

	INDIAN SCHOOL AL WADI AL KABIR	
Class: X	Department: SCIENCE 2026 – 27 SUBJECT: PHYSICS	Date: 17/04/2026
Worksheet No: 1 WITH ANSWERS	CHAPTER: LIGHT REFLECTION AND REFRACTION -PART 1	Note: A4 FILE FORMAT
NAME OF THE STUDENT	CLASS & SEC:	ROLL NO.

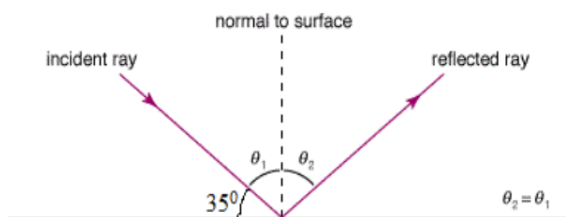
OBJECTIVE TYPE QUESTIONS

- From the following options, choose the one which gives a negative magnification greater than one.
 - Concave mirror, Nature of image- real
 - Concave mirror, Nature of image- virtual
 - Convex mirror, Nature of image- real
 - Convex mirror, Nature of image- virtual
- Arnav was making notes, and he wrote down the following statements from his understanding of reflection from curved surfaces.
 - Concave mirrors can produce both real and virtual images depending on the position of the object.
 - Convex mirrors always produce real, inverted images regardless of the object's position.
 - In both concave and convex mirrors, the image location can be determined using the mirror formula $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$ where f is the focal length, v is the image distance, and u is the object distance.

Choose from the following the correct option that lists the correct statements about reflection from curved surfaces.

(a) I and II (b) I, II and III (c) II and III (d) I and III
- In the following cases, a ray is incident on a concave mirror. In which case is the angle of incidence equal to zero?
 - A ray parallel to the principal axis.
 - A ray passing through the centre of curvature and incident obliquely.
 - A ray passing through the principal focus and incident obliquely.
 - A ray incident obliquely to the principal axis, at the pole of the mirror.
- Mirror 'X' is used to concentrate sunlight in a solar furnace, and Mirror 'Y' is fitted on the side of the vehicle to see the traffic behind the driver. Which of the following statements are true for the two mirrors?
 - The image formed by mirror 'X' is real, diminished and at its focus.
 - The image formed by mirror 'Y' is virtual, diminished and erect.
 - The image formed by mirror 'X' is virtual, diminished and erect.
 - The image formed by mirror 'Y' is real, diminished and at its focus.

- (a) (i) and (ii)
 (b) (ii) and (iii)
 (c) (iii) and (iv)
 (d) (i) and (iv)
5. The image formed by a concave mirror of focal length 50 cm is real and of magnification -1 . In this case the distance between the object from its own image is :
 (a) 14. 50 cm (b) 200 cm (c) 100 cm (d) Zero
6. The radius of curvature of a converging mirror is 30 cm. At what distance from the mirror should an object be placed so as to obtain a virtual image?
 (a) infinity
 (b) 30 cm
 (c) Between 16 cm and 30 cm
 (d) Between 0 cm and 15 cm
7. An object of height 4 cm is kept at a distance of 30 cm from the pole of a diverging mirror. If the focal length of the mirror is 10 cm, the height of the image formed is
 (a) +3.0cm (b) +2.5cm (c) +1.0cm (d) +0.75 cm
8. An object is placed in front of a convex mirror at infinity. According to the new cartesian sign convention, the sign of the focal length and the sign of the image distance in this case respectively:
 (a) +,- (b) -,+ (c) -,- (d) +,+
9. There are certain rules for the image formation in spherical mirror. Which of the following are applicable in convex mirror?
- In a convex mirror a ray of light parallel to the principal axis after reflection appears to diverge from the focus.
 - In a convex mirror a ray of light directed towards the centre of curvature after reflection is reflected back along the same direction.
 - In a convex mirror a ray of light passing through the optical centre goes without any deviation.
 - In a convex mirror a ray of light directed towards the focus after reflection goes parallel to the principal axis.
- Choose the correct option
- (a) (i)(ii) and (iii)
 (b) (i) (ii) and (iv)
 (c) (ii) (iii) and (iv)
(d) (i) (iii) and (iv)
10. A 5 cm long rod is placed vertically in front of a concave mirror. If its 5 cm long image is formed at 20 cm in front of the mirror, the focal length of the mirror is:
 (a) -20 cm (b) -10 cm (c) -5 cm (d) 20 cm
11. Find the angle of incidence and the angle of reflection from the diagram



