

$$\textcircled{1} \quad x^2 + y^2 = r^2$$

$$c) \quad r = 2\sqrt{5}$$

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

$$x^2 + y^2 = 20$$

$$\textcircled{2} \quad B: \quad x^2 + y^2 = \underline{50} \quad r^2 = 50$$

$$a) \quad r = 5\sqrt{2}$$

$$r = \sqrt{50}$$

b) x int:

$$x = \pm 5\sqrt{2}$$

$$r = \sqrt{25 \times 2}$$

$$r = 5\sqrt{2}$$

c) y int:

$$y = \pm 5\sqrt{2}$$

d) Domain:

$$\{x \mid -5\sqrt{2} \leq x \leq 5\sqrt{2}, x \in \mathbb{R}\}$$

e) Range:

$$\{y \mid -5\sqrt{2} \leq y \leq 5\sqrt{2}, y \in \mathbb{R}\}$$

$$\textcircled{3} \quad x^2 + y^2 = 100$$

$$\text{a) } (-6, ?)$$

$x, y$

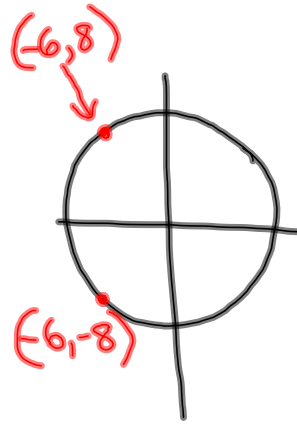
$$(-6)^2 + y^2 = 100$$

$$36 + y^2 = 100$$

$$y^2 = 100 - 36$$

$$y^2 = 64$$

$$y = \pm 8$$



$$\textcircled{4} \quad x^2 + y^2 = 25$$

$$\text{a) } (-5, 0)$$

LS	RS
$x^2 + y^2$	25
$(-5)^2 + (0)^2$	
25 + 0	
25	

$$\textcircled{5} \quad x^2 + y^2 = r^2$$

$$\text{a) } \overset{x}{(6)}, \overset{y}{(0)}$$

$$(\overset{x}{6})^2 + (\overset{y}{0})^2 = r^2$$

$$36 + 0 = r^2$$

$$36 = r^2$$

$$\boxed{\pm 6 = r}$$

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

$$x^2 + y^2 = (\overset{6}{})^2$$

$$\boxed{x^2 + y^2 = 36}$$

ANSWERS => EQUATIONS OF A CIRCLE  
WORKSHEET #1.

1.a)  $r = 3$

$$\begin{aligned}x^2 + y^2 &= r^2 \\x^2 + y^2 &= (3)^2 \\x^2 + y^2 &= 9\end{aligned}$$

b)  $r = \sqrt{3}$

$$\begin{aligned}x^2 + y^2 &= r^2 \\x^2 + y^2 &= (\sqrt{3})^2 \\x^2 + y^2 &= 3\end{aligned}$$

c)  $r = 2\sqrt{5}$

$$\begin{aligned}x^2 + y^2 &= r^2 \\x^2 + y^2 &= (2\sqrt{5})^2 \\x^2 + y^2 &= 4(5) \\x^2 + y^2 &= 20.\end{aligned}$$

d)  $r = 2r$

$$\begin{aligned}x^2 + y^2 &= r^2 \\x^2 + y^2 &= (2r)^2 \\x^2 + y^2 &= 4r^2\end{aligned}$$

2.  $A: x^2 + y^2 = 16$

a) radius =  $\sqrt{16} = 4$  units

b) x-intercepts  $\Rightarrow -4$  and  $+4$

c) y-intercepts  $\Rightarrow -4$  and  $+4$ .

d) domain:  $\{x \mid -4 \leq x \leq 4, x \in \mathbb{R}\}$

e) range:  $\{y \mid -4 \leq y \leq 4, y \in \mathbb{R}\}$

$$B: x^2 + y^2 = 50$$

a) radius =  $\sqrt{50} = \sqrt{25 \times 2} = 5\sqrt{2}$  units

b) x-intercepts  $\Rightarrow -5\sqrt{2}$  and  $5\sqrt{2}$

c) y-intercepts  $\Rightarrow -5\sqrt{2}$  and  $5\sqrt{2}$

d) domain:  $\{x \mid -5\sqrt{2} \leq x \leq 5\sqrt{2}, x \in \mathbb{R}\}$

e) range:  $\{y \mid -5\sqrt{2} \leq y \leq 5\sqrt{2}, y \in \mathbb{R}\}$

$$3. \quad x^2 + y^2 = 100$$

$$a) \quad (-6, ?)$$

$$\text{If } x = -6 \\ \hookrightarrow (-6)^2 + y^2 = 100$$

$$\begin{aligned} 36 + y^2 &= 100 \\ y^2 &= 100 - 36 \\ y^2 &= 64 \\ y &= \pm\sqrt{64} \\ y &= \pm 8. \end{aligned}$$

$$\Rightarrow (-6, \boxed{8}) \\ \text{or} \\ (-6, \boxed{-8})$$

$$b) \quad (?, 8)$$

$$\text{If } y = 8 \\ \hookrightarrow x^2 + (8)^2 = 100$$

$$\begin{aligned} x^2 + 64 &= 100 \\ x^2 &= 100 - 64 \\ x^2 &= 36 \\ x &= \pm\sqrt{36} \\ x &= \pm 6 \end{aligned}$$

