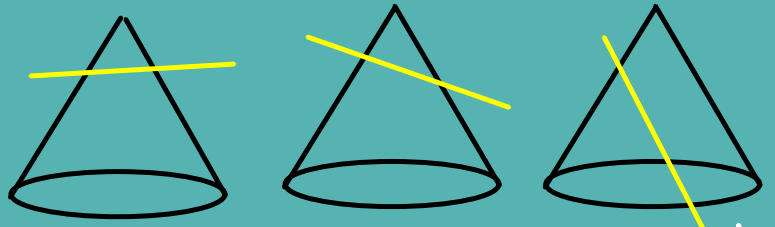
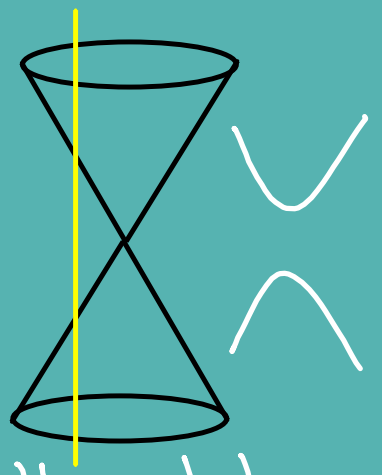
November 15, 2021

Conic Sections



Circle Ellipse Parabola



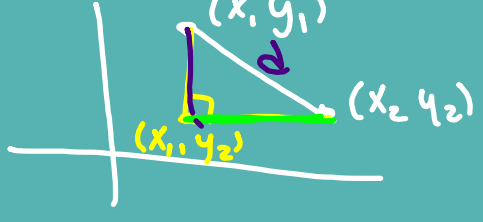
Hyperbola

Analytic Geometry – Study of shapes using coordinates

General Formulas

Distance Formula

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

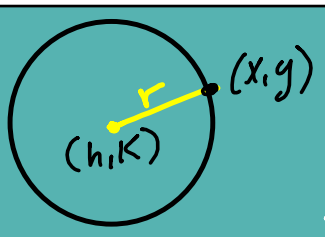


Midpoint Formula

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

CIRCLES

Is the set of points equidistant from a given point.



$$\left(\sqrt{(x-h)^2+(y-K)^2}\right)^2=(r)^2$$

$$\boxed{(x-h)^2+(y-K)^2=r^2}$$

Center (h,K)

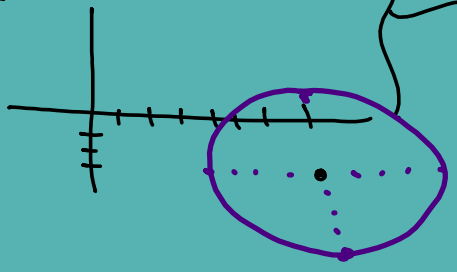
radius $=\sqrt{r^2}=r$

$(x-7)^2+(y+3)^2=16$

Center $(7,-3)$

$\sqrt{r^2}=\sqrt{16}$

$r=4$



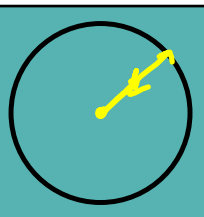
$(x+13)^2+y^2=24$

$(-13,0)$

$r=\sqrt{24}=2\sqrt{6}$

4.6

Circle



$$\frac{2x^2}{2} + \frac{2y^2}{2} + \frac{12x}{2} - \frac{20y}{20} - \frac{4}{2} = \frac{0}{2}$$

$$x^2 + y^2 + 6x - 10y - 2 = 0$$

$$x^2 + 6x \underline{+9} + y^2 - 10y \underline{+25} = 2 + 9 + 25$$

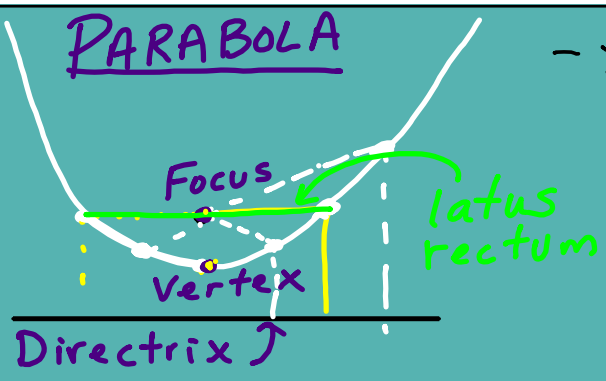
$+3$ $\quad -5$

$$(x+3)^2 + (y-5)^2 = 36$$

Center: $(-3, 5)$

$r = \sqrt{36} = 6$

PARABOLA



- the set of points equidistant from a given point & a given line.

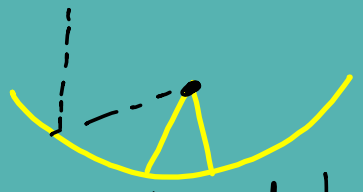
$y = a(x-h)^2 + k$

$\text{latus} = \left|\frac{1}{a}\right|$

$a = 2$ latus $= 1/2$

$a = \frac{1}{8}$ latus $= 8$

Reflective Property



satellite dish

mirrors in microscope

concert stages

Sound at football game

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FORMULAS

	$y = a(x-h)^2 + K$	$x = a(y-K)^2 + h$ sideways
Vertex	(h, K)	(h, K)
line of sym	$x = h$	$y = K$
direction	+a up -a down	+a right -a left
focus	$(h, K + \frac{1}{4a})$	$(h + \frac{1}{4a}, K)$
latus rectum	$\left\lvert \frac{1}{a} \right\rvert$	$\left\lvert \frac{1}{a} \right\rvert$

$x = \frac{1}{8}(y-2)^2 + 1$ sideways

Vertex $(1, 2)$

line of symm $y = 2$

direction right

latus $\left\lvert \frac{1}{\frac{1}{8}} \right\rvert = 8$

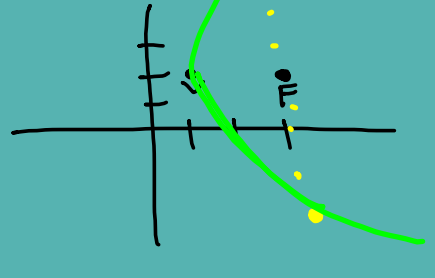
focus $(h + \frac{1}{4a}, K)$

$(1 + \frac{1}{4(\frac{1}{8})}, 2)$

$(1 + \frac{1}{\frac{1}{2}}, 2)$

$(1 + 2, 2)$

$(3, 2)$



How to graph:

1) Plot vertex
2) Plot focus
3) Put 1/2 of latus on each side of focus