(a) 55° , 45°

(b) 45° , 55°

(c) 55° , 55°

(d) 45° , 45°

12. Which of the following mirror is used by a dentist to examine a small cavity?
(a) Convex mirror (b) Plane mirror
(c) Concave mirror (d) Combination of convex and concave mirror
13. The radius of curvature of concave mirror is 14 cm. Then, the focal length will be
(a) 14 cm (b) 7 cm
(c) -28 cm (d) -7 cm
14. An object is placed in front of a convex mirror. Its image is formed:
(a) at a distance equal to the object distance in front of the mirror.
(b) at twice the distance of the object in front of the mirror.
(c) half the distance of the object in front of the mirror.
(d) behind the mirror and its position varies according to the object distance.

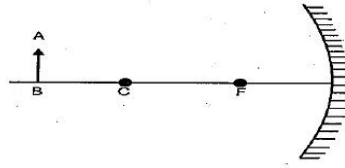
ASSERTION AND REASONING

DIRECTION: In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

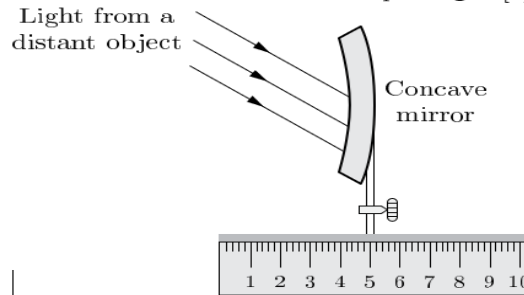
- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.
(e) Both Assertion and Reason are false.
15. **Assertion (A):** A point object is placed at a distance of 26 cm from a convex mirror of focal length 26 cm. The image will not form at infinity.
Reason (R): For above given system the equation $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$ gives $v = \infty$.
16. **Assertion (A):** A convex mirror always forms an image behind it and the image formed is virtual.
Reason (R): According to the sign convention, the focal length of a convex mirror is positive.
17. **Assertion:** The height of an object is always considered positive.
Reason: An object is always placed above the principal axis in this upward direction.
18. **Assertion:** When a concave mirror is held under water, its focal length will increase.
Reason: The focal length of a concave mirror is independent of the medium in which it is placed.
19. **Assertion:** A ray incident along normal to the mirror retraces its path.
Reason: In reflection, angle of incidence is always equal to angle of reflection.

TWO MARKS TYPE QUESTIONS

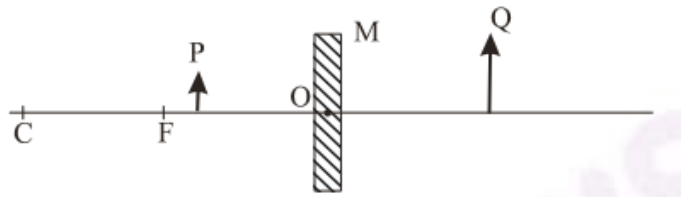
20. a. What is the magnification produced if an object is placed at the centre of curvature of a concave mirror?
b. Complete the ray diagram and show the position of the image



21. In the below set-up, the focal length of the concave mirror is 4.0 cm. Where should the screen be placed on the scale to obtain a sharp image?



22. An object is placed 80 cm in front of a concave mirror. The real image formed by the mirror is located 40 cm in front of the mirror. What is the object's magnification?
23. Consider the following diagram in which M is a mirror and P is an object and Q is its magnified image formed by the mirror.



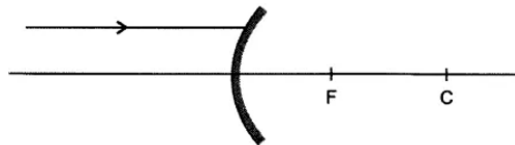
State the type of the mirror M and one characteristic property of the image Q.

