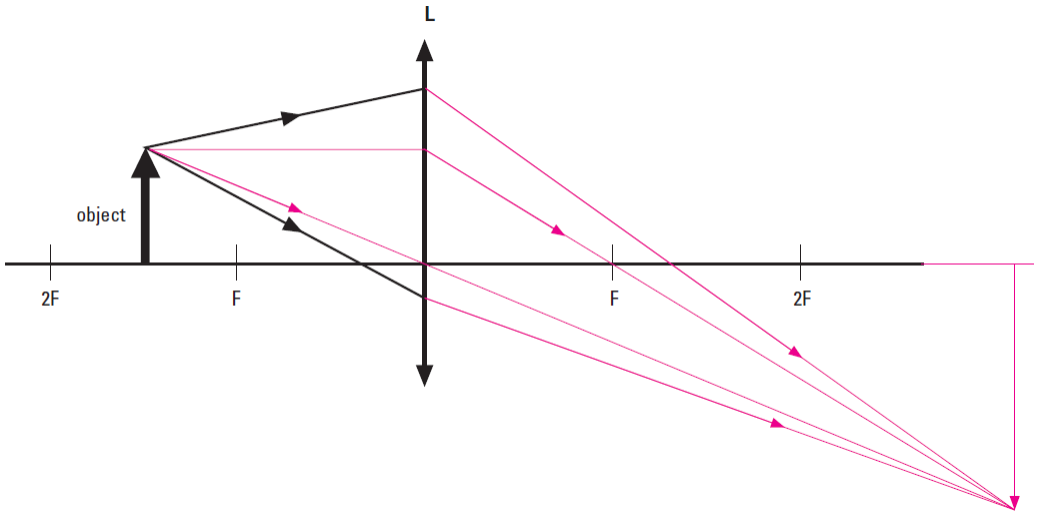
MCQ

Ray Diagrams
ABDDB BDDDB

Lens Formula
ADACD

Structured Questions

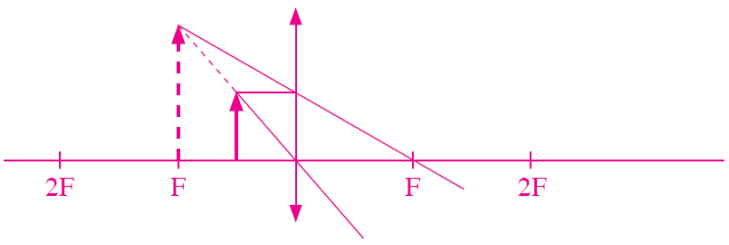
16 (a)



(b) (i) Inverted, magnified, real
(ii) Projector

(c) See diagram in (a)

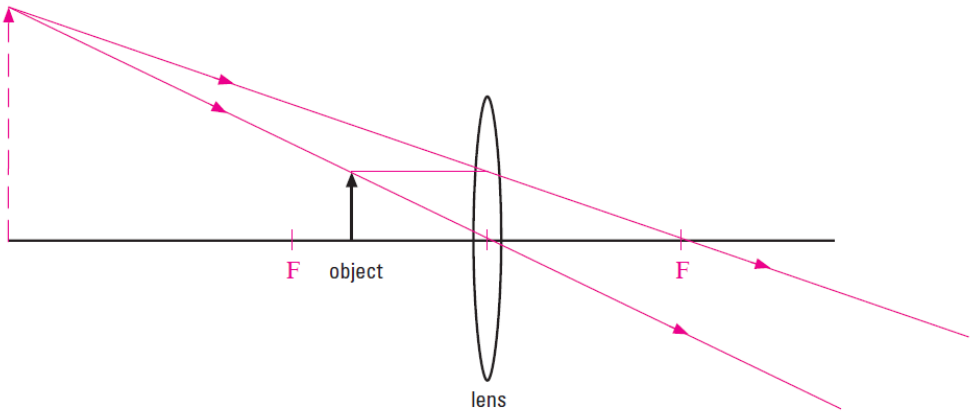
(d) (i)



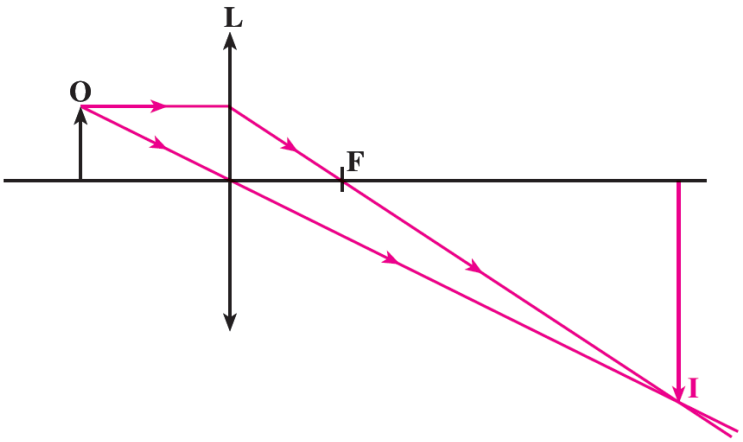
(ii) Virtual, magnified, upright
(iii) 2
(iv) Magnifying glass

17 (a) Virtual, upright, magnified

(b)



18 (a)



(b) Real, inverted, magnified

19 (a) (i) 3.01 cm
(ii) 4.29

(b) (i) 2.05 cm
(ii) 6.29

20 0.0390 m