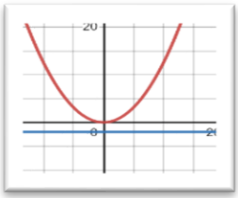
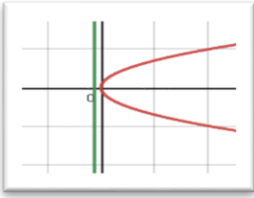
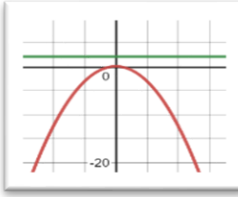



Working with Basic Conics Exercises

Parabolas

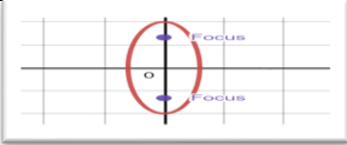
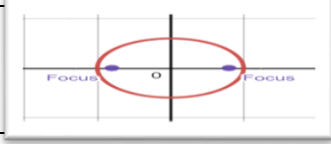
Formula	$x^2 = 4py$ (vertical)	$y^2 = 4px$ (horizontal)
Vertices	$(0,0)$	$(0,0)$
Focus	$(0, p)$	$(p, 0)$
directrix	$y = -p$	$x = -p$
P > 0	<i>opens up</i>	<i>opens right</i>
P < 0	<i>opens down</i>	<i>opens left</i>
Focal diameter	$= 4p $	$= 4p $

$x^2 = 8y,$ $8 = 4p, p = 2$ Focus: $(0, 2)$ Directrix $y = -2,$ Opens up Focal Diameter $ 4(2) = 8,$		$y^2 = 24x,$ $24 = 4p, p = 6,$ Focus: $(6, 0)$ Directrix $x = -6,$ Opens right Focal Diameter = 24.	
$x^2 = -8y,$ $-8 = 4p, p = -2$ Focus: $(0, -2)$ Directrix $y = 2,$ Opens down Focal Diameter = 8,		$y^2 = -24x,$ $-24 = 4p, p = -6,$ Focus: $(-6, 0)$ Directrix $x = 6,$ Opens left Focal Diameter = 24,	

Ellipses

Formula	$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1; b > a,$ vertical	$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1; a > b,$ horizontal
Vertices	$(0, \pm a)$	$(\pm a, 0)$
Major axis	$2b$	$2a$
Minor axis	$2a$	$2b$
Focus	$(0, \pm c)$	$(\pm c, 0)$
	$c^2 = b^2 - a^2$	$c^2 = a^2 - b^2$

Note: Circle (special ellipse with $a = b$); Radius: r , Center: (h, k) $(x - h)^2 + (y - k)^2 = r^2$

$\frac{x^2}{9} + \frac{y^2}{16} = 1$ $a = 3, b = 4, c^2 = b^2 - a^2 = 16 - 9 = 7; c = \sqrt{7},$ Foci: $(0, -\sqrt{7}), (0, \sqrt{7}),$ major = 8, minor = 6	
$\frac{x^2}{25} + \frac{y^2}{9} = 1$ $a = 5, b = 3, c^2 = a^2 - b^2, c^2 = 25 - 9 = 16, c = 4,$ Foci: $(-4, 0), (4, 0),$ major = 10, minor = 6	

Hyperbolas

Formula	$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ horizontal	$\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$ vertical
Vertices	$(\pm a, 0)$	$(0, \pm a)$
Transverse Axis	$2a$	$2a$
Asymptotes	$y = \pm \frac{b}{a}x$	$y = \pm \frac{a}{b}x$
Foci	$(\pm c, 0)$	$(0, \pm c)$
	$c^2 = a^2 + b^2$	$c^2 = a^2 + b^2$

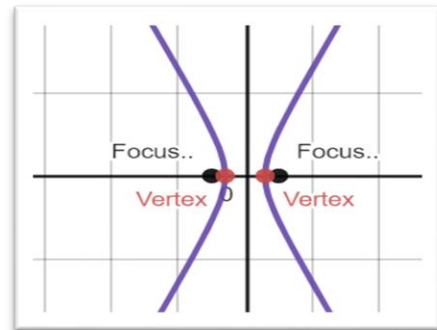
$$\frac{x^2}{9} - \frac{y^2}{16} = 1$$

$$a = 3, b = 4$$

Vertices: $(-3, 0), (3, 0)$, Transverse axis: $2 \cdot 3 = 6$
 Asymptotes: $y = \pm \frac{b}{a}x, y = -4/3x, y = 4/3x,$

$$c^2 = 9 + 16; c = \pm 5$$

Foci $(-5, 0), (5, 0)$



$$\frac{y^2}{25} - \frac{x^2}{9} = 1$$

$$a = 5, b = 3$$

Vertices: $(0, -5), (0, 5)$, Transverse axis: $2 \cdot 5 = 10$
 Asymptotes: $y = \pm \frac{a}{b}x; y = \frac{5}{3}x, y = -\frac{5}{3}x$

$$c^2 = 25 + 9; c = \pm 2\sqrt{10}$$

Foci $(0, -2\sqrt{10}), (0, 2\sqrt{10})$

