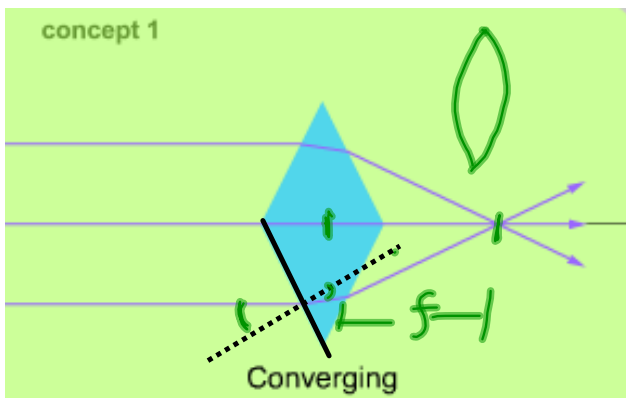


Lenses

magnify things (possibly)

Concave + convex


concept 1



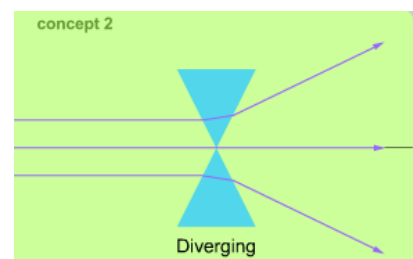
Converging

Converging lens
Two stacked prisms form crude lens
Prisms refract light
Thicker at center

