SUBJECT: SCIENCE   **GUIDED WORKSHEET**   **CLASS: X**
SYLLABUS: LIGHT-REFLECTION AND REFRACTION
Name:_____   Class/Sec:_____   RolNo:_____

1. **Define:**

   a. Reflection of light   b. Refraction of light   c. Aperture   d. Pole   e. Centre of

   curvature   f.radius of curvature   g. Principal axis h. focus   i. focal length

   j.refractive index   k.magnification   l. Power of lens m.One Diopter n.Snell's

   law

2. Differentiate between real and virtual image
3. What is the relationship between R and f of a spherical mirror? Mention the focal length of a

   concave mirror whose radius is 28cm.

4. Name the type of mirror used in the following situations :
   a. Headlights of a car   b. used by a dentist   c. rear –view mirror of a vehicle   d. Solar furnace
5. A student was asked to obtain real image of a tree on the screen with the help of suitable mirror. He can

   do by taking a :

   (a) concave mirror   (b) plane mirror   (c) convex mirror (d) both either concave or by convex mirror
6. Draw the following diagrams
   a)   Reflected ray is passing parallel to principal axis of a converging mirror
   b)   A ray of light is moving along principal axis is falling on a convex mirror .Draw the path

   of the reflected ray .Also state the values of angle of incidence and reflection in this case.

   c)   Complete the below given diagram
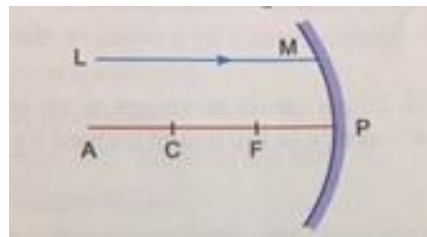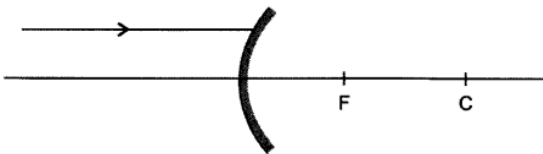
7. Draw a ray diagram to show the path of the reflected ray in each of the following cases.

   A ray of light incident on a convex mirror:

   i) strikes at its pole making an angle θ from the principal axis.

   ii) is incident towards its principal focus.

   iii) is parallel to its principal axis.

8. Name the mirror that shows virtual, erect and diminished image and draw a ray diagram using the

   same mirror.

9. Priya wants to see an enlarged and erect image of an object in a mirror. What kind of mirror should

   she use? Where should the object be placed?

10. A real image, 1\5 th the size of object is formed at a distance of 18 cm from a mirror. What is the nature of

mirror? Calculate its focal length.

11. A ray of light is moving along principal axis is falling on a convex mirror .Draw the path of the reflected ray .Also state the values of angle of incidence and reflection in this case.

12. Discuss the position and nature of the images formed by a concave mirror when the object is moved from infinity towards the pole of a mirror using neat ray diagrams.

13. A concave mirror has a focal length of 40cm.Determine the position of the object for which an erect and four times the size of the object image is formed.

14. A spherical mirror produces a magnification of -1 on a screen placed at a distance of 50cm from the mirror.

    i)Write the type of the mirror.

    ii) Find the distance of the image from the object.

    iii)What is the focal length of the mirror?

    iv)Draw the ray diagram to show the image formation in this case.

15. An erect image 3 times the size of the object is obtained with a concave mirror of radius of curvature 36cm. What is the position of the object?

16. An object 2cm high is placed at a distance of 16cm from a concave mirror, which produces 3cm high inverted image. What is the focal length of the mirror? Also, find the position of the image.

17. A 4.5 cm needle is placed 12 cm away from a convex mirror of focal length 15 cm. Give the location of the image and its magnification .Describe what happens to the image as the needle is moved further from the mirror?

18. The image formed by a convex mirror of focal length 20cm is a quarter of the object. What is the distance of the object from the mirror.

19. Magnification produced by a mirror is as follows .What does it mean ? Also state the type of mirror.
    a) -1   b) +1   c) -0.5   d) + 0.6   e) + 1.5   f) + 1.7   g) -1.5

20. Light enters from air into diamond which has refractive index, 2.42. The speed of light in air is

    3×10^8 ms^{-1} . Calculate the speed of light in diamond

21. When a ray of light travelling in air enters obliquely in to a glass slab , it is observed that light ray emerges parallel to the incident ray but shifted sideways slightly. Draw a ray diagram to illustrate it.

22.The absolute refractive index of diamond is 2.42 and glass is 1.50 .Find the refractive index of diamond with respect to glass.

23.The refractive indices of four media A, B, C and D are given in the following table:

Medium	A	B	C	D
Refractive Index	1.33	1.50	1.52	2.40

If light, travels from one medium to another, in which case the change in speed will be (i) minimum, (ii) maximum?

