THE VILLAGE
INTERNATIONAL SCHOOL
"We Nurture Dreams"

Revision Worksheet -MT 3

Grade 10

Chapter 10- Light

1) The laws of reflection hold true for (1)
(a) plane mirrors only
(b) concave mirrors only
(c) convex mirrors only
(d) all reflecting surface
Answer:
(d) The laws of reflection hold true for all reflecting surface.

2) List four characteristics of the images formed by plane mirrors. (1)
Answer:
Characteristics of the image formed by a plane mirror are
(i) image distance is same as that of object distance
(ii) image formed is virtual and erect
(iii) image formed is of the same size as that of the object
(iv) image formed is laterally inverted (left appears right and right appears left).

3) When an object is kept within the focus of a concave mirror, an enlarged image is formed behind the mirror. This image is (1)
(a) real
(b) inverted
(c) virtual and inverted
(d) virtual and erect
Answer:
(d) When an object is placed between the principal focus and pole of a concave mirror, an enlarged virtual and erect image is formed behind the mirror.

4) An object is placed at a distance of 30 cm in front of a convex mirror of focal length 15 cm. Write four characteristics of the image formed by the mirror. (1)
Answer:
Four characteristics of the image formed by the given convex mirror are:
(i) Virtual
(ii) Erect
(iii) Diminished
(iv) Image is always formed behind the mirror between pole and focus.

5) "The magnification produced by a spherical mirror is -3". List four informations you obtain from this statement about the mirror/ image. (2)
Answer:

Negative sign of magnification indicates that the image is real and inverted. Since the image is real and inverted, the mirror is concave and magnification of -3 indicates that the image is magnified.

6) List two possible ways in which a concave mirror can produce a magnified image of an object placed in front of it. State the difference if any between these two images. (2)

Answer:

A concave mirror can produce a magnified image of an object when object is placed:

(1) In between its pole and its focus

(2) In between its focus and its centre of curvature.

Difference,between these two images:

The image produced in first case will be virtual and erect.

The image produced in second case will be real and inverted

7) State the laws of refraction of light. Explain the term absolute refractive index of a medium. (3)

Answer:

(a) Laws of refraction of light:

(i) The incident ray, the refracted ray and the normal to the interface of two transparent media at the point of incidence, all lie in the same plane.

(ii) The ratio of sine of angle of incidence to the sine of the angle of refraction is constant, for the light of a given colour and for the given pair of media.

This law is also known as Snell's law of refraction.

$\sin i/\sin r$ = constant,

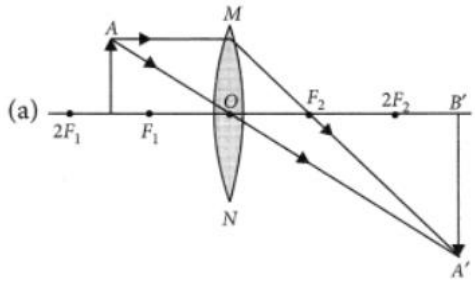
where i is the angle of incidence and r is the angle of refraction.

This constant value is called refractive index of the second medium with respect to the first when the light travels from first medium to second medium.

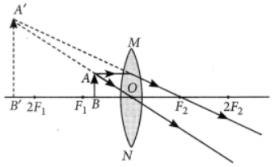
$\Rightarrow$ constant = $n_{21} = v_1/v_2$ $\quad \therefore \sin i/\sin r = v_1/v_2$

8) Draw ray diagrams to show the formation of three times magnified (a) real, and (b) virtual image of an object by a converging lens. Mark the positions of O, F and 2F in each diagram. (3)

Answer:



(b) Ray diagrams of an object placed between F_1 and optical centre O of lens can be drawn as follows:



(i) The image formed is virtual and erect.
(ii) Image is formed in front of the lens.
(iii) Image formed is enlarged.

9) If the speed of light in vacuum is 3×10^8 m/s, find the absolute refractive index of a medium in which light travels with a speed of 1.4×10^8 m/s. (3)

Answer:

Laws of refraction: Refer to answer 74.

