Algebra 2 | Monday 2-11-13 | Class Notes

Ch. 12-1 Introduction to Conic Sections

Recall the vertex form of a parabola ⇒

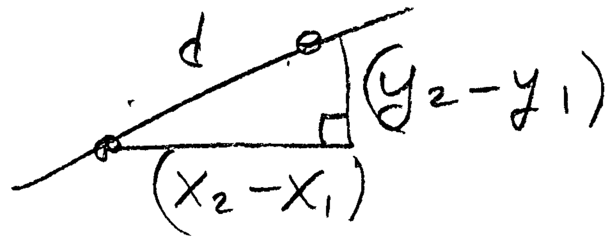
$$y = (x-h)^2 + k$$

A parabola is one of four conic sections. They all involve x^2 or y^2 for a parabola, and x^2 and y^2 for the other three conic sections ⇒

- circle
- ellipse
- hyperbola

They can also be defined as the curves that result when a plane intersects a double right cone. (see pg 816)

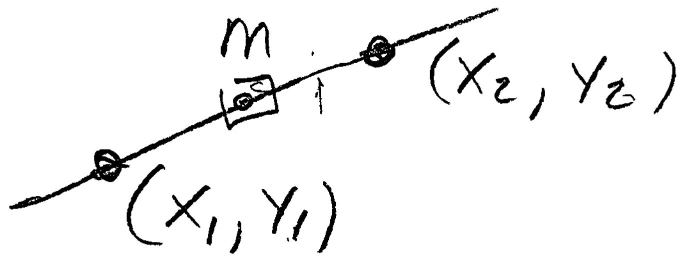
* Recall: distance formula



$$d^2 = (y_2 - y_1)^2 + (x_2 - x_1)^2$$

$$\boxed{d = \sqrt{\underbrace{(y_2 - y_1)^2}_{\text{rise}} + \underbrace{(x_2 - x_1)^2}_{\text{run}}}}$$

* And midpoint formula:



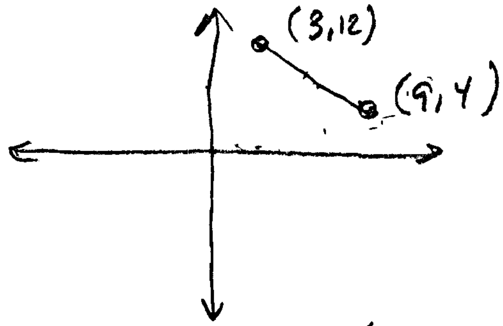
$$\boxed{M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)}$$

Average of x's — Average of y's

* These are often used with conic sections

EX 3
Pg 819

Find the center and radius of a circle with endpoints of a diameter at (3, 12), (9, 4)



Center = Midpoint (3, 12), (9, 4)

$$C\left(\frac{9+3}{2}, \frac{12+4}{2}\right)$$

$$\boxed{C\ (6, 8)}$$

radius = $\frac{\text{distance}}{2}$ between end points
or the distance from center to either point on end of diameter

$$r = \frac{d}{2} \Rightarrow (3, 12), (9, 4)$$

$\ominus$ $\ominus$

$$d^2 = (4-12)^2 + (9-3)^2$$

$$d = \sqrt{(-8)^2 + (6)^2}$$

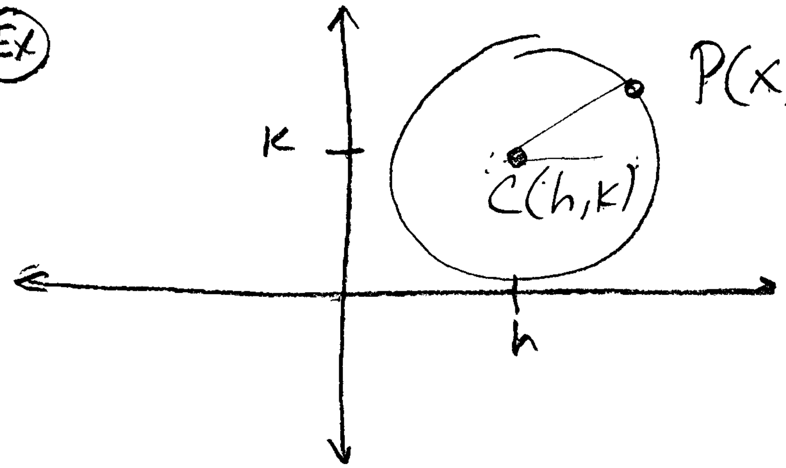
$$d = \sqrt{64+36} = \sqrt{100} = 10$$

$$\therefore \boxed{r = \frac{10}{2} = 5}$$

12-2 Circles

Let (h,k) be known center of ANY circle

Ex



Let $P(x,y)$ be any point on circle.

