

# CHAPTER : ELECTRICITY

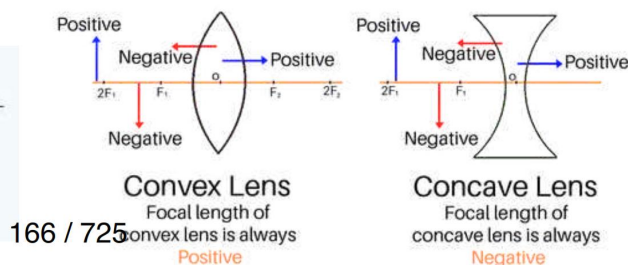
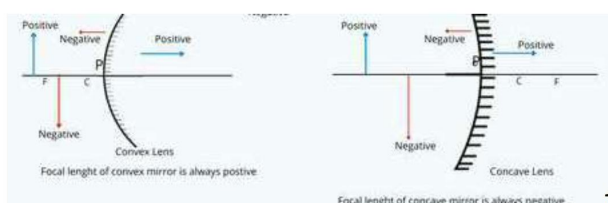
Sr. No	Topic	Formula
1.	Voltage (V)	$V = \frac{W}{Q}$ W = Work done Q = Charge
2.	Current (i)	$i = \frac{Q}{t}$ Q = Charge t = time
3.	Power (P)	$P = Vi$ V = Voltage i = Current
4.	Conductivity( $\sigma$ )	$\sigma = \frac{1}{\rho}$ $\rho$ = rho (Resistivity)
5.	Resistance(R)	$R = \frac{\rho l}{A}$ or $\frac{V}{i}$ $\rho$ = rho l = length A = Area
6.	Resistance in Series	$R_s = R_1 + R_2 + R_3 \dots$
7.	Power in Series	$P_s = Vi = i^2 R$ $P_s = \frac{1}{P_1} + \frac{1}{P_2} + \frac{1}{P_3} \dots$
8.	Resistance in Parallel	$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \dots$
9.	Power in Parallel	$P_p = Vi = \frac{V^2}{R}$ $P_p = P_1 + P_2 + P_3 \dots$
10.	Electric Energy or Heat Produced	$E = i^2 Rt = Vit = \frac{V^2}{R} t$



# CHAPTER : LIGHT

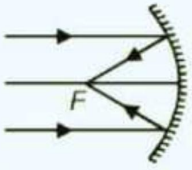
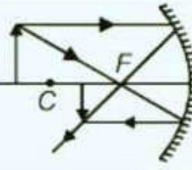
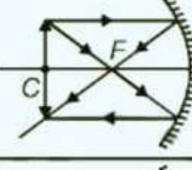
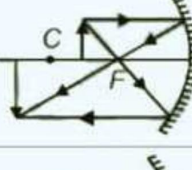
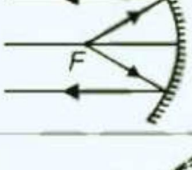

Sr. No	Topic	Formula
1.	Mirror Formula	$\frac{1}{V} + \frac{1}{U} = \frac{1}{F}$ V = image distance U = object distance F = focal length
2.	Lens Formula	$\frac{1}{V} - \frac{1}{U} = \frac{1}{F}$ V = image distance U = object distance F = focal length
3.	Magnification	$\frac{H_i}{H_o} = \frac{-V}{U}$ Hi = Height of image Ho = Height of object
4.	Power of a lens	$P = \frac{1}{F}$ F = Focal length
5.	Absolute Refractive index	$n = \frac{\text{speed of light in Vacuum}}{\text{speed of light in Medium}}$
6.	Relative Refractive Index	$n_{21} = \frac{\text{speed of light in Medium 1}}{\text{speed of light in Medium 2}}$
7.	Snell's Law	$n_{21} = \frac{\sin i}{\sin r}$ i = incidence angle r = refraction angle
8.	Combining power of lenses	$P = P_1 + P_2 + P_3 \dots$
9.	Radius Of Curvature	$2 \times \text{Focal length} = 2f$

