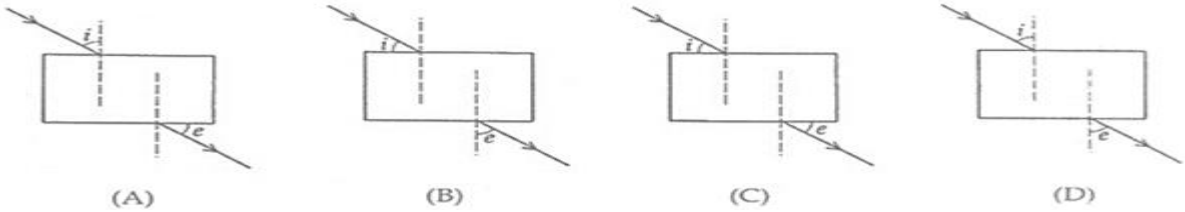
Physics Worksheet

Light: Reflection and Refraction

Name of the student: **Grade – X**

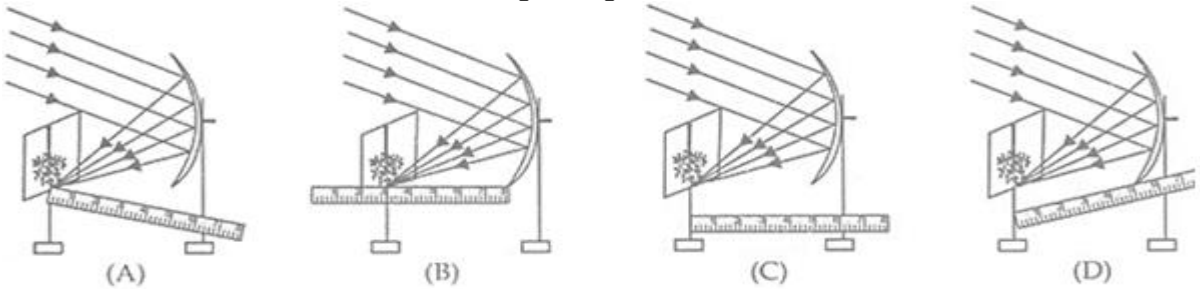
Multiple Choice Questions:

1. An object is placed 20 cm in front of a plane mirror. The mirror is moved 2 cm towards the object. The distance between the positions of the original and final images seen in the mirror is:
   (a) 2 cm
   (b) 4 cm
   (c) 10 cm
   (d) 22 cm
2. A concave mirror gives real, inverted and same size image if the object is placed
   (a) At F
   (b) At infinity
   (c) At C
   (d) Beyond C
3. Image formed by plane mirror is
   (a) Real and erect
   (b) Real and inverted
   (c) Virtual and erect
   (d) Virtual and inverted
4. Power of the lens is -40, its focal length is
   (a) 4m
   (b) -40m
   (c) -0.25m
   (d) -25m
5. In optics an object which has higher refractive index is called
   (a) Optically rarer
   (b) Optically denser
   (c) Optical density
   (d) Refractive index
6. Convex lens focus a real, point sized image at focus, the object is placed
   (a) At focus
   (b) Between F and 2F
   (c) At infinity
   (d) At 2F
7. The unit of power of lens is
   (a) Metre
   (b) Centimeter
   (c) Diopter
   (d) M-1
8. A concave mirror produces a magnification of +4. The object is placed:
   (a) At the focus
   (b) Between focus and centre of curvature
   (c) Between focus and pole
   (d) Beyond the centre of curvature
9. A student does the experiment on tracing the path of a ray of light passing through a rectangular glass slab for different angles of incidence. He can get a correct measure of the angle of incidence and the angle of emergence by following the labelling indicated in figure:



(a) A
(b) B
(c) C
(d) D

10. Four students A, B, C and D performed the experiment to determine the focal length of a concave mirror by obtaining the image of a distant tree on a screen. They measured the distances between the screen and the mirror as shown in the diagrams given below:



The correct way to measure accurate focal length of the mirror is:
(a) A
(b) B
(c) C
(d) D

Comprehension type Question:

Q. A lens X has following observation

a. When the objects is placed at infinity, the image is formed at focus of the lens
b. When a object is placed at 60 cm from the lens, A real image is forced at 10 cm from lens on other side
c. The lens has positive Power

Answer following based on the data given above

1. The lens is
    a. Convex
    b. Concave
2. The focal length of the lens is
    a. 20 cm
    b. 10 cm
    c. 25 cm
    d. None of these
3. The power of the lens
    a. 10 D
    b. 5 D
    c. 4 D
    d. None of these
4. When the object is placed at a distance twice the focal length in front of lens, what will be characteristics of the image formed
    a. A real inverted image of same size will be formed at a distance twice the focal length
    b. A real ,erect image of high diminished size will be formed at a distance twice the focal length
    c. A high enlarged image at infinity will be formed
    d. None of these

5. When the lens is placed close to the page of book, the letters of the page appear
   a. Highly diminished
   b. Enlarged
   c. Same size as object
   d. None of these

Fill in the blanks

1. The refractive index of a medium gives an indication of the _____ _____ability of that medium.

2. When a ray of light goes from water to air, it bends _____from the normal.

3. When a ray of light goes from air to glass, it bends _____the normal.

4. The speed of light is _____ in glass then air.

5. The relative refractive index can be less then_____.

Answer the following:

1. A concave lens has focal length of 20 cm. At what distance from the lens a 5 cm tall object be placed so that it forms an image at 15 cm from the lens? Also calculate the size of the image formed.

2. An object 50 cm tall is placed on the principal axis of a convex lens. Its 20 cm tall image is formed on the screen placed at a distance of 10 cm from the lens. Calculate the focal length of the lens.

