

Good morning: **you will need your textbook**  
**and a graphing calculator today**

Warm up in notes or textbook p. 389

Complete the square:

$$x^2 + 12x - 5 = 0$$

~~+5~~ +5

$$x^2 + 12x + 36 = 5 + 36$$

$$\downarrow \quad \uparrow$$
$$\frac{1}{2}(12) \rightarrow (6)^2$$

$$x^2 + 12x + 36 = 41$$

$$(x + 6)(x + 6) = 41$$

$$(x + 6)^2 = 41$$

Reminders:

- Tutoring after school today
- Homeroom tom. and Thurs.
- EOC....soon? soonish?
- Quarter ends 3/18

Not sure how to start?

Check your video notes.

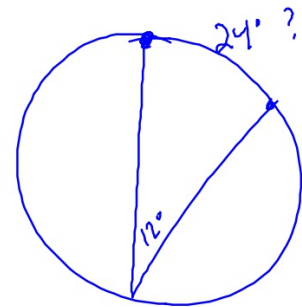
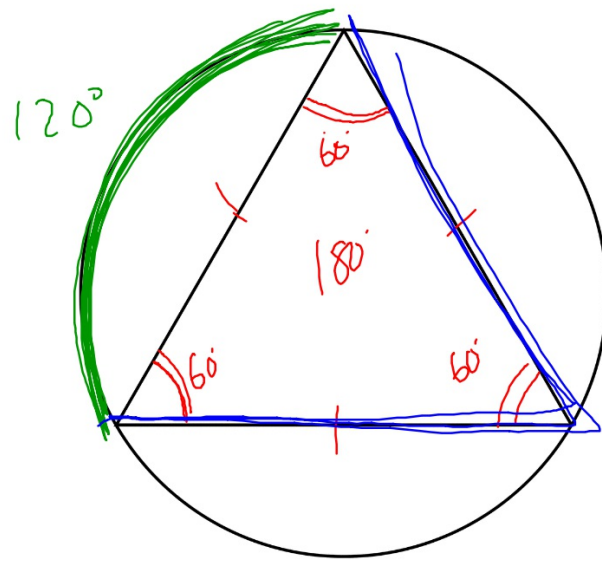
Don't have them?

**Do your homework.**

**It doesn't get ANY easier than watching a Youtube video.**

(Also see p 396)

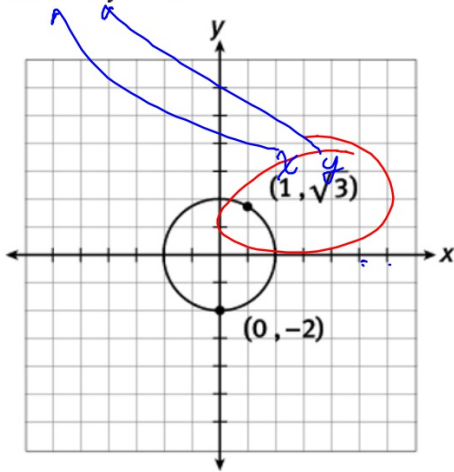
Paper plate from yesterday:



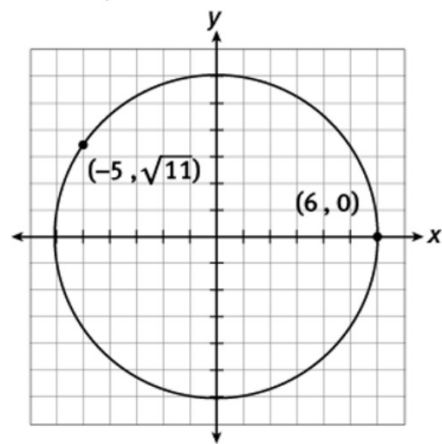
Launch: Do now p. 391 #1 a and b (just plug coordinates into the equation and see if result is true)

Show that the points given in the diagram are on the circle by showing that the coordinates of the points satisfy the equation given for the circle.

1a.  $x^2 + y^2 = 4$



1b.  $x^2 + y^2 = 36$



Equations: Graph these using your graphing calculator:

$$y = 2x - 4$$

$$y = 0.5x^2 - 3x - 5$$

What kind of figures do they make?

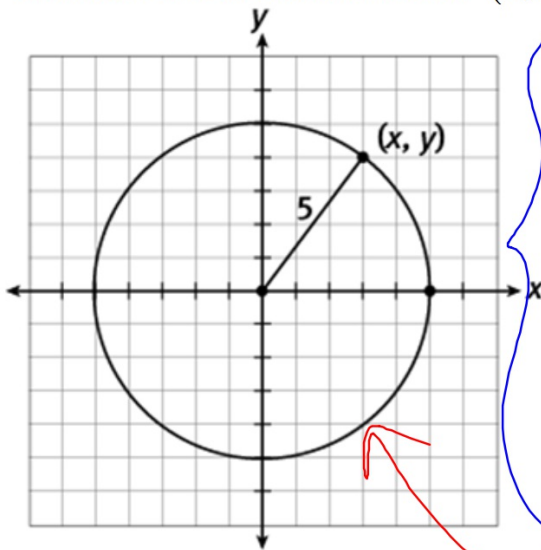


How do you make a circle on a graph?

