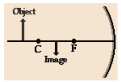
Wave Reflection

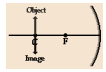
Definitions

Concave Mirrors

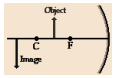
The object is beyond C: image will be an inverted image/reduced in size/real



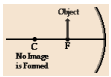
The object is at C: image will be inverted/equal to the object size/real.



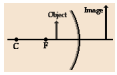
The object is between C & F: image will be inverted/larger/real.



The object is at F: When the object is located at the focal point, no image is formed.

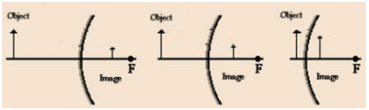


The object is in front of F: image will be upright/magnified/virtual. The image is behind the mirror.



Convex Mirrors

Regardless of the position of the object the image will always be virtual/upright/ reduced in size. The image is behind the mirror. The image is located behind the mirror by tracing the rays back to where they appear to come from.



Equations

$\frac{1}{f}=\frac{1}{d_o}+\frac{1}{d_i}$	Focal length	f	m
	Object distance	d_o	m
	Image distance	d_i	m
$m=\frac{d_i}{d_o}=\frac{h_i}{h_o}$	magnification	m	-
	Image distance	d_i	m
	Object distance	d_o	m
	Image height	h_i	m
	Object height	h_o	m

f: Distance between f and pole of mirror.
d_o: Distance from the mirror to the object.
d_i: Distance from the mirror to the image
h_o: Height of the object.
h_i: Height of the image.
m: Magnification – the ratio of height of object, h_o to height of image, h_i

- If d_i is behind the mirror/virtual it is negative
- The image height, h_i for a virtual image is negative
- The focal length for a convex mirror is negative

Questions

AT THE SWIMMING POOL (2020;1)
Mia and Aria are at the swimming pool. They notice the lifeguards are using a convex mirror on the wall to help them see the swimmers in the pool.

(a) Complete the ray diagram below to show the formation of the image.
(b) Describe the nature, size, and orientation of the images of the swimmers formed by the mirror. Assume the mirror is far away from the swimmers.

Terms

F: the focal length
C: the centre of curvature (where C = 2f)

Real image: An image generated by a mirror that can be projected onto a screen
Virtual image: An image where light rays appear to originate from a mirror; this image cannot be projected on a screen

Tips

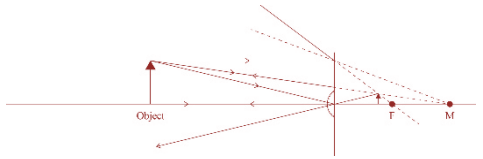
Ray diagrams for Curved Mirrors

1. A ray parallel to the principal axis will be reflected through F.
2. A ray that passes through F will be reflected parallel to the principal axis.
3. A ray that passes through the centre of curvature, C, is reflected back along itself.

REMEMBER – you do not need to draw all 3 rays. The first two are enough, and then you can use the 3rd ray as a check.

Answers

(a)



(b) Upright, virtual, and diminished.