Then the distance between any point on circle and center, i.e. the radius^2 is $r^2 = C(h,k), P(x,y)$

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

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

Vertex, i.e. Center Form of the Equation of Any circle.

"Parent" circle is $x^2 + y^2 = r^2$

Center $(0,0)$

h = horizontal shift k = vertical shift

WARNING: $(x-h)^2+(y-k)^2=r^2$

the number in the equation is already r^2

Ex $(x-2)^2+(y+3)^2=9$

$\boxed{C(2,-3) \quad r=3}$

Ex $(x+1)^2+(y+6)^2=5$

$\boxed{C(-1,-6) \quad r=\sqrt{5}}$

Ex $(x-8)^2+y^2=12$

$\boxed{C(8,0) \quad r=\sqrt{12}=2\sqrt{3}}$

Ex $C(-2,7)$ $r=\sqrt{15}$ EOC = ?

$\boxed{(x+2)^2+(y-7)^2=15}$

graphing $\Rightarrow$ find $C(h,k)$ and r

go r units $c \longrightarrow$ of center

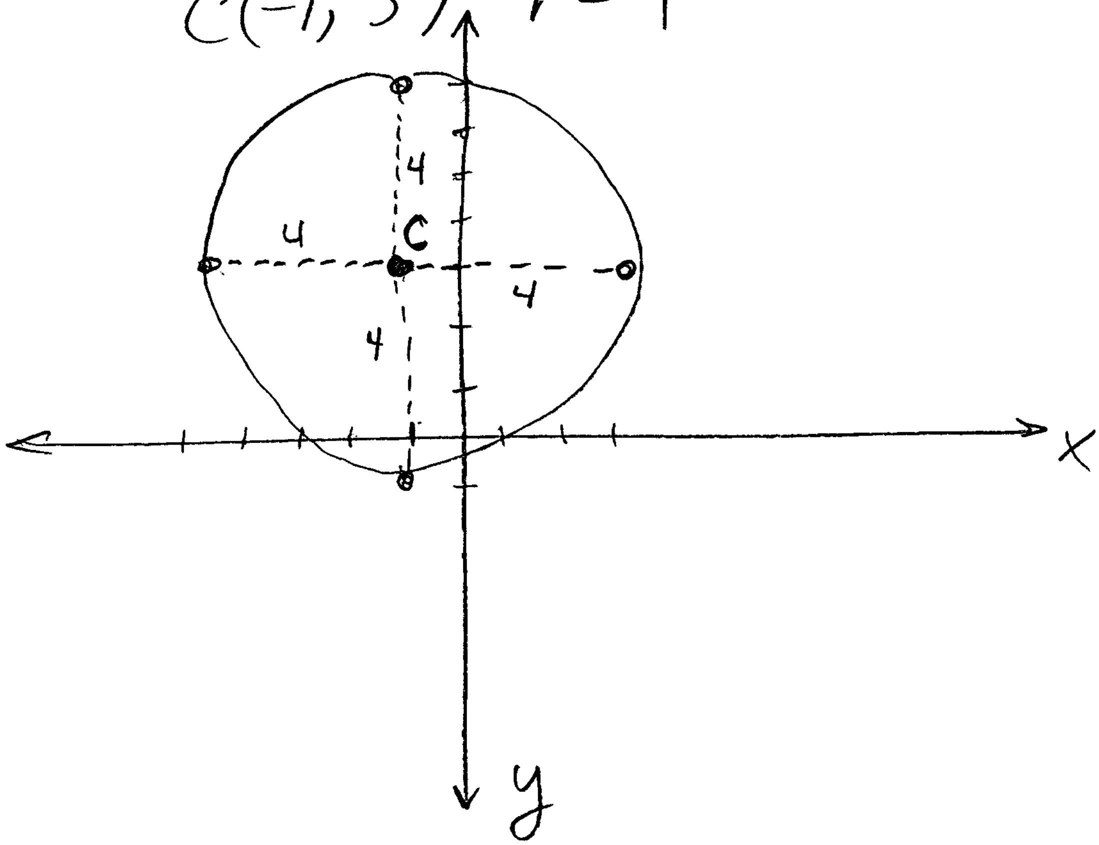
go r units $\longleftarrow c$ of center

go r units $\uparrow$ of center

go r units $\downarrow$ of center

Ex graph $(x+1)^2+(y-3)^2=16$

$C(-1,3)$, $r=4$