## SIGN CONVENTIONS FOR MIRROR & LENS

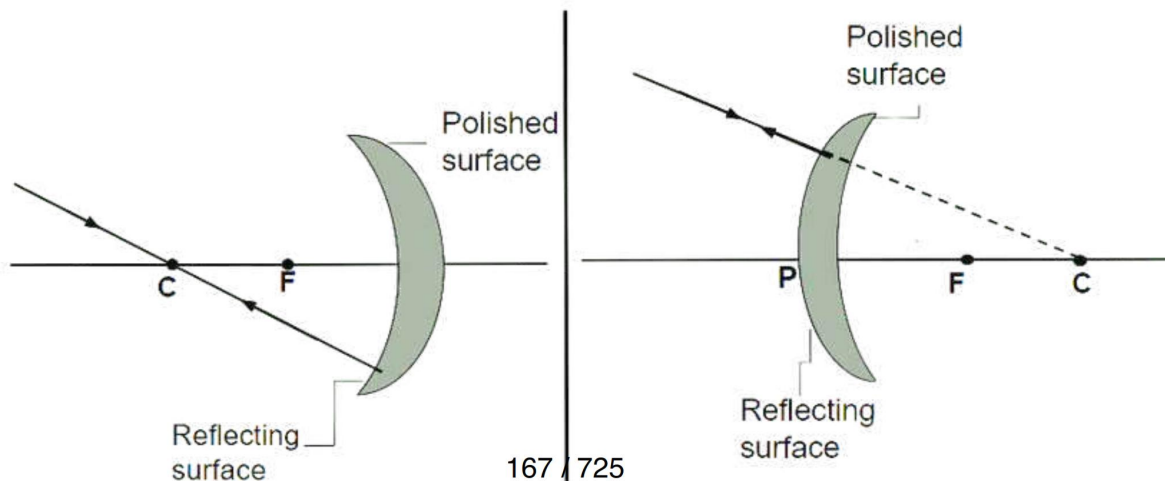




## IMAGES FORMED BY CONCAVE MIRROR

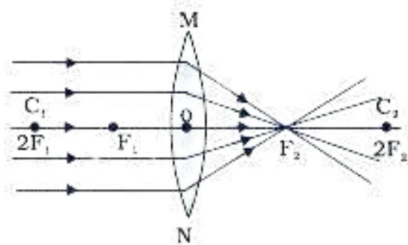
Position of object	Figure	Position of image	Nature of image
1. At infinity		At the principal focus or in the focal plane	Real, inverted, extremely diminished in size
2. Beyond the centre of curvature		Between the principal focus and centre of curvature	Real, inverted and diminished
3. At the centre of curvature		At the centre of curvature	Real, inverted and equal to object
4. Between focus and centre of curvature		Beyond centre of curvature	Real, inverted and bigger than object.
5. At the principal focus		At infinity	Extremely magnified
6. Between the pole and principal focus		Behind the mirror	Virtual, erect and magnified

