Equation of a Circle Centred at the Origin

How can we define a circle?

Suppose we have a circle centred at the origin $O(0,0)$ with a radius of 5. Use the formula for length to confirm that $P(0,5)$ and $Q(3,4)$ are both on the circle.

We can use the formula for length to define the equation of a circle. For any point $P(x, y)$ on the circle of radius r,

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

$$r =$$

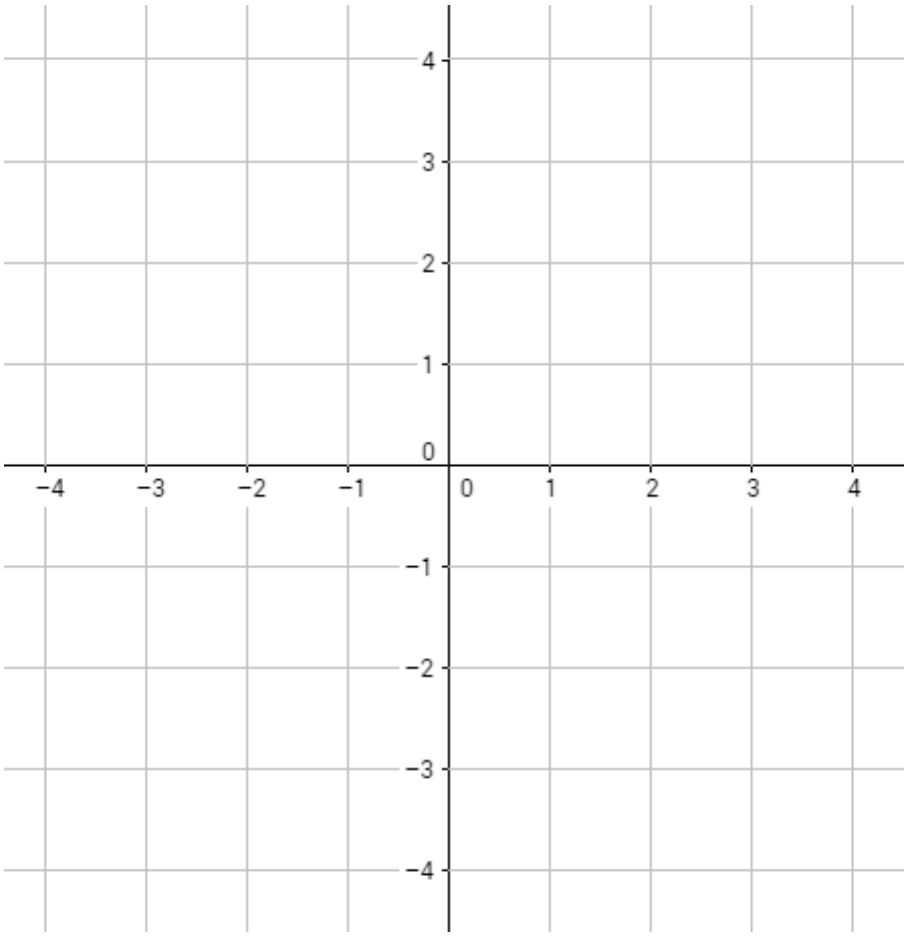
Example 1: Use the following table of values to help graph the circle $x^2 + y^2 = 9$:

x	y
0	
1	
2	
3	
4	

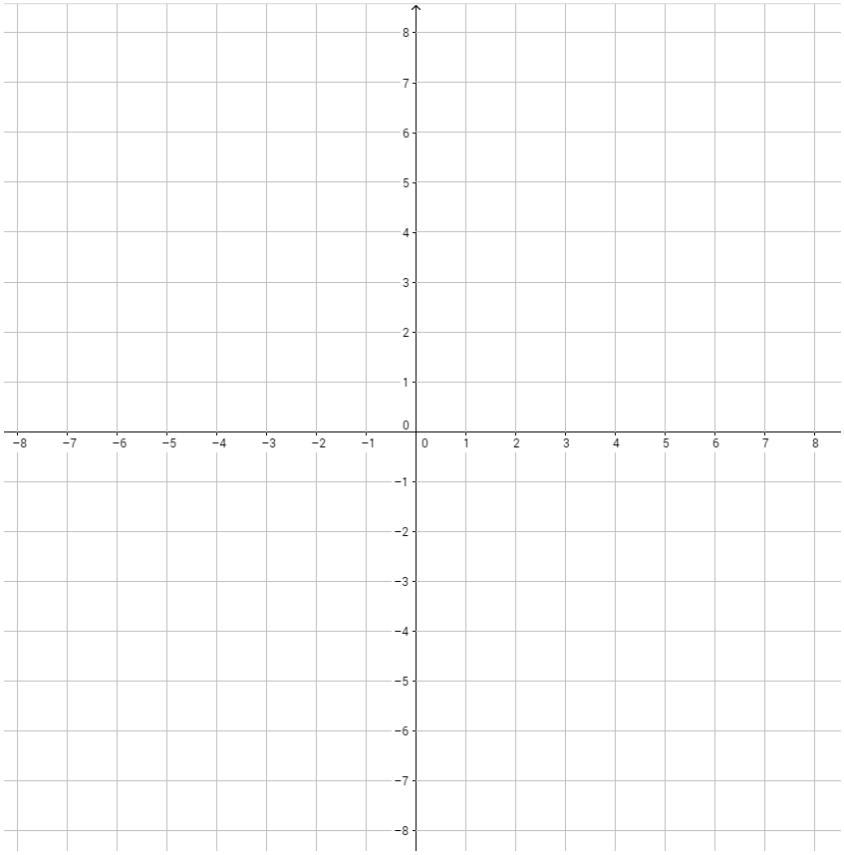
x	y
-1	
-2	
-3	
-4	

x-intercepts:

y-intercepts:



Example 2: Sketch a graph of the circle $x^2 + y^2 = 36$.



Example 3: A circle has centre $(0,0)$ and passes through the point $P(8,-6)$.

a) What is the equation of the circle?

b) What are the coordinates of the point opposite to P that forms the other endpoint of the diameter?

c) Does the point $Q(9,4)$ lie inside, outside, or on the circle?

Example 4: A stone is dropped into a pond. The ripples it sends out form a circle whose radius increases by 5 cm/s. Find the equation of the circle 12 s after the stone is dropped.

What will the equation be after 100 s?

How long after the stone is dropped will the circle pass through the point $M(35,25)$?