

Girls' High School & College, Prayagraj

Worksheet No. - 5

Session 2020-2021

Class - X A B C D E F

Subject- Physics

Chapter- Refraction Through A Lens

Instructions: - Parents are expected to ensure that the student spends two days to read and understand the chapter according to the books and website referred and thereafter answer the given questions. Student should refer to the following books/website-

Concise Physics, for class 10, By R. P. Goyal and S. P. Tripathi (Selina Publishers) OR

A New Approach to I.C.S.E. Physics by V. K. Sally and R N Das Gupta (Goyal Brothers Prakashan) OR

ICSE Physics By S C Gupta and Smita Aggarwal (Srijan Publishers) OR

website- http://quiznext.in/study-material/learning_material/ICSE-10-Physics/Refraction-Through-A-Lens/lens-and-refraction-through-a-lens/

Topics: - 1. LENS AND REFRACTION OF LIGHT THROUGH A LENS
2. FORMATION OF IMAGE BY A LENS
3. SIGN CONVENTION AND LENS FORMULA
4. MAGNIFYING GLASS AND APPLICATION OF LENSES

1) Questions based on Lens and Refraction of Light Through A Lens:-

Answer the following questions briefly: -

Q.1:- Define the following:

- a) Centre of curvature
- b) Radius of curvature
- c) Principal axis
- d) Optical centre
- e) Focal length.

Q.2:- Out of two lenses, one concave and the other convex, state which one will show the divergent action on a light beam. Draw diagram to illustrate your answer.

Q.3:- How does the action of a convex lens differ from that of a concave lens on a parallel beam of light incident on them? Draw diagrams to illustrate your answer.

Q.4:-

a) Draw a diagram to represent the second focus of a concave lens.

b) Draw a diagram to represent the second focus of a convex lens.

Q.5:- Distinguish between a convex lens and a concave lens.

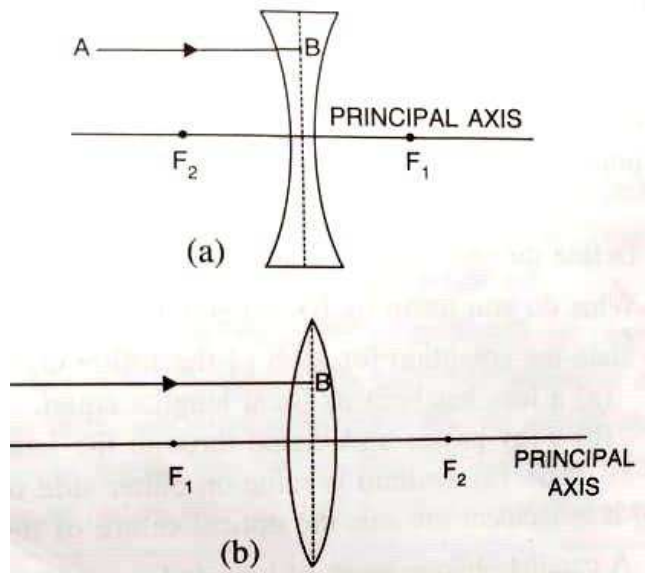
Q.6:- What do you mean by focal plane of a lens?

Q.7:- State the condition for each of the following :

a) a lens has both its focal lengths equal.

b) a ray passes undeviated through the lens.

Q.8:- In the figure (a) and (b), F_1 and F_2 are the positions of the two foci of the thin lenses. Draw the path taken by the light ray AB after it emerges from each lens.



Q.9:- A beam of light incident on a thin concave lens parallel to its principal axis diverges and appears to come from a point F on the principal axis. Name the point F. Draw a ray diagram to show it.

Q.10:- A ray of light, after refraction through a concave lens emerges parallel to the principal axis.

(a) Draw a ray diagram to show the incident ray and its corresponding emergent ray.

(b) The incident ray when produced meets the principal axis at a point F. Name the point F.

