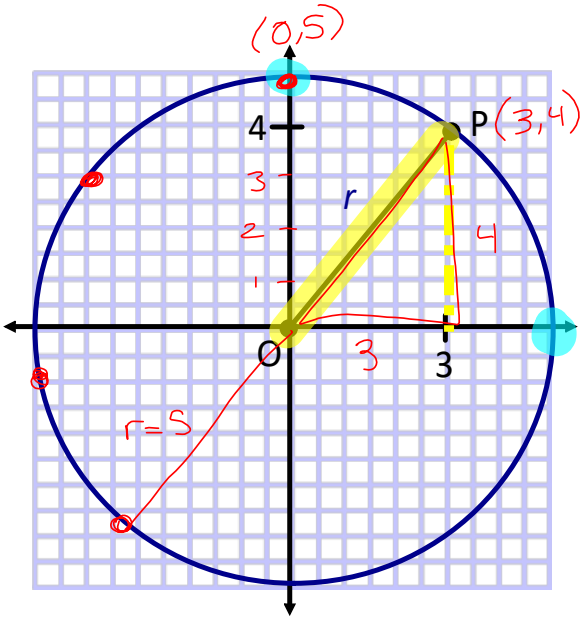
2.6 Equation of a Circle

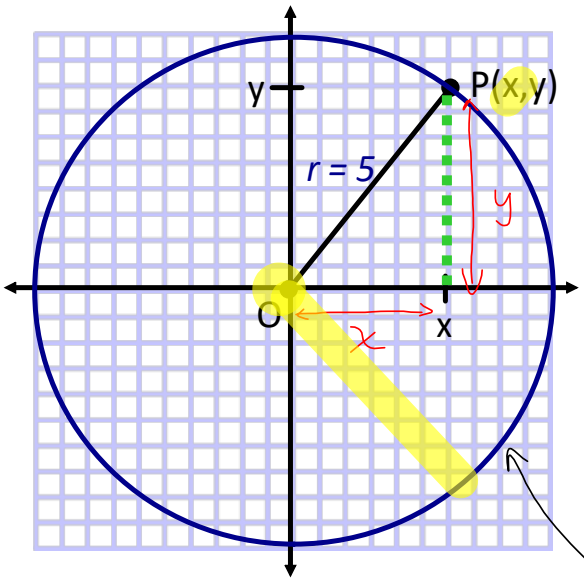


Define circle...

- The line segment PO is the radius of the circle.
- The circle would ∴ have a radius of 5 units.
- All points on the circle would be 5 units away from (0,0).

$$a^2 + b^2 = c^2$$
$$3^2 + 4^2 = c^2$$
$$9 + 16 = c^2$$
$$25 = c^2$$
$$5 = c$$

Consider the general point P(x, y) on the circle whose centre is at the origin (0,0) and whose radius is 5...



- any point on the circle creates a right angled triangle
- hypotenuse = 5
- side length = x
- side length = y

Use the Pythagorean Theorem to write an equation for this circle:

$$a^2 + b^2 = c^2$$
$$x^2 + y^2 = 5^2$$

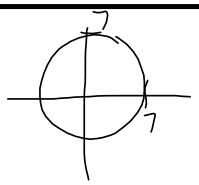
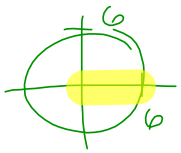
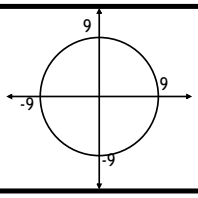
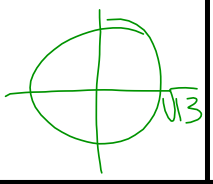
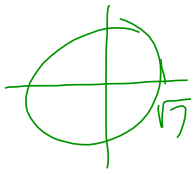
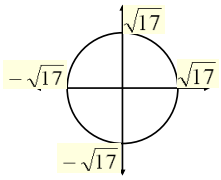
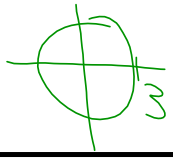
Equation $x^2 + y^2 = 25$

In general, the equation of a circle with centre (0,0) and radius, *r*, is given by

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

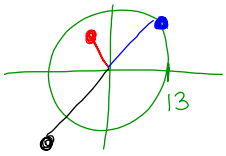
Ex. 1: Complete the table.

Always (0,0) gr 10 math

equation	centre	radius	sketch	x-int, y-int
$x^2 + y^2 = 49$ (r^2)	(0,0)	$r^2 = 49$ $r = \sqrt{49}$ $r = 7$		$x = \pm 7$ $y = \pm 7$
$x^2+y^2=36$	(0, 0)	6		$x = \pm 6$ $y = \pm 6$
$x^2+y^2=81$	(0,0)	9		$x = \pm 9$ $y = \pm 9$
$x^2 + y^2 = 13$	(0,0)	$r^2 = 13$ $r = \sqrt{13}$		$x = \pm\sqrt{13}$ $y = \pm\sqrt{13}$
$x^2+y^2=r^2$ $x^2+y^2=(\sqrt{7})^2$ $x^2+y^2=7$	(0, 0)	$\sqrt{7}$		$x = \pm\sqrt{7}$ $y = \pm\sqrt{7}$
$x^2+y^2=17$	(0,0)	$\sqrt{17}$		$x = \pm\sqrt{17}$ $y = \pm\sqrt{17}$
$x^2+y^2=9$	(0, 0)	3		±3

Ex. 2 Consider the circle $x^2 + y^2 = 169$. How could you tell if a given point $P(x,y)$ is: $r = 13$

a. on the circle
b. inside the circle
c. outside the circle?



a. If $x^2 + y^2 = 169$, then the point is on the circle.
(The point satisfies the equation).

b. If $x^2 + y^2 < 169$, then the point is inside the circle.
(x,y) *(The length of line segment PO is shorter than the radius).*

c. If $x^2 + y^2 > 169$, then the point is outside the circle.
(The length of line segment PO is longer than the radius).

Ex. 3: Determine whether the following points are on, inside, or outside the circle defined by the equation $x^2 + y^2 = 169$.

a. (-5,12) $x^2 + y^2$
$= (-5)^2 + (12)^2$
$= 25 + 144$
$= 169$

$x^2 + y^2 = 169$
∴ point falls ON the circle

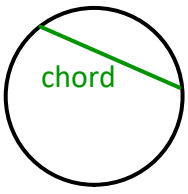
b. (11,-4) $x^2 + y^2$
$= (11)^2 + (-4)^2$
$= 121 + 16$
$= 137$

∵ $x^2 + y^2 < 169$
∴ Point falls inside the circle.

c. (10,11) $x^2 + y^2$
$= 10^2 + 11^2$
$= 100 + 121$
$= 221$

∵ $x^2 + y^2 > 169$
∴ Point falls outside circle

Note: Chord of a circle is a line segment joining 2 points on the circle.



more than one answer

Pg. 96 #1ce,2bc,4d,
6,7,8,11bcd,15

Try one or two Shortest distance Q's.

Note: Chord of a circle is a line segment joining 2 points on the circle.