Convex



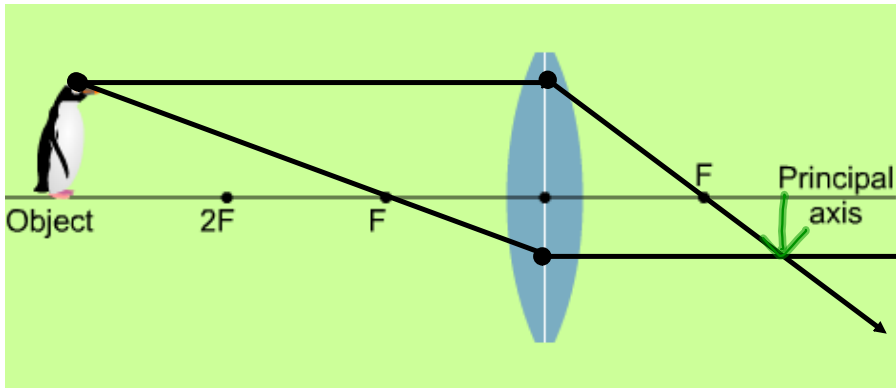
concept 2



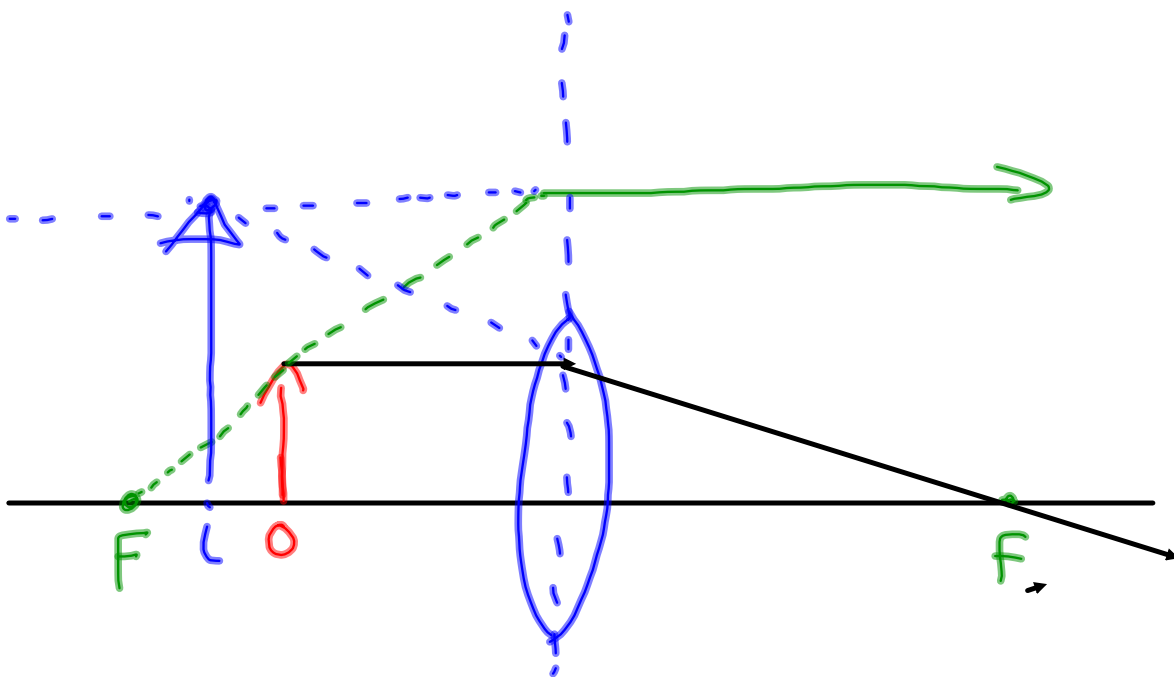
Diverging

Diverging lens
Thinner in center, light "spreads out"