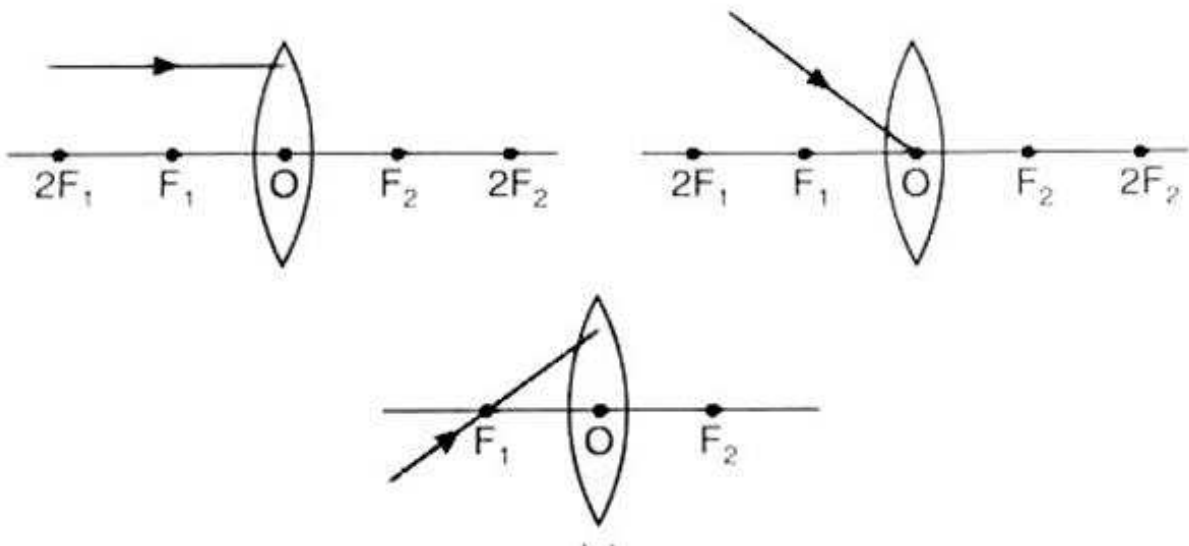
2) Questions based on Formation of Image by A Lens:-

Answer the following questions briefly: -

Q.1:-

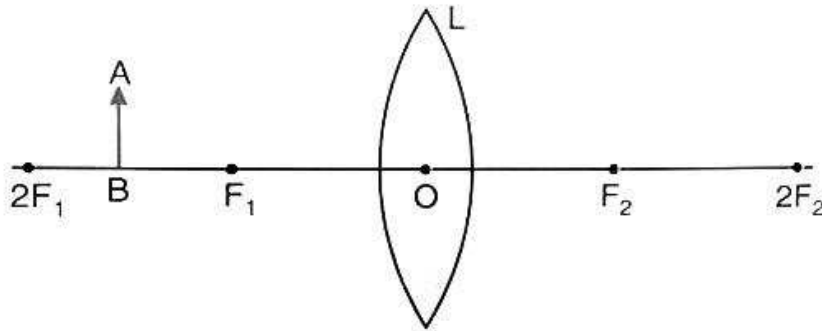
- a) When does a ray of light falling on a lens pass through it undeviated?
- b) Which lens can produce real and inverted image of an object?

Q.2:- Redraw the given diagram in your answer book and show the paths of refracted ray for each diagram.



Q.3:- Draw a ray diagram to show how a converging lens is used as a magnifying glass to observe a small object. Mark on your diagram the foci of the lens and the position of the eye.

Q.4:- An object is placed between $2F_1$ and F_1 on the principal axis of a lens as shown in figure below. Copy the diagram and using three rays starting from point A, obtain the image of the object formed by the lens.



Q.5:-

- a) Distinguish between a real and a virtual image.
- b) Can a concave lens form an image of size two times that of the object?
Give reason.

Q.6:- A lens forms an upright and magnified image of an object.

- a) Name the lens.
- b) Draw a labelled ray diagram to show the image formation.

Q.7:-

- a) Name the lens which always forms an erect and virtual image.
- b) State whether the image in part (a) is magnified or diminished.

Q.8:-

- a) Give two characteristics of the image formed by a concave lens.
- b) Give two characteristics of the virtual image formed by a convex lens.