THREE MARKS TYPE QUESTIONS

24. a) To get an enlarged, real and inverted image of an object by a concave mirror, where should the object be placed? Draw a labelled ray diagram to justify your answer.
 (b) If an object is placed at the centre of curvature of this mirror, what will be the magnification produced?
25. If a man's face is 25 cm in front of concave shaving mirror producing erect image 1.5 times the size of face. Find the focal length of the mirror.
26. An object 2 cm in size is placed 30 cm in front of a concave mirror of focal length 15 cm. At what distance from the mirror should a screen be placed in order to obtain a sharp image? Draw the ray diagram for the image formation.
27. An object of size 7.0 cm is placed at 27 cm in front of a concave mirror of focal length 18 cm. At what distance from the mirror should a screen be placed, so that a sharp focused image can be obtained? Find the size and the nature of the image.

FIVE MARKS TYPE QUESTIONS

28. a. Redraw the diagram given below in your answer book and show the direction of the light ray after reflection from the mirror.



- b. If the image formed by a spherical mirror for all positions of the object placed in front of it is always erect and diminished, what type of mirror is it?
 - c. If we want to obtain a virtual and magnified image of an object by using a concave mirror of focal length 18 cm, where should the object be placed? Use mirror formula to determine the object distance for an image of magnification +2 produced by this mirror to justify your answer.
29. (i) A concave mirror of focal length 10 cm can produce a magnified real as well as virtual image of an object placed in front of it. Draw ray diagrams to justify this statement.
- (ii) An object is placed perpendicular to the principal axis of a convex mirror of focal length 10 cm. The distance of the object from the pole of the mirror is 10 cm. Find the position of the image formed.

CASE STUDY QUESTIONS/PASSAGE-BASED QUESTIONS

30. Highly polished smooth surface from which most of the light is reflected is called a mirror. There are two types of mirrors; plane mirror and curved mirror. Plane mirror is a mirror whose reflecting surface is plane and a curved mirror is a mirror whose reflecting surface is curved one. It may be of any shape - spherical, elliptical or parabolic. There are two types of spherical mirrors; concave mirror and convex mirror. In a concave mirror, the reflecting surface faces inwards. The reflection takes place only at the inner surface. In a convex mirror, the reflecting surface faces outwards. Thus, the spherical mirror that has a convex reflecting surface is called a convex mirror.
- A. What is the radius of curvature of a mirror having focal length 15 cm.
 - B. What is the nature of the image formed by a concave mirror if the magnification produced by the mirror is +3?
 - C. What kind of mirrors are used in the headlights of a motor-car and why?

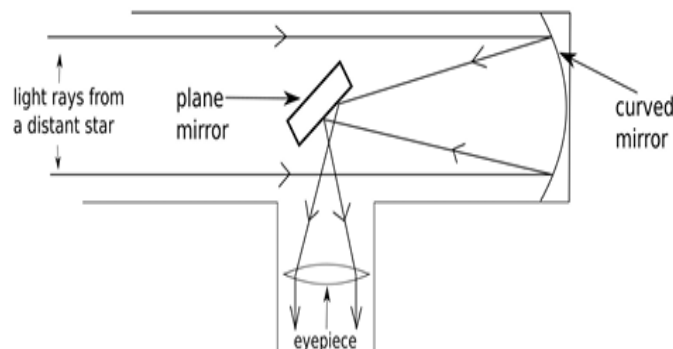
OR

- D. An object is placed 60cm in front of a convex mirror. The virtual image formed by the mirror is located 30 cm behind the mirror. What is the magnification? Write the characteristics of the image.
31. A highly polished surface such as a mirror reflects most of the light falling on it. In our daily life we use two types of mirrors- plane and spherical. The reflecting surface of a spherical mirrors may be curved inwards or outwards. In concave mirrors, reflection takes place from the inner surface, while in convex mirrors reflection takes place from the inner surface, while in convex mirrors reflection takes place from the outer surface.
- A. Define the principal axis of a concave mirror.
 - B. A ray of light is incident on a concave mirror, parallel to its principal axis. If this ray after reflection from the mirror passes through the principal axis from a point at a distance of 10cm from the pole of the mirror, find the radius of curvature of the mirror.
 - C. i. An object is placed at a distance of 10cm from the pole of a convex mirror of focal length 15cm. Find the position of the image.

OR

D.ii. A mirror forms a virtual, erect and diminished image of an object. Identify the type of this mirror. Draw a ray diagram to show the image formation in this case

32.



The above image is that of a reflecting telescope. Reflecting telescopes revolutionised our ways of looking into the sky. They employ mirrors to gather and focus light, rather than relying solely on lenses as in their refracting counterparts. These telescopes utilise precisely shaped and polished mirrors to capture incoming light and reflect it to a focal point, where it forms an image for observation.

