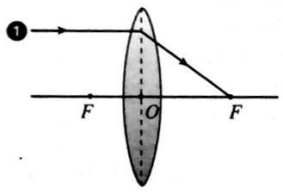
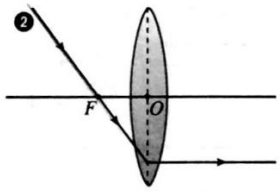
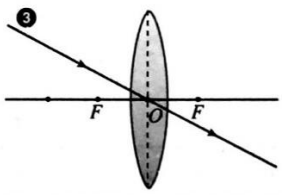
Signature: Name: Marks:

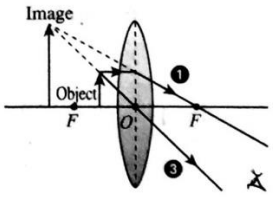
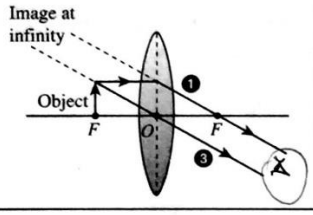
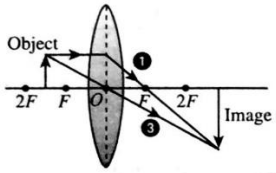
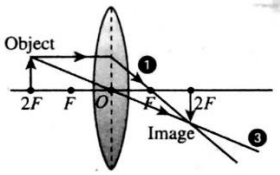
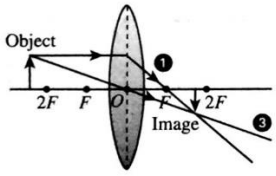
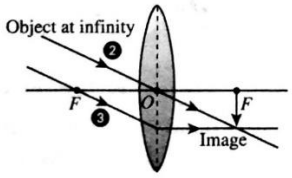
Ray Diagrams for Lenses Worksheet

Concave lens			
Ray	Ray ❶	Ray ❷	Ray ❸
Incident ray	A ray moves in parallel to the principal axis.	A ray passes through *F*.	A ray passes through *O*.
Refracted ray	The ray is refracted inwards to converge at *F*.	The ray is refracted parallel to the principal axis	The ray is not refracted.
Ray diagram			

Draw the image formed from the object and state the image characteristics (Length of axis is 15 cm)

[You'll need a ruler and pencil]

Signature: Name: Marks:

Position of object	Ray diagram	Characteristics and position of image	Application
• Between F and P • $u < f$		• Image is behind the object and on the same side of the lens ($v > f$). • Virtual • Upright • Magnified • On the same side as the object	Magnifying lens
• Object, is at F • $u = f$		• Image is at infinity ($v = \infty$). • Virtual • Upright • Magnified • On the same side as the object	Eyepiece of telescope
• Between F and $2F$ • $f < u < 2f$		• Image is beyond $2F$ ($v > 2f$). • Real • Inverted • Magnified • Opposite side of the object	Objective lens of microscope
• Object is at $2F$ • $u = 2f$		• Image is formed at $2F$ ($v = 2f$). • Real • Inverted • Same size • Opposite side of the lens at $2F$ ($v = 2f$).	Photocopying machine
• Object is beyond $2F$ • $u > 2f$		• Image is between F and $2F$ ($f < v < 2f$). • Real • Inverted • Diminished in size • Opposite side of the lens)	Lens of camera
• Object is at infinity • $u = \infty$		• Image is at F ($v = f$). • Real • Inverted • Diminished • Opposite side of the lens	Objective lens of telescope