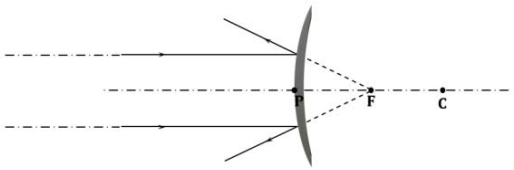
IMAGE FORMATION BY CONVEX MIRROR

Image Formation By Convex Mirror: Real Object

Case 1: When a real object is positioned at negative infinity, the resulting image will form at the focal point, and it will be virtual, appearing as a point image.



Case 2: When the real object is situated between negative infinity and the mirror's pole, the resulting image will form between the pole and the focus. It will be virtual, erect, and smaller in size compared to the object.

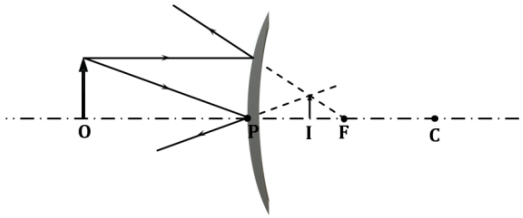
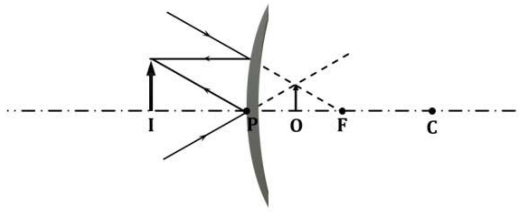
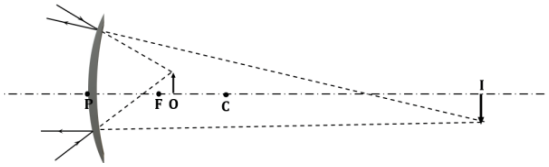


Image Formation By Convex Mirror: Virtual Object

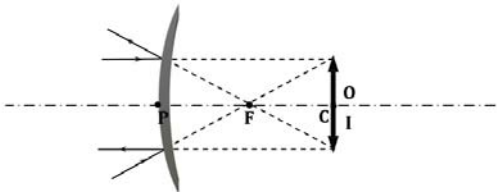
Case 3: When the virtual object is positioned between the mirror's pole and its focus, the resulting image will form between the pole and negative infinity. It will be real, erect, and larger in size than the object.



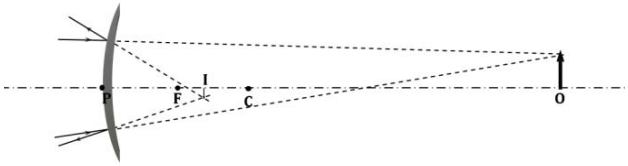
Case 4: If the virtual object is positioned between the mirror's focus and its center of curvature, the resulting image will form beyond the center of curvature. It will be virtual, inverted, and larger in size than the object.



Case 5: If the virtual object is positioned at the center of curvature of the mirror, the resulting image will also form at the center of curvature. It will be virtual, inverted, and identical in size to the object.



Case 6: If the virtual object is positioned beyond the center of curvature of the mirror, the resulting image will form between the focus and the center of curvature. It will be virtual, inverted, and smaller in size than the object.



Monty's ray diagram for Convex Mirror

Object	Image	Nature	
$O = -\infty$	$I = F$	Virtual, Point Image	Case 1
$-\infty < O < P$	$P < I < F$	Virtual, Erect, Smaller	Case 2
$P < O < F$	$-\infty < I < P$	Real, Erect, Larger	Case 3
$F < O < C$	$C < I < \infty$	Virtual, Inverted, Larger	Case 4
$O = +C$	$I = +C$	Virtual, Inverted, Same Size	Case 5
$C < O < \infty$	$F < I < C$	Virtual, Inverted, Smaller	Case 6

In the figure, Ray 1 corresponds to both Case 1 and Case 2 as outlined in the table.
Ray 2 in the figure represents Case 3 as described in the table.
Ray 3 in the figure corresponds to both Case 4 and Case 5 as depicted in the table.
Ray 4 in the figure also represents Case 3 as outlined in the table.

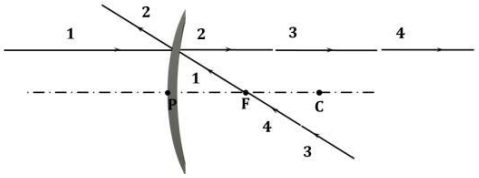
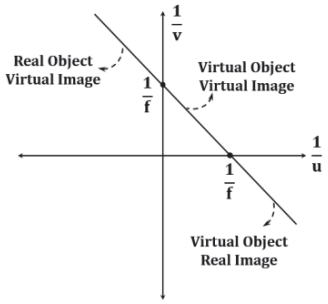


Image Formation by Convex Mirror: Graphical Representation

We Know that, $\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$

Given that f remains consistent and positive for a concave mirror, let. $\frac{1}{f} = c$. Now by choosing $\frac{1}{u} = x$ and $\frac{1}{v} = y$, we get, $y + x = c = \frac{1}{f}$



This depicts a linear trend with a negative slope, as illustrated in the figure.
In the 1st quadrant, $\frac{1}{u} = x = +ve$ and $\frac{1}{v} = y = +ve$ Therefore, u = +ve and v = +ve. Consequently, this segment of the straight line represents "virtual object" and "virtual image".
In the 2nd quadrant, $\frac{1}{u} = x = -ve$ and $\frac{1}{v} = y = +ve$, Therefore, u = −ve and v = +ve. Consequently, this segment of the straight line denotes "real object" and "virtual image".
In the 3rd quadrant, $\frac{1}{u} = x = +ve$ and $\frac{1}{v} = y = -ve$, Therefore, u = +ve and v = −ve. Consequently, this segment of the straight line indicates "virtual object" and "real image".

Since f is constant, if we plot "v" vs "u" graph, then the graph will be a hyperbola