Textbook p. 392

Consider the circle with center (0,0) and radius 5.

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



2. Suppose (x,y) is a point on the circle.

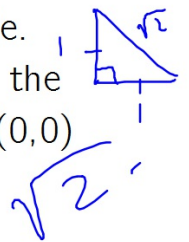
a. Use the distance formula and find the distance between (x,y) and the center (0,0)

$$\sqrt{(x-0)^2 + (y-0)^2} = 5$$
$$\sqrt{x^2 + y^2} = 5$$

How far apart are (0,0) and (x,y) [any point on circle]? So set the answer equal to this number.

b. Square both sides of the equation.

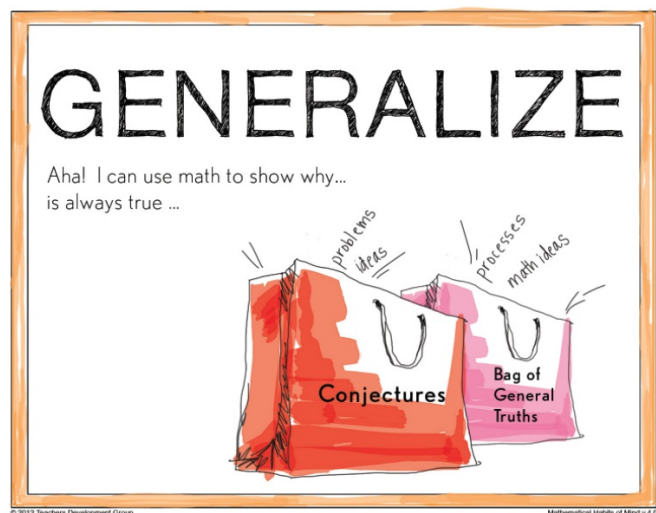
$$x^2 + y^2 = 25$$

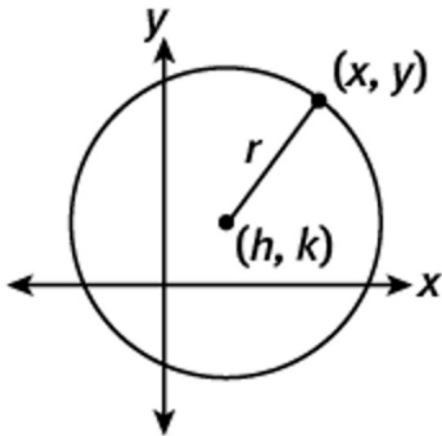


But the center is not always  $(0,0)$ ! That's boring!

And circles don't always have a radius of 5...

So let's Generalize





Consider circle with center  $(h, k)$  with radius  $r$ .  
Suppose  $(x, y)$  is on the circle.

3a. Use the distance formula to find the distance between  $(h, k)$  and  $(x, y)$

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

What is this distance? So set 'em equal.

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

b. ~~Square root sign? Gross. Square both sides~~

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



**Very important!!!**

Equation of a Circle

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

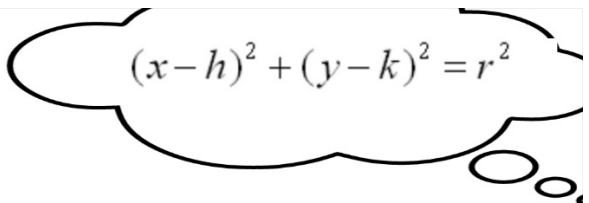
Center: (h,k)

radius

Please enter your voting egg PIN

What is the radius of this circle:

$$(x-4)^2+(y+3)^2 = 25$$

- 
- A 5  
B 25  
C 4  
D -3  
E I don't know yet

What is the center of this circle?

$$(x+3)^2 + (y-4)^2 = 36$$

$$(x - -3)^2$$

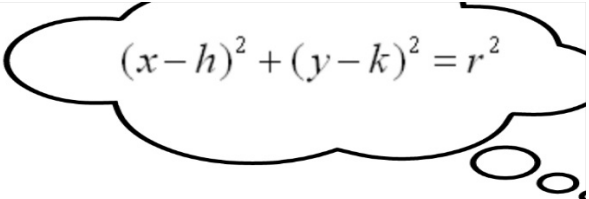
A 6

B (3,4)

