

1. General Equation of a Circle

2. You should be familiar with the Pythagorean Theorem and transformations of graphs, specifically shifting graphs left, right, up and down.

In this lesson, we develop the equation of a circle from the geometric definition.

3. The geometric definition of a circle is the set of all points located a fixed distance from some fixed point. The distance is called the radius and the fixed point is called the center.

(Insert Video Here)

4. How do we find the equation of a circle? If the circle is centered at the origin, we need to find a relation involving the arbitrary point (x, y) . For this example, the radius is 5.

5. The x -coordinate measures the x -distance and the y -coordinate measures the y -distance. We have a right triangle, so the equation is merely the Pythagorean Theorem.

6. In this example, $x^2 + y^2 = 5^2$, which is 25.

7. In general, the equation of a circle centered at the origin is $x^2 + y^2 = r^2$

8. What happens if we move the center of the circle away from the origin? In this example, the radius is the distance from the center $(3, 2)$ to an arbitrary point (x, y) . You find the horizontal distance by subtracting x -coordinates and the vertical distance by subtracting y -coordinates.

9. The horizontal distance is $x - 3$ and the vertical distance is $y - 2$.

10. In this case, the Pythagorean Theorem gives us $(x - 3)^2 + (y - 2)^2 = 9$

11. In general, we have $(x - h)^2 + (y - k)^2 = r^2$

12. To recap: If you are given the center of a circle at (h, k) and radius r , the equation of the circle is the Pythagorean Theorem $(x - h)^2 + (y - k)^2 = r^2$.

13. Here are two sample problems to test your understanding.

14. .

15. .

16. .