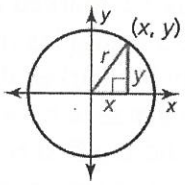
Name: Date: Period: 6

Writing and Graphing Equations of Circles

Lesson Objective IWBAT write eqns. of Cs & graph Cs in the coordinate plane

Let (x, y) represent any point on a circle with a center at the origin and radius *r*. By The Pythagorean Theorem…

$$x^2+y^2=r^2$$

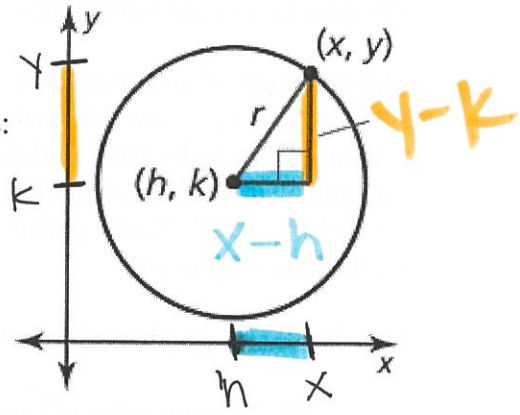


This is the equation of a circle with center at the origin (0, 0) and radius *r*.

Standard Equation of a Circle

Let (x, y) represent any point on a circle with center (h, k) and radius *r*.

By the Ruler Postulate, the lengths of the legs of the right triangle are as follows:



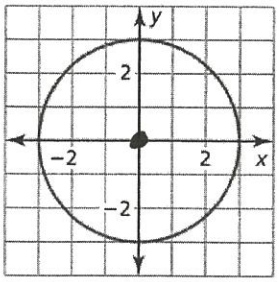
By the Pythagorean Theorem, we have this equation:

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

This is the standard equation of a circle with center (h, k) and radius *r*.

Example:

1. Write the standard equation of the circle shown.



center: (0, 0) (h, k)

$r=3$

$(x-0)^2+(y-0)^2=3^2$

$x^2+y^2=9$

2. Write the equation of a circle with center (0, -9) and radius 4.2

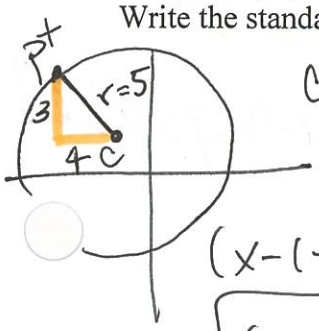
(h, k)

$(x-0)^2+(y-(-9))^2=4.2^2$

$x^2+(y+9)^2=17.64$

~~$x^2+y^2+18y+81=17.64$~~

3. The point (-5, 6) is on a circle with center (-1, 3). Write the standard equation of the circle.



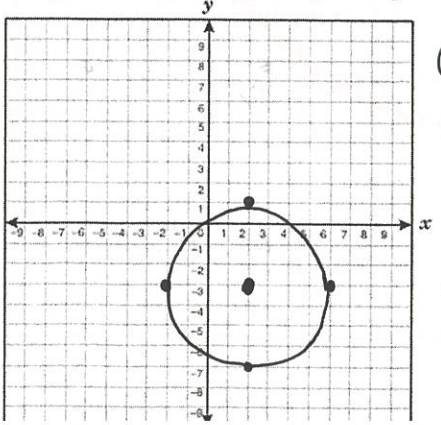
center: (-1, 3)