A. What kind of image of the star is seen by the observer at the eyepiece?

B. What kind of mirror is used in this reflecting telescope?

Attempt either subpart C or D.

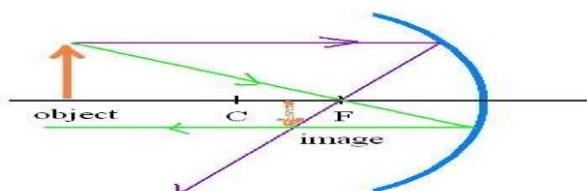
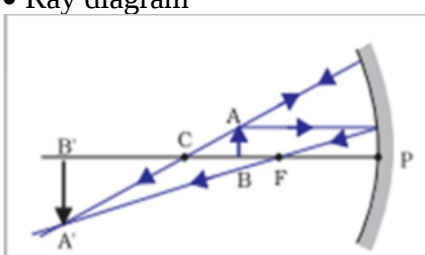
C. Explain with reason what kind of optical device (type of lens or mirror) that is used at the eyepiece.

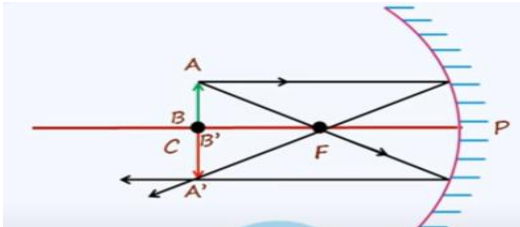
OR

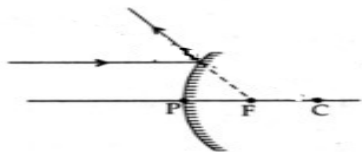
D. What is the role of the plane mirror in the telescope?

ANSWER KEY

1.	(a) Concave mirror, Nature of image- real
2.	(d) I and III
3.	(b) A ray passing through the centre of curvature and incident obliquely.
4.	(a)(i) and (ii)
5.	(d) Zero
6.	(d) Between 0 cm and 15 cm
7.	c) +1.0cm
8.	d) +, +
9.	b. (i) (ii) and (iv)
10.	(b) - 10 cm
11.	(c) 55° , 55°

12.	(c) Concave mirror
13.	(d) -7 cm
14.	(d) behind the mirror and its position varies according to the object distance.
15.	(c) Assertion (A) is true but reason (R) is false
16.	(b) Both A and R are true, and R is not the correct explanation of A
17.	(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
18.	(d) Assertion (A) is false but reason (R) is true
19.	(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
20.	-1 
21.	1 cm on the scale
22.	$m = -v/u$ $v = -40 \text{ cm}$ $u = -80 \text{ cm}$ $m = -(-40/-80)$ $= -0.5$
23.	Concave Mirror Image formed is virtual /erect /magnified
24.	a) Between F and C • Ray diagram  b) Magnification produced is (-)1 (if 1 is written deduct ½ mark) Image formed is of same size, real and inverted (Note : If a candidate writes give ½ mark)

25.	$m = -\frac{v}{u} \Rightarrow 1.5 = -\frac{v}{-25}$ $\Rightarrow v = \frac{75}{2} \text{ cm}$ Now, from mirror formula, $\frac{1}{f} = \frac{1}{v} + \frac{1}{u} = \frac{1}{75/2} + \frac{1}{-25} = -\frac{1}{75}$ $\therefore f = -75 \text{ cm}$ Hence, focal length of concave mirror is 75 cm.
26.	$f = -15 \text{ cm}$, $h_o = 2 \text{ cm}$, $u = -30 \text{ cm}$. Using, $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$, we get $\frac{1}{v} = \frac{1}{f} - \frac{1}{u} = \frac{1}{-15} - \frac{1}{-30}$ $= \frac{2-1}{-30} = \frac{1}{-30}$ $\Rightarrow v = -30 \text{ cm}$ 
27.	Here, object size, $h = +7.0 \text{ cm}$, object distance, $u = -27 \text{ cm}$ and focal length, $f = -18 \text{ cm}$ Image distance, $v = ?$ and image size, $h' = ?$ From the mirror formula, $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$, we have $\frac{1}{v} = \frac{1}{f} - \frac{1}{u} \quad \text{or} \quad \frac{1}{v} = \frac{1}{-18} - \frac{1}{-27} = \frac{-3+2}{54} = -\frac{1}{54} \quad \text{or} \quad v = -54 \text{ cm}$ The screen should be placed at a distance of 54 cm on the object side of the mirror to obtain a sharp image. Now, magnification, $m = \frac{h'}{h} = -\frac{v}{u}$ or image size, $h' = -\frac{vh}{u} = \frac{(-54) \times (+7)}{(-27)} = -14 \text{ cm}.$ The image is real, inverted and enlarged in size.
28.	(a)



