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### The Equation of a Circle in Standard Position

mar 1/2011

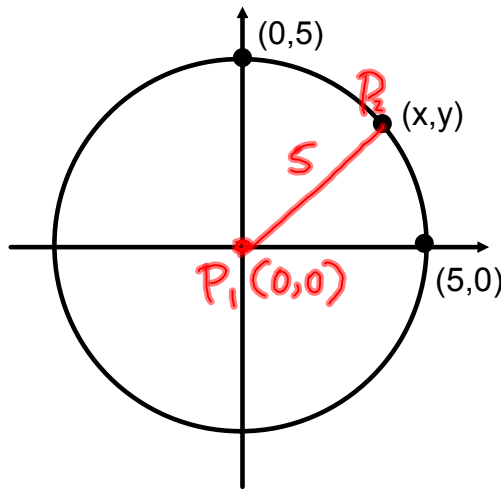
**Circle:** The set of all points that are equidistant from a reference point (the centre).

**Standard Position:** The centre of the circle is at the origin (0, 0).

We can use this definition, along with the distance formula, to determine the equation of a circle.

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Suppose we have a circle with a radius of 5, so every point on the circle is 5 units from the origin.



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

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

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

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

$$\boxed{x^2 + y^2 = 25}$$

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In general, a circle has a radius,  $r$ , and the equation of a circle in standard position is:

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

Ex.1. Write the equation of a circle in standard position with:

(a)  $r = 2$

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

$$x^2 + y^2 = 4$$

(b)  $r = 3\frac{1}{5}$

$$r = \frac{16}{5}$$

$$x^2 + y^2 = \left(\frac{16}{5}\right)^2$$

$$x^2 + y^2 = \frac{256}{25}$$

$$3 + \frac{1}{5} = \frac{15}{5} + \frac{1}{5} = \frac{16}{5}$$

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Assigned Work:

p.91-92 # 1, 2, 3a, 4, 5, 6, 8

5. (a)  $x^2 + y^2 = r^2$

$$8^2 + 15^2 = r^2$$

$$64 + 225 = r^2$$

$$289 = r^2$$

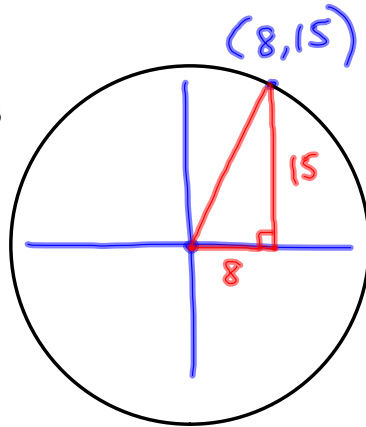
$$r = \sqrt{289}$$

$$r = 17$$

(b)  $x^2 + y^2 = r^2$

$$x^2 + y^2 = 17^2$$

$$x^2 + y^2 = 289$$



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8. (a)  $x^2 + y^2 = 144^2$   
 $x^2 + y^2 = 20736$

(b)  $x^2 + y^2 = r^2$   
 $x^2 + y^2 = 19000^2$   
 $x^2 + y^2 = 361000000$

(c)  $r = \frac{69}{2}$   
 $= 34.5 \text{ cm}$   
 $x^2 + y^2 = (34.5)^2$   
 $x^2 + y^2 = 1190.25$

(d)  $d = 2.4 \text{ m}$   $r = 1.2 \text{ m}$   
 $x^2 + y^2 = 1.2^2$   
 $x^2 + y^2 = 1.44$

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