$r=5$

$(x-(-1))^2+(y-3)^2=5^2$

$(x+1)^2+(y-3)^2=25$

4. Graph the circle: $(x-2)^2+(y+3)^2=16$



center: ~~(-2, 3)~~ (2, -3) ~~(2, 3)~~ ~~(-2, 3)~~

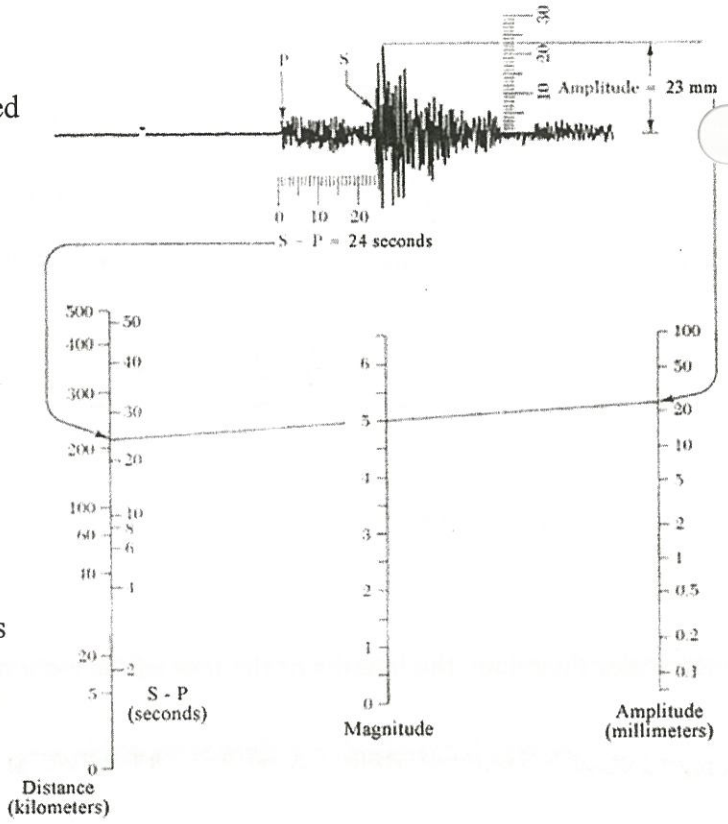
$\sqrt{r^2}=\sqrt{16}$

5. *In relation to this unit's Performance Task...*

To figure out just where that earthquake happened, you need to look at your seismogram and you need to know what at least two other seismographs recorded for the same earthquake. You will also need a map of the world, a ruler, a pencil, and a compass for drawing circles on the map.

One minute intervals are marked by the small lines printed just above the squiggles made by the seismic waves (the time may be marked differently on some seismographs). The distance between the beginning of the first P wave and the first S wave tells you how many seconds the waves are apart. This number will be used to tell you how far your seismograph is from the epicenter of the earthquake.

The epicenter of an earthquake is the point on Earth's surface directly above the earthquake's origin. A seismograph can be used to determine the distance to the epicenter of the earthquake. Seismographs are needed in three different places to locate an earthquake's epicenter.

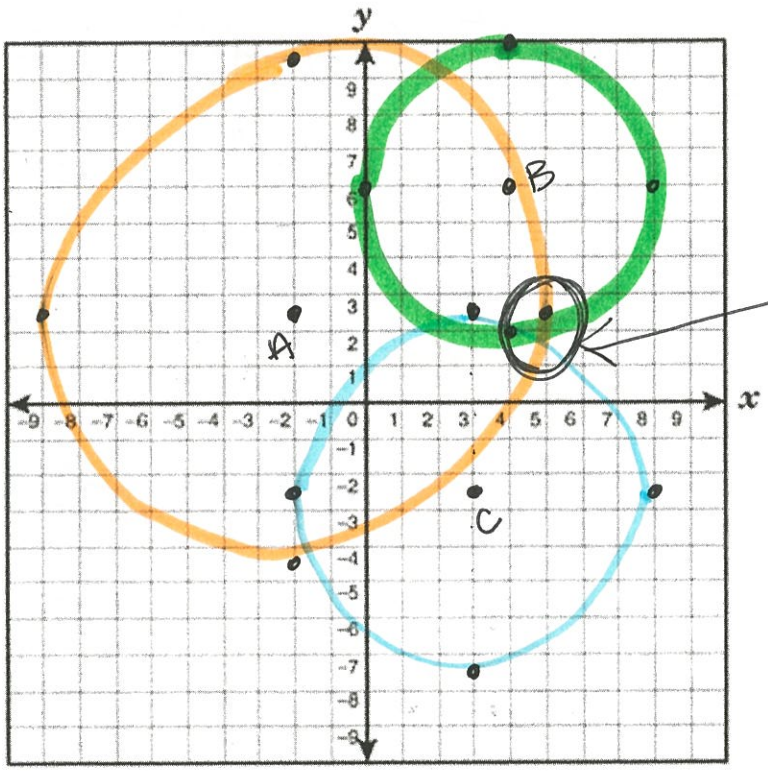


Use the seismograph readings from locations A, B, and C to find the epicenter of an earthquake.

- ➔ The epicenter is 7 miles away from seismograph A (-2, 2.5)
- ➔ The epicenter is 4 miles away from seismograph B (4, 6)
- ➔ The epicenter is 5 miles away from seismograph C (3, -2.5)

r = 7

center



all 3 Os meet @ ≈(5,2), so this is the epicenter of the earthquake!