(b)

Convex mirror

- (c) To obtain a virtual and magnified image of an object by using a concave mirror we should place the object between pole (P) and focus (F) on the principal axis. The object should be placed at a distance less than 18 cm from the front of mirror.

$$\text{Now, } m = -\frac{v}{u} = +2$$

$$v = -2u$$

$$\text{As, } f = -18\text{cm}$$

Using mirror formula

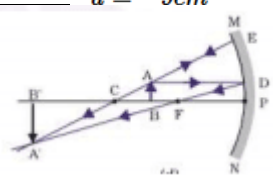
$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$

$$\frac{1}{-18} = \frac{1}{-2u} + \frac{1}{u}$$

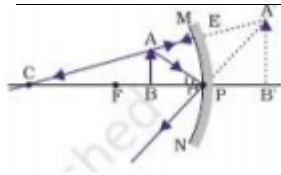
$$\frac{1}{-18} = \frac{1}{2u}$$

$$u = -9\text{cm}$$

29.



Real



Virtual

$$f = +10\text{ cm}$$

$$u = -10\text{ cm}$$

$$\Rightarrow \frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$

$$\Rightarrow \frac{1}{10} = \frac{1}{v} + \frac{1}{-10}$$

$$\Rightarrow \frac{1}{v} = \frac{1}{10} - \frac{1}{-10}$$

$$\Rightarrow \frac{1}{v} = \frac{1}{10} + \frac{1}{10}$$

$$\Rightarrow \frac{1}{v} = \frac{2}{10}$$

$$\Rightarrow v = \frac{10}{2}$$

$$\Rightarrow v = +5\text{ cm}$$

30.

A. The radius of curvature = 30 cm

B. The image is virtual, erect and magnified.

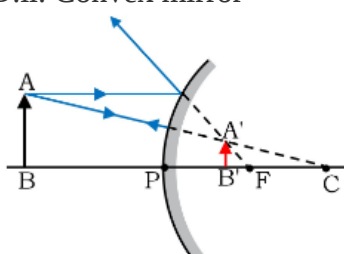
C. Concave mirrors (1) are used in head-lights to get powerful beam of light. This is because when a lighted bulb is placed at the focus of a concave reflector, it produces a powerful beam of parallel light rays. (1)

OR

$$D. m = -v / u = -30 / -60 (1/2)$$

$$m = 1/2, (1/2)$$

Image is virtual, erect and smaller than the object. (1)

31.	A. The principal axis is a straight line that passes through the pole and centre of curvature of a spherical mirror. B. $R=2f=2\times 10=20\text{cm}$ C.i. Given: Object distance, $u = -10\text{ cm}$ The focal length of the mirror, $f = 15\text{ cm}$ Mirror type = convex Finding the image distance using the mirror formula: We know the formula $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$ Therefore, $\frac{1}{v} = \frac{1}{f} - \frac{1}{u}$ Substituting the known values in the above equation we get, $\frac{1}{v} = \frac{1}{15} - \left(\frac{-1}{10}\right)$ $\frac{1}{v} = \frac{1}{15} + \frac{1}{10}$ $\frac{1}{v} = \frac{(2+3)}{30}$ Hence, $v = \frac{30}{5} = 6\text{cm}$ OR D.ii. Convex mirror 
32.	A. Real Image (the final image is formed due to the lens at the eye-piece) B. Concave Mirror C. A converging lens is used at the eyepiece to collect the rays from the plane mirror and help the viewer to see a real erect image of the star. OR D. The plane mirror laterally inverts the image formed by the curved mirror and its position helps to direct the rays towards the eye-piece.

Prepared by : Ms Vipina Gangadharan	Checked by: HOD Science
--	----------------------------