## IMAGES FORMED BY CONVEX MIRROR

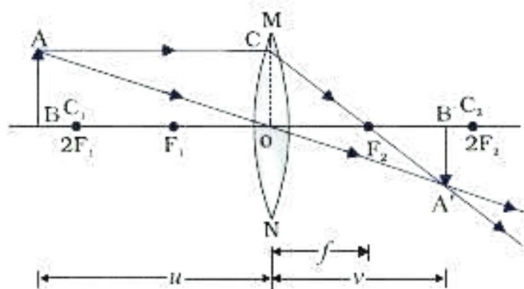




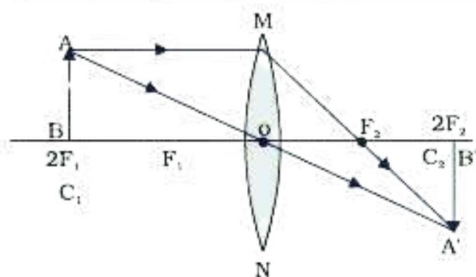
# IMAGES FORMED BY CONCEX LENS



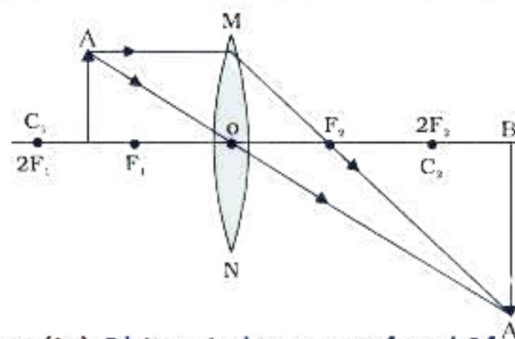
Case (i) Object at infinity



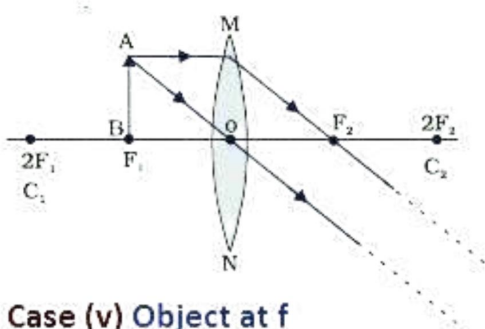
Case (ii) Object at beyond 2f



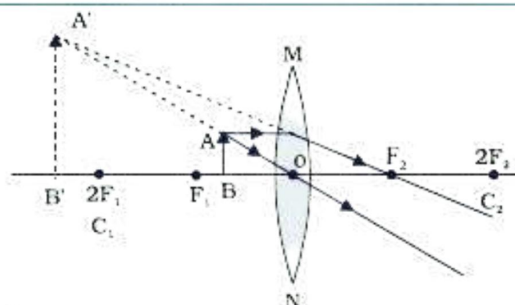
Case (iii) Object at 2f



Case (iv) Object in between f and 2f



Case (v) Object at f



Case (vi) Object distance < f

# IMAGES FORMED BY CONCAVE LENS

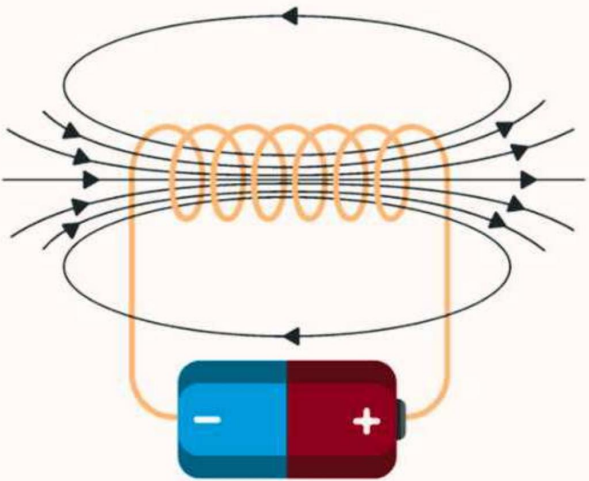
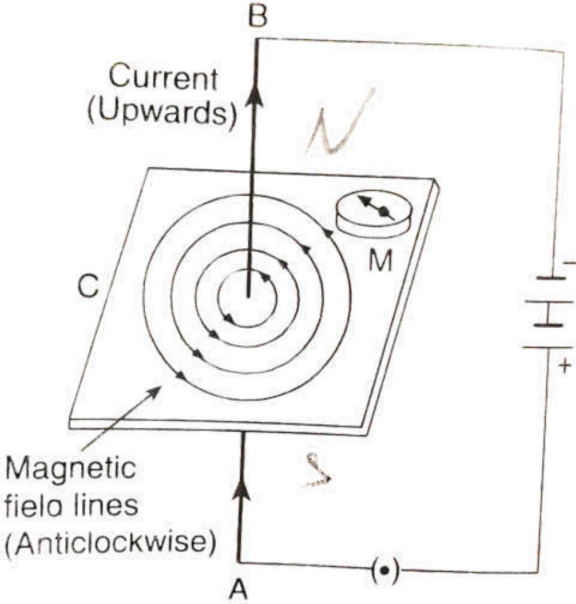
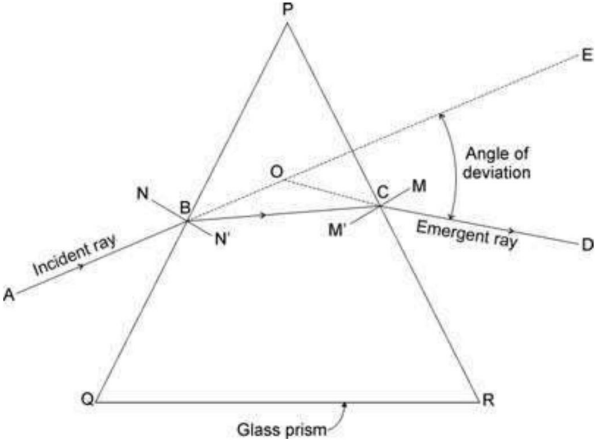
	Ray diagram	Position of object	Position of image	Nature of image
(a)	<p><math>u = -ve, v = -ve</math> and <math>f = -ve</math></p>	At infinity	At F	Virtual, erect and highly diminished
(b)	<p><math>u = -ve, v = -ve</math> and <math>f = -ve</math></p>	Between infinity and O	Between F and O	Virtual, erect and diminished



