Equation of a Circle

Learning Goal

- Develop and use an equation for a circle.

Minds On…

- Where do we see circles in nature?

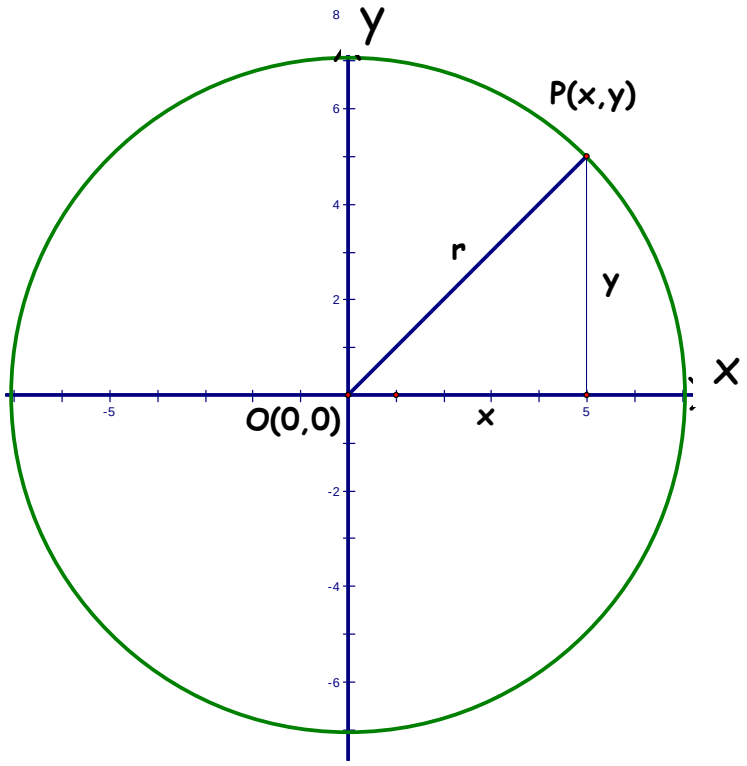






Big Ideas

- Using the distance formula, you can show that the equation of a circle with centre (0, 0) and radius r is $x^2 + y^2 = r^2$.



Example #1

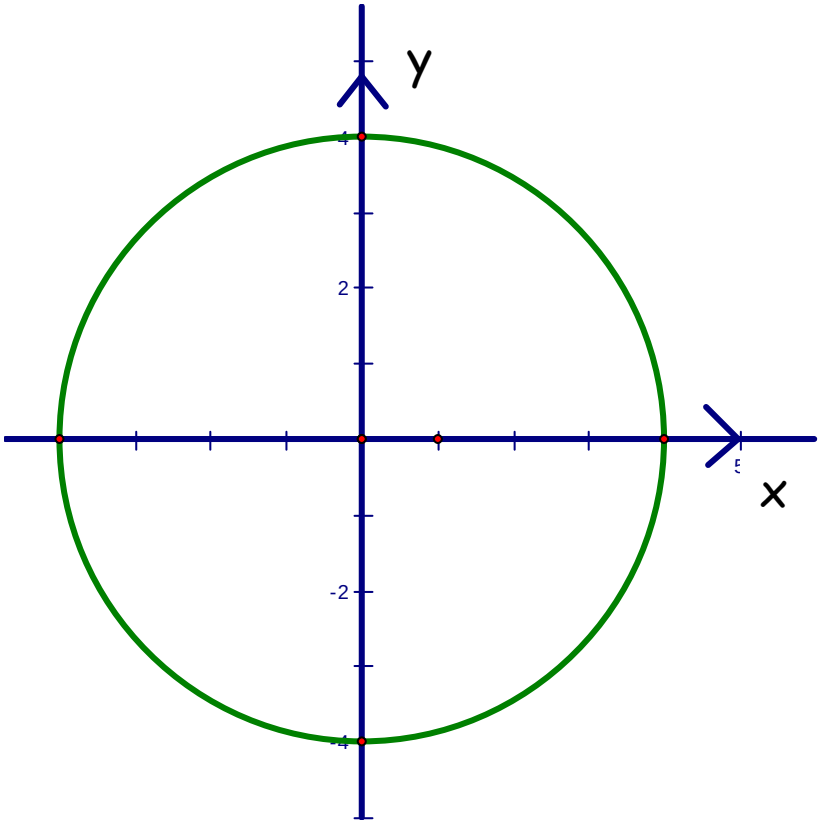
- Write the equation of a circle with centre (0,0) and a radius of $^2/_3$ units.

$$x^2 + y^2 = \left(\frac{2}{3}\right)^2$$

$$x^2 + y^2 = \frac{4}{9}$$

Example #2

- A circle is defined by the equation $x^2+y^2=16$. Sketch a graph of this circle.



Example #3

- A circle has centre (0,0) and passes through the point (-5,12). Find the equation of the circle.

$$(-5)^2 + (12)^2 = r^2$$

$$25 + 144 = r^2$$

$$169 = r^2$$

Therefore, the equation of the circle is $x^2+y^2=169$.

Example #4

- A stone is dropped into a pond and sends out a circular ripple whose radius increases by 2 cm/s. Find the equation of the circle 8.5 s after the stone is dropped.

- Solution
  - If the radius grows 2 cm/s, then after 8.5 s the radius is 2x8.5=17 cm. The equation of the circle at this time is $x^2+y^2=17^2$ or $x^2+y^2=289$.

Consolidation

- Write an equation for a circle that models each situation.
  - The possible locations of the epicentre of an earthquake, which is recorded to be a distance of 144 km from a seismograph station in Toronto.
  - The path of a satellite in a circular orbit at a distance of 19 000 km from the centre of Earth.
  - The rim of a bicycle wheel with a diameter of 70 cm.
  - The cross-section of a storm-water tunnel that has a diameter of 2.4 m.

Reinforcement

- Pages 92 – 93
  - #4 – 7, 10, 13