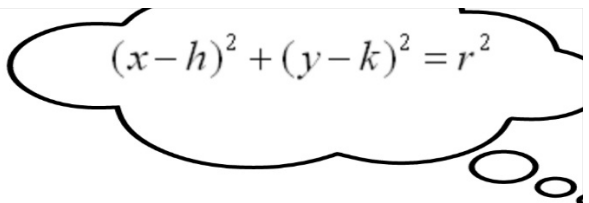
C (-3,4)

D (-3,-4)

E I don't know yet


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

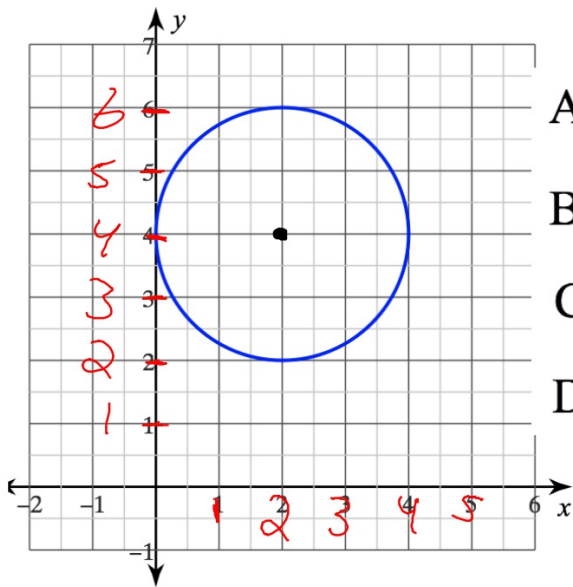
Which of these is the equation of a circle with center (4,2) and radius 9?


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

- A  $(x+4)^2 + (y+2)^2 = 9$
- B  $(x+4)^2 + (y+2)^2 = 3$
- C  $(x-4)^2 + (y+2)^2 = 81$
- D  $(x-4)^2 + (y-2)^2 = 81$
- E I don't know yet

What is the equation of this circle:

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



A)  $(x + 2)^2 + (y - 4)^2 = 4$

B)  $(x - 2)^2 + (y - 4)^2 = 16$

C)  $(x - 4)^2 + (y + 2)^2 = 1$

D)  $(x - 2)^2 + (y - 4)^2 = 4$

E) I don't know yet

Do now:

p. 393 #4c and #5a

4. Write the equation of the circle described.

c. center  $(9, -4)$ , radius  $= \sqrt{15}$

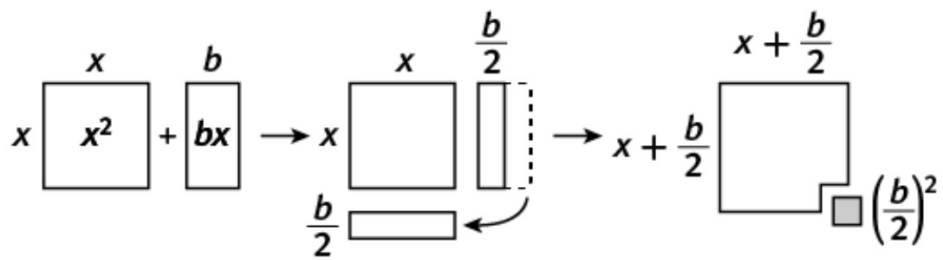
$$(x-9)^2 + (y+4)^2 = 15$$

$$(2, -1)$$
$$r = 3.$$

5. Identify the center and radius of the circle.

a.  $(x-2)^2 + (y+1)^2 = 9$

Not all equations are nice and ready-made for you as these were:  
 p. 396





#2,3: Rewrite into circle standard form

$$x^2 + 6x + (y-2)^2 = 16 + 9$$

$\frac{1}{2}(6) = (3)^2$

$$x^2 + 6x + 9 + (y-2)^2 = 25$$
$$(x+3)(x+3)$$
$$(x+3)^2 + (y-2)^2 = 25$$

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

Center:  $(-3, 2)$   
radius: 5

5b.)  $x^2 + 3x + (y+2)^2 = 1$  Center?  $(-1.5, 2)$

$\frac{1}{2}(3) \rightarrow (1.5)^2$

+2.25

Radius?  $\sqrt{3.25} \approx 1.8$

$x^2 + 3x + 2.25 + (y+2)^2 = 3.25$

$(x+1.5)(x+1.5) + (y+2)^2 = 3.25$

Sometimes, you will have a completely scrambled problem and you must complete the square for both x and y terms separately in order to discover needed information for the circle (center + radius)

$$\underline{x^2+6x} + \underline{(y-2)^2} = 16$$

$$\underline{x^2-8x} + \underline{y^2-14y} = 16$$

## Homework

p.395 #13-14 (GPE-1a)

p. 398 #10ab (GPE-1b)