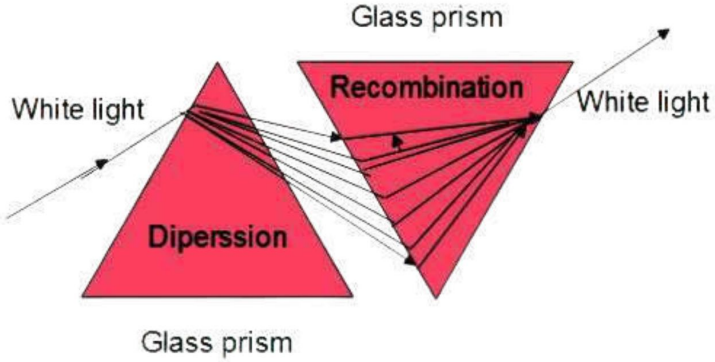
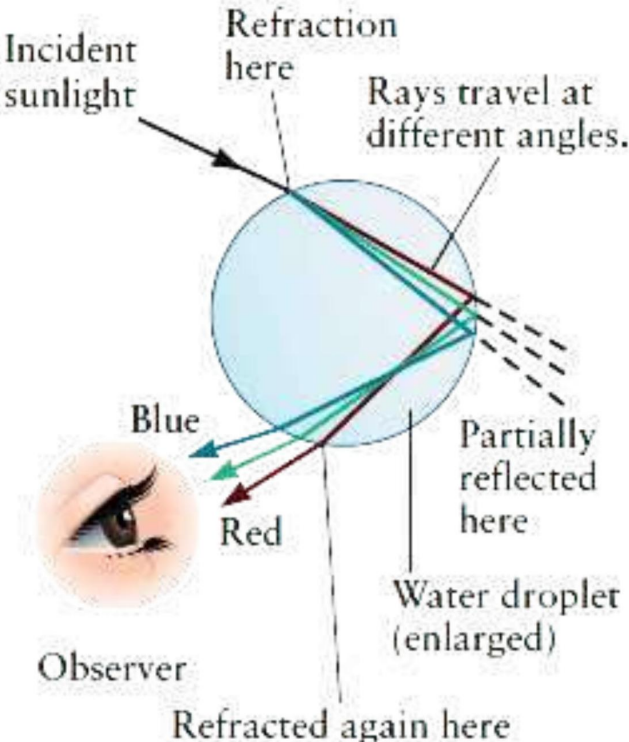
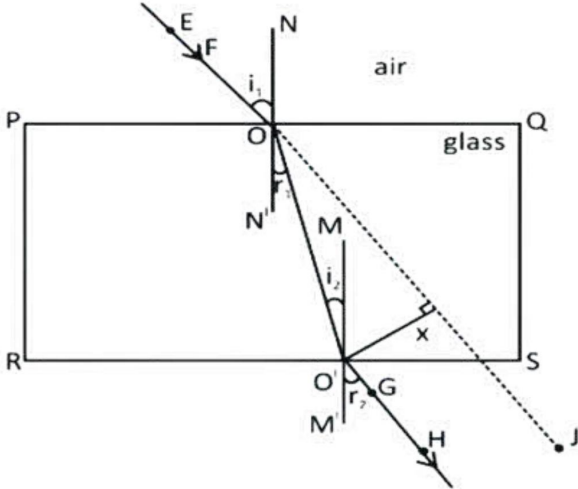
# IMPORTANT DIAGRAMS