The speed of light in vacuum = 3×10^8 m/s

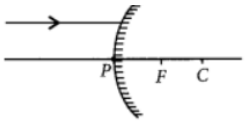
The speed of light in a medium = 1.4×10^8 m/s

∴ Absolute refractive index

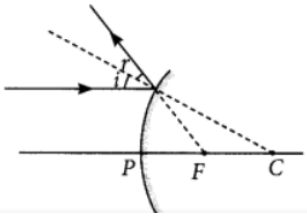
$$= \frac{\text{Speed of light in vacuum}}{\text{Speed of light in a medium}}$$

$$n = \frac{3 \times 10^8 \text{ m/s}}{1.4 \times 10^8 \text{ m/s}} = 2.14$$

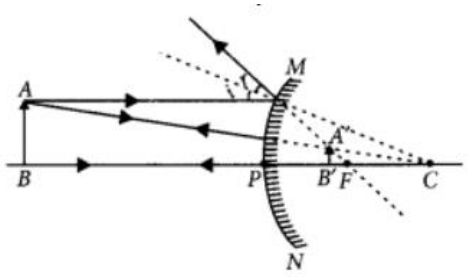
10) A ray of light is incident on a convex mirror as shown. Redraw the diagram and complete the path of this ray after reflection from the mirror. Mark angle of incidence and angle of reflection on it. (2)



Answer:



11) List two properties of the images formed by convex mirrors. Draw ray diagram in support of your answer.
Answer: (2)
Convex mirrors always form diminished, virtual and erect images.



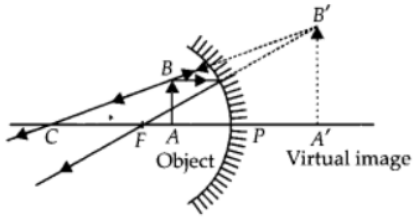
12) The linear magnification produced by a spherical mirror is +3. Analyse this value and state the (i) type of mirror and (ii) position of the object with respect to the pole of the mirror. Draw a ray diagram to show the formation of image in this case. (3)

Answer:

Positive value of the magnification indicates that image is virtual and erect.

(i) Since the image is magnified, the mirror is concave.

(ii) The object is between pole and focus of the mirror as shown

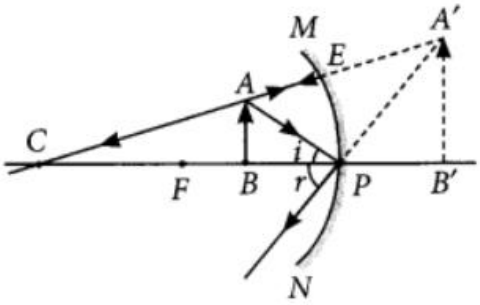


The image produced in second case will be real and inverted.

13) The image formed by a concave mirror is observed to be virtual, erect and larger than the object. Where should the position of the object be relative to the mirror? Draw ray diagram to justify your answer. (3)

Answer:

The position of the object should be between P and F



14) Mention the types of mirrors used as (i) rear view mirrors, (ii) shaving mirrors. List two reasons to justify your answer in each case. (3)

Answer:

(i) Convex mirror is used as rear view mirror because

(a) it gives erect image.

(b) it gives diminished image thus provides wider view of traffic behind the vehicle.

(ii) Concave mirror is used as shaving mirror because

(a) it gives erect image when mirror is close to the face.
(b) it gives enlarged image of the face so that a person can shave safely.

15) State the types of mirrors used for (i) headlights and (ii) rear view mirrors, in motorcycles. Give reason to justify your answer in each case. (2)
Answer:
(i) Concave mirrors are used in headlights of cars to get powerful beams of light.
(ii) Convex mirrors are used as rear-view mirrors of vehicle to get a wider field of view and and erect image of traffic behind.

16) **Assertion(A) :** The centre of curvature is not a part of the mirror. It lies outside its reflecting surface.
Reason (R) : The reflecting surface of a spherical mirror forms a part of a sphere. This sphere has a centre.

(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

Ans: (a)

17) **Assertion (A) :** Light does not travel in the same direction in all the media.
Reason (R) : The speed of light does not change as it enters from one transparent medium to another.
(a)Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.
Ans: c)

18) **Assertion(A) :** A ray of light travelling from a rarer medium to a denser medium slows down and bends away from the normal. When it travels from a denser medium to a rarer medium, it speeds up and bends towards the normal.
Reason (R) : The speed of light is higher in a rarer medium than a denser medium.
a)Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.
Ans : (d)

19) **Assertion(A):** The mirrors used in search lights are concave spherical.
Reason (R) : In concave spherical mirror the image formed is always virtual.
a)Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.
Ans : c

20) **Assertion(A) :** Light travels faster in glass than in air.
Reason (R) : Glass is denser than air.
a)Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.

(c) A is true but R is false.
(d) A is false but R is true.
Ans : c