3. Draw the ray diagram in each case to show the position and nature of the image formed when the object is placed:
   (i) at the centre of curvature of a concave mirror
   (ii) between the pole P and focus F of a concave mirror
   (iii) in front of a convex mirror
   (iv) at 2F of a convex lens
   (v) in front of a concave lens

4. Name the type of mirrors used in the following situations:
   (i) Headlights of a car
   (ii) Rear-view mirror of vehicle
   (iii) Solar furnace
   Support your answer with reason.

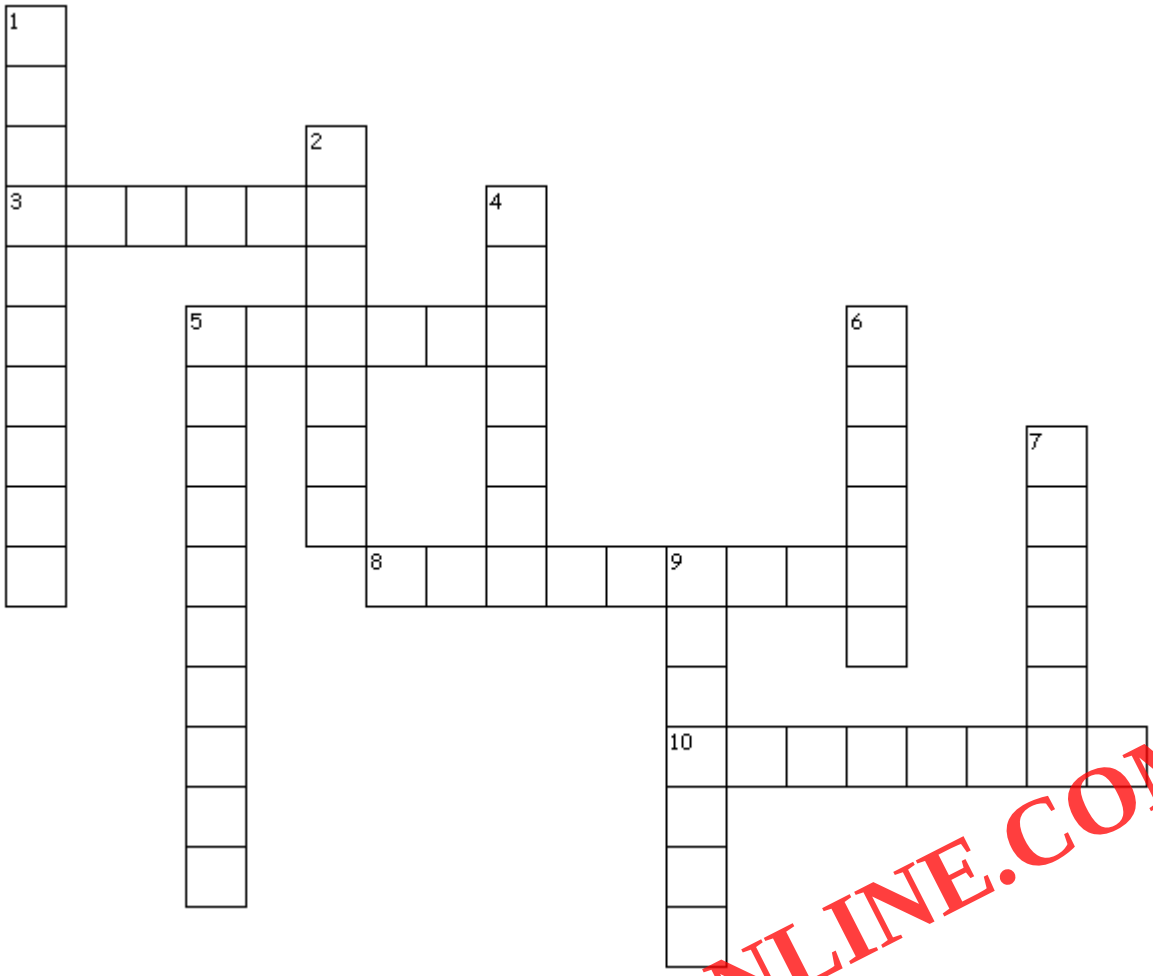
5. Draw a ray diagram to show the path of the reflected ray in each of the following cases.
   A ray of light incident on a convex mirror:
   (i) strikes at its pole making an angle \thetaθtheta from the principal axis.
   (ii) is directed towards its principal focus.
   (iii) is parallel to its principal axis.

6. If the image formed by a mirror for all positions of the object placed in front of it is always virtual and diminished, state the type of the mirror. Draw any ray diagram in support of your answer.

7. Suppose you want to observe an erect image of a candle flame using a concave mirror of focal length 20 cm, space, start text, c, m, end text. State the range of distance of the candle flame from the mirror. List two other characteristics of the observed image. Draw a ray diagram to show the formation of image in this case.

8. A spherical mirror produces an image of magnification -1 on a screen placed at a distance of 50 cm from the mirror.
   (a) Write the type of mirror.
   (b) Find the distance of the image from the object.
   (c) What is the focal length of the mirror?
   (d) Draw the ray diagram to show the image formation in this case.

Crossword Puzzle



Across

3. The human eye forms the image at this point
5. The medium where speed of light is less
8. A instrument which is used to see details of distant objects
10. The refractive index is equal to reciprocal of the sine of this angle

Down

1. A optical instrument which is used to see small objects
2. It is produced by the dispersion of sunlight by the rain drops in the air
4. The nature of the image formed by the convex lens when the object is placed between optical center and focus
5. The size of the image formed by the concave lens
6. A converging lens
7. It is the defect of eye when it cannot see distant objects clearly
9. The lens having negative power