Topic	Diagram
Magnetic lines around a magnetic bar	
Uniform Magnetic Field	<p>magnetic field lines</p>
Magnetic Field lines due to current carrying loop	
Magnetic Lines around two Magnets	



Topic	Diagram
<p>Magnetic lines around a solenoid</p>	 <p>The diagram shows a solenoid, which is a coil of wire, connected to a battery. The battery is represented by a blue rectangle with a minus sign (-) on the left and a red rectangle with a plus sign (+) on the right. Current flows from the positive terminal, through the solenoid, and back to the negative terminal. Black lines with arrows represent the magnetic field lines. These lines are concentrated inside the solenoid, pointing from left to right, and loop around the outside of the solenoid. The arrows on the external lines indicate a clockwise direction when viewed from the right end of the solenoid.</p>
<p>Magnetic lines around a current carrying conductor</p>	 <p>The diagram illustrates the magnetic field around a vertical wire carrying an upward current. The wire is labeled with 'B' at the top and 'A' at the bottom, with an arrow pointing upwards and the text 'Current (Upwards)'. Concentric circular lines around the wire represent the magnetic field, with an arrow indicating an 'Anticlockwise' direction. A small compass labeled 'M' is shown near the wire, with its needle deflected. The entire setup is connected to a battery on the right, with the positive terminal (+) at the bottom and the negative terminal (-) at the top. A symbol for current coming out of the page (a dot in a circle) is also present on the bottom wire segment.</p>
<p>Refraction through a glass prism</p>	 <p>The diagram shows a triangular glass prism with vertices labeled P (top), Q (bottom left), and R (bottom right). An 'Incident ray' enters the prism at point B on side PQ and exits at point C on side PR, becoming the 'Emergent ray'. The incident ray is extended forward to point A, and the emergent ray is extended backward to point D. The angle between these two extensions is labeled 'Angle of deviation'. Normal lines are drawn at points B and C: N-N' at B and M-M' at C. Point O is marked at the intersection of the incident ray and the normal at C. The prism itself is labeled 'Glass prism' at the bottom.</p>



Topic	Diagram
Recombination of spectrum of white light	 <p>The diagram illustrates the recombination of white light. It features two red glass prisms. The first prism, labeled 'Glass prism' at its base, is an upright triangular prism where 'White light' enters from the left and is dispersed into a spectrum of colored rays, labeled 'Dispersion'. The second prism, also labeled 'Glass prism' at its base, is an inverted triangular prism where the dispersed rays enter from the left and are recombined into a single 'White light' ray exiting to the right, labeled 'Recombination'.</p>
Rainbow Formation	 <p>This diagram shows the formation of a rainbow. 'Incident sunlight' enters a circular 'Water droplet (enlarged)'. At the point of entry, 'Refraction here' occurs, and 'Rays travel at different angles.' Inside the droplet, the light reflects off the back surface, labeled 'Partially reflected here'. As the light exits the droplet, it undergoes 'Refraction again here'. The exiting rays are shown as a spectrum of colors, with 'Blue' at the top and 'Red' at the bottom. An 'Observer' is depicted looking at the droplet.</p>
Refraction through a glass slab	 <p>The diagram shows a rectangular glass slab with vertices P, Q, R, and S. An incident ray EF enters the top surface PQ at point O. A normal line NN' is drawn at O. The angle of incidence is <math>i_1</math>. The ray refracts into the glass, becoming ray OM. At the bottom surface RS, the ray emerges as ray GH at point O'. A normal line MM' is drawn at O'. The angle of emergence is <math>r_2</math>. A dashed line extends from the incident ray through the slab to point J. Other points labeled include N, M, G, and S. The medium above the slab is labeled 'air'.</p>