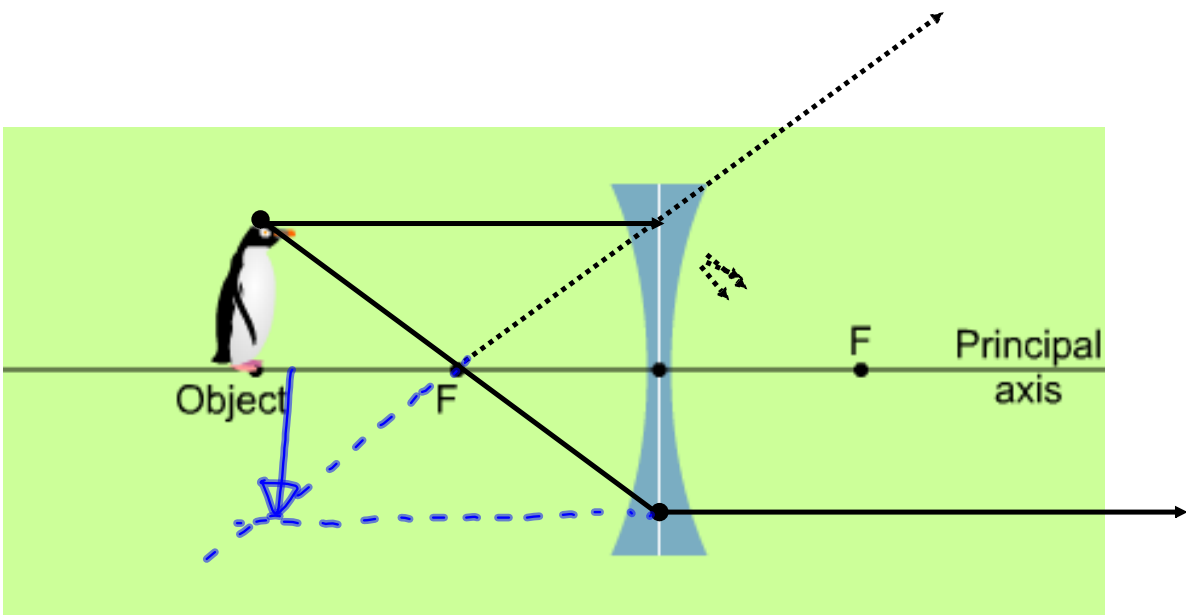
Concave



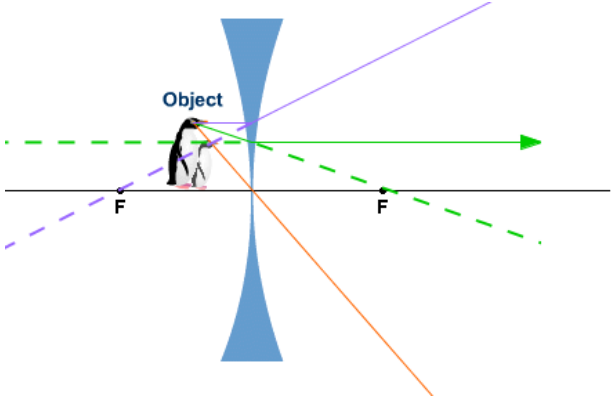
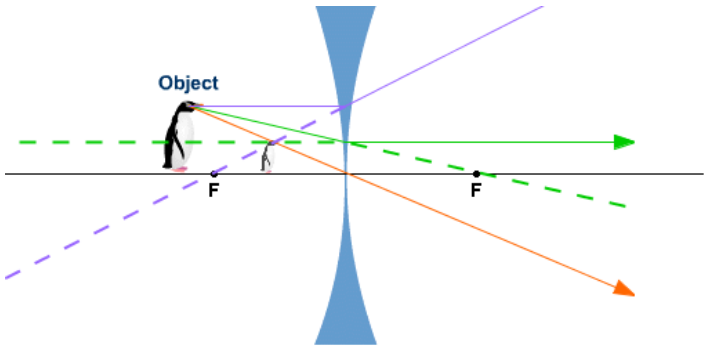
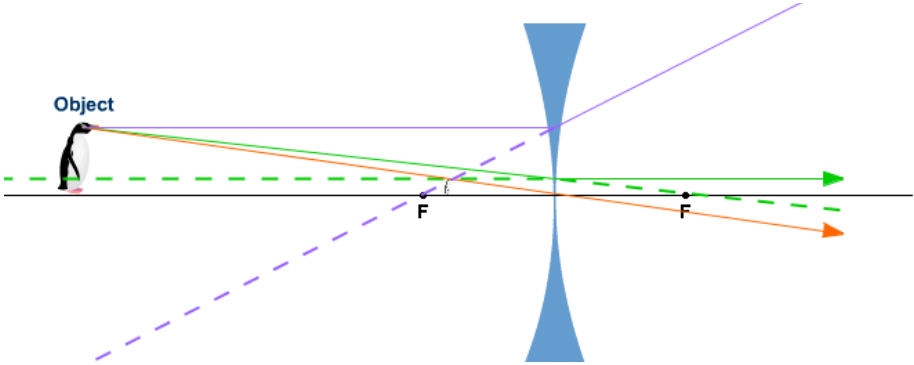
Inverted
smaller



Upright
Virtual
larger



smaller, inverted, virtual

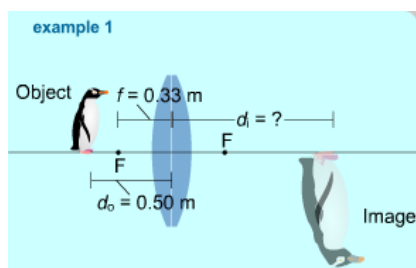


Quantity	Positive sign	Negative sign
Focal length, f	CONVEX Converging lens	CONCAVE Diverging lens
Image distance, d_i	Far side (real)	Object side (virtual)
Object distance, d_o	Real	Virtual
Magnification, m and height, h	Image upright	Image inverted

Lense EQ

$$\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$$

$$m = \frac{h_i}{h_o}$$



$$d_i = ? \quad m = ?$$

$$d_o = 0.50 \text{ m}$$

$$f = 0.33 \text{ m}$$

$$\frac{1}{f} = \frac{1}{d_i} + \frac{1}{d_o}$$

$$\frac{1}{.33} = \frac{1}{d_i} + \frac{1}{.50}$$

$$\frac{1}{d_i} = \frac{1}{.33} - \frac{1}{.5}$$

$$\frac{1}{d_i} = 3 - 2 = 1$$

$$d_i = 1 \text{ m}$$

$$M = \frac{-d_i}{d_o} = \frac{-1}{.5}$$

$$m = -2$$

$$\frac{1}{x} = .721$$

$$x = \frac{1}{.721}$$