24.If a light ray IM is incident on the surface AB as shown, identify the correct emergent ray.
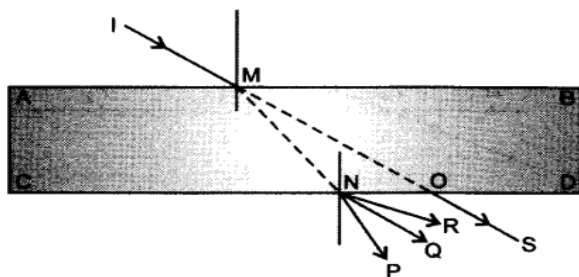
25.A student wants to draw diagram for formation of a real image at 2F of a convex lens. For this he must take the object placed at : (a) infinity   (b) focus   (c) between optical Centre and focus   (d) 2 F

26.With the help of a ray diagram show the formation of an image by a convex lens when the object is placed any where between infinity and pole .

. 27.A 5.0 cm tall object is placed perpendicular to the principal axis of a convex lens of focal length 20 cm. The distance of the object from the lens is 30 cm. By calculation determine
i)the position and (ii) the size of the image formed.

28.An object is kept at a distance of 18cm,20cm,22cm and 30cm from a lens of power 5D.
a)In which case would you get a magnified image? b)Which of the magnified image can we get on a screen ? c) List two widely used applications of a convex lens and concave lens.

29.Find the position and the size of the virtual image formed when an object of 2cm tall is placed 20cm from : a)diverging lens of focal length 40cm b) converging lens of focal length 40cm .Draw labelled diagrams to show the formation of image

30.A convex lens has a focal length of 25 cm. Calculate the distance of the object from the lens if the image is to be formed on the opposite side of the lens at a distance of 75 cm from the lens. What will be the nature of the image?

31.A 2cm tall object is placed perpendicular to principal axis of a convex lens of focal length 10cm.The distance of the object from the lens is 15cm.Find the position ,nature and size of the image formed.

32.A convex lens forms a real and inverted image of a needle at a distance of 50cm from it. Where is the needle placed in front of this lens if the size of the image is equal to the size of the object? Also find the power of lens.

33.A student focused the image of a candle flame on a white screen using a convex lens. He noted down the positions of the candle flame, screen and the lens as given below:
Position of the candle flame = 12.0cm
Position of the lens= 50.0 cm
Position of the screen=88.0 cm
Find : (i) the focal length of the convex lens.
(ii) the position of the image of the candle flame if it is shifted towards the lens at a position of 31.0 cm.
(iii) State the nature of the image formed if the candle flame is further shifted towards the lens.

34.The magnification produced by a spherical lens is +0.75.What is the nature of the image and the lens?
35.A 2.0cm tall object is placed 40cm from a diverging lens of focal length 15cm.Find the

position and the size of the Image.

36. Calculate the image distance for an object of height 12mm at a distance of 0.20m from a concave lens of focal length 0.30 m and state the nature and size of the image.

37. A concave lens of focal length 15cm forms an image of 10cm from the lens. How far is the Object placed from the lens .Draw the ray diagram for the same.

38. A convex lens of focal length 15cm and a concave lens of focal length 10cm are placed in contact with one another .What is the power of this combination and the focal length of the same combination.

39. A concave lens of 5.5D and a concave lens of power 10.5D are placed in contact with each other. What is power of the combination of this lens?

40. The power of combination of two lenses is X and Y is 5D .? If the focal length of the lens X be 15cm. Calculate the focal length of the lens Y and state the nature of the lens.

42. Analyse the following observation table showing a variation of image-distance (v) with object-distance (u) in case of a convex lens and answer the questions that follow without doing any calculations:

S.No.	Object-Distance u (cm)	Image-Distance v (cm)
1	– 100	+ 25
2	– 60	+ 30
3	– 40	+ 40
4	– 30	+ 60
5	– 25	+ 100
6	– 15	+ 120

(a) What is the focal length of the convex lens ? Give a reason to justify your answer.

(b) Write the serial number of the observation which is not correct. On what basis have you arrived at this conclusion ?

(c) Select an appropriate scale and draw a ray diagram for the observation at S.No.2. Also, find the approximate value of magnification.

43. Answer question numbers 4.1-4.4 on the basis of your understanding of the following paragraph and the related studied concepts.

Is there a relationship between the radius of curvature R, and focal length f , of a spherical mirror? For spherical mirrors of small apertures, the radius of curvature is found to be equal to twice the focal length. We put this as $R\backslash f = 2$. This implies that the principal focus of a spherical mirror lies midway between the pole and center of curvature.

1. Write relation between radius of curvature and focallength.

2. For which type of mirrors above relation is verified?

3 The size of the aperture should be?

(a) small (b) large (c) neither small nor large (d) None of these

4. Principal focus of a spherical mirror lies :

(a) midway between the pole and center of curvature   (b) near the pole

 (c) near the center of curvature   (d) None of these