Q.9:- A lens forms an image between the object and the lens.

- a) Name the lens.
- b) Draw a ray diagram to show the formation of such image.

c) State three characteristics of the image.

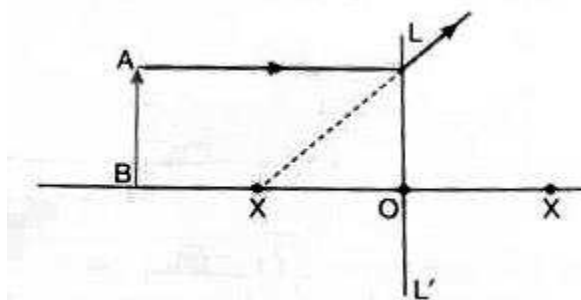
Q.10:- A convex lens forms an image of an object equal to the size of the object.

a) Where is the object placed in front of the lens?

b) Draw a diagram to illustrate it.

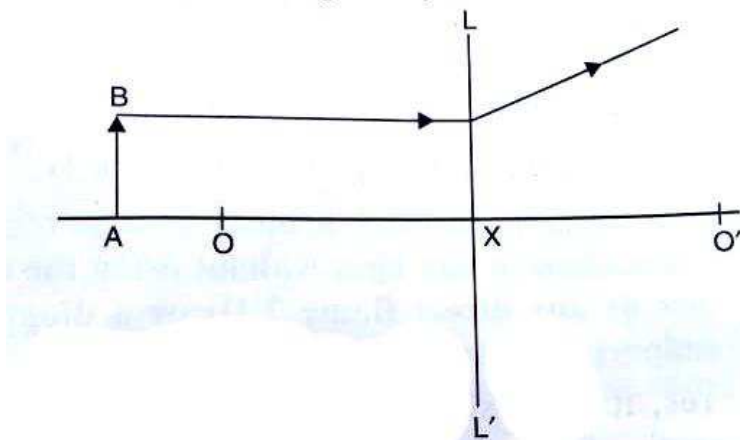
c) State two more characteristics of the image.

Q.11:- a) Copy and complete the diagram to show the formation of the image of the object AB.



b) What is the name given to point X?

Q.12:- Study the diagram given below.



- (i) Name the lens LL'.
- (ii) What are the points O and O' called?
- (iii) Complete the diagram to form the image of the object AB.
- (iv) State three characteristics of the image.

3) Questions based on Sign Convention and Lens Formula:-

(A) Answer the following questions briefly: -

Q.1:- Write the lens formula explaining the meaning of the symbols used.

Q.2:- Copy and complete the following table:

Type of lens	Position of object	Nature of image	Size of image
Convex	At F	-----	-----
Concave	At ∞	-----	-----

Q.3:- How does the power of a lens change if its focal length is doubled?

Q.4:- Define the term power of a lens. In what unit is it expressed?

Q.5:- Which type of lens has a positive power and which type of lens has a negative power?

(B) Numerical problems :-

Q.6:- The focal length of a convex lens is 25 cm. At what distance from the optical centre of the lens an object be placed to obtain a virtual image of twice the size?

Q.7:- Where should an object be placed in front of a convex lens of focal length 0.12 m to obtain a real image of size three times the size of the object, on the screen?

Q.8:- A lens forms the image of an object placed at a distance of 45 cm from it on a screen placed at a distance 90 cm on other side of it.

a) Name the kind of lens.

b) Find:

i) the focal length of lens, and

ii) the magnification of image.

Q.9:- The power of lens is +2.0 D. Find its focal length and state the kind of lens.

Q.10:- The power of lens is -2.0 D. Find its focal length and its kind.

4) Questions based on Magnifying Glass and Application of Lenses:-

Answer the following questions briefly: -

Q.1:- What is a magnifying glass?

Q.2:- Write an expression for the magnifying power of a simple microscope. How can it be increased?

Q.3:- How will you differentiate between a convex and concave lens by looking at (i) a distant object, (ii) a printed page?

Q.4:- State two applications of a convex lens.

Q.5:- State two applications of a concave lens.

END