EX 2B Write the EOC (Equation of Circle) with center (2,4) and containing point (8,12)

Pg 824

$h=2$, $k=4$, only need r

use distance from center to (8,12) to find r

$(2,4),(8,12)$

$\ominus \quad \ominus$

$$r^2=(12-4)^2+(8-2)^2$$

$$r^2 = 8^2+6^2=100$$

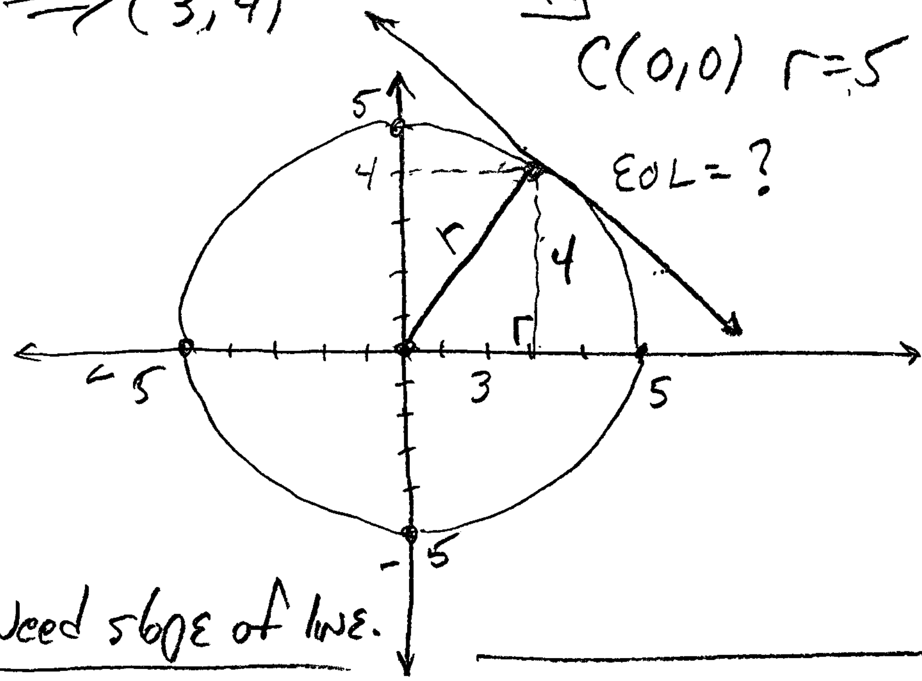
really want r^2 anyway

so EOC $\Rightarrow$ $\boxed{(x-2)^2+(y-4)^2=100}$

$y = mx + b$

Ex 4 WRITE THE EQUATION OF THE LINE
Pg 825 that is tangent to the circle $x^2 + y^2 = 25$ AT THE POINT $(3, 4)$

$C(0,0)$ $r = 5$



Need slope of line.

A property of tangents is they are perpendicular to a radius drawn to the point of tangency $(3, 4)$.

$\perp$ SLOPES ARE OPPOSITE RECIPROCALS

SLOPE of r IS $\frac{4}{3}$ $\therefore$ $m_{LINE} = -\frac{3}{4}$

Goes through $(3, 4)$ — x, y

$y = mx + b \therefore 4 = -\frac{3}{4} \cdot 3 + b$

$4 = -\frac{9}{4} + b$

$\frac{16}{4} = -\frac{9}{4} + b$

$\frac{25}{4} = b$

$\therefore$ $\boxed{EOL = y = -\frac{3}{4}x + \frac{25}{4}}$