$$\Rightarrow (\boxed{6}, 8) \\ \text{or} \\ (\boxed{-6}, 8)$$

$$c) (10, ?)$$

$$\text{If } x=10.$$

$$\hookrightarrow (10)^2 + y^2 = 100$$

$$100 + y^2 = 100$$

$$y^2 = 100 - 100$$

$$y^2 = 0$$

$$y = \pm\sqrt{0}$$

$$y = 0$$

$$\Rightarrow (10, \boxed{0})$$

$$e) (?, 5)$$

$$\text{If } y=5$$

$$\hookrightarrow x^2 + (5)^2 = 100$$

$$x^2 + 25 = 100$$

$$x^2 = 100 - 25$$

$$x^2 = 75$$

$$x = \pm\sqrt{75}$$

$$x = \pm\sqrt{25 \times 3}$$

$$x = \pm 5\sqrt{3}$$

$$\Rightarrow (\boxed{5\sqrt{3}}, 5)$$

$$\text{or } (\boxed{-5\sqrt{3}}, 5)$$



f)  $(?, 5\sqrt{2})$

If  $y = 5\sqrt{2}$

$$\hookrightarrow x^2 + (5\sqrt{2})^2 = 100$$

$$x^2 + 25(2) = 100$$

$$x^2 + 50 = 100$$

$$x^2 = 100 - 50$$

$$x^2 = 50$$

$$x = \pm\sqrt{50}$$

$$x = \pm\sqrt{25 \times 2}$$

$$x = \pm 5\sqrt{2}$$

$$\Rightarrow (\boxed{5\sqrt{2}}, 5\sqrt{2})$$

$$(\boxed{-5\sqrt{2}}, 5\sqrt{2})$$

\* d)  $(0, ?)$

If  $x = 0$

$$\hookrightarrow (0)^2 + y^2 = 100$$

$$0 + y^2 = 100$$

$$y^2 = 100 - 0$$

$$y^2 = 100$$

$$y = \pm\sqrt{100}$$

$$y = \pm 10$$

$$\Rightarrow (0, \boxed{10})$$

$$(0, \boxed{-10})$$

$$4. \quad x^2 + y^2 = 25$$

$$a) \quad (-5, 0)$$

$$\begin{array}{rcl} \text{L.S.} & & \text{R.S.} \\ x^2 + y^2 & & 25 \\ (-5)^2 + (0)^2 & & \\ 25 + 0 & & \\ 25 & & \end{array}$$

Since  $L.S. = R.S.$ ,  
 $(-5, 0)$  is located  
on the circle.

$$b) \quad (0, 25)$$

$$\begin{array}{rcl} \text{L.S.} & & \text{R.S.} \\ x^2 + y^2 & & 25 \\ (0)^2 + (25)^2 & & \\ 0 + 625 & & \\ 625 & & \end{array}$$

Since  $L.S. \neq R.S.$ ,  
 $(0, 25)$  is not located  
on the circle.

c)  $(0, 5)$

$$\begin{array}{l} \text{L.S.} \\ x^2 + y^2 \\ (0)^2 + (5)^2 \\ 0 + 25 \\ 25 \end{array}$$

$$\begin{array}{l} \text{R.S.} \\ 25. \end{array}$$

Since  $L.S. = R.S.$ ,  
 $(0, 5)$  is located  
on the circle.

d)  $(3, -4)$

$$\begin{array}{l} \text{L.S.} \\ x^2 + y^2 \\ (3)^2 + (-4)^2 \\ 9 + 16 \\ 25 \end{array}$$

$$\begin{array}{l} \text{R.S.} \\ 25 \end{array}$$

Since  $L.S. = R.S.$ ,  
 $(3, -4)$  is located  
on the circle.

$$e) (12\frac{1}{2}, 12\frac{1}{2}) \\ \Rightarrow \left(\frac{25}{2}, \frac{25}{2}\right)$$

$$\begin{array}{l} \text{L.S} \\ x^2 + y^2 \\ \left(\frac{25}{2}\right)^2 + \left(\frac{25}{2}\right)^2 \\ \frac{625}{4} + \frac{625}{4} \\ \frac{1250}{4} \\ \frac{625}{2} \end{array}$$

Since L.S  $\neq$  R.S,  
 $(12\frac{1}{2}, 12\frac{1}{2})$  is not  
 located on the  
 circle.

$$f) (-2\sqrt{2}, 4)$$

$$\begin{array}{l} \text{L.S} \\ x^2 + y^2 \\ (-2\sqrt{2})^2 + (4)^2 \\ 4(2) + 16 \\ 8 + 16 \\ 24 \end{array} \quad \begin{array}{l} \text{R.S} \\ 25 \end{array}$$

Since L.S  $\neq$  R.S,  
 $(-2\sqrt{2}, 4)$  is not  
 located on the  
 circle.

5. a)  $(6, 0)$   
 $\hookrightarrow x=6$  and  $y=0$

$$\begin{aligned}x^2 + y^2 &= r^2 \\(6)^2 + (0)^2 &= r^2 \\36 + 0 &= r^2 \\36 &= r^2\end{aligned}$$

Equation  $\Rightarrow x^2 + y^2 = 36$

b)  $(0, -3)$   
 $\hookrightarrow x=0$  and  $y=-3$

$$\begin{aligned}x^2 + y^2 &= r^2 \\(0)^2 + (-3)^2 &= r^2 \\0 + 9 &= r^2 \\9 &= r^2\end{aligned}$$

Equation  $\Rightarrow x^2 + y^2 = 9$

$$c) (-3, 4)$$

$$\hookrightarrow x = -3 \text{ and } y = 4$$

$$\begin{aligned}x^2 + y^2 &= r^2 \\(-3)^2 + (4)^2 &= r^2 \\9 + 16 &= r^2 \\25 &= r^2\end{aligned}$$

$$\text{Equation} \Rightarrow x^2 + y^2 = 25$$

$$d) (1, -\sqrt{2})$$

$$\hookrightarrow x = 1 \text{ and } y = -\sqrt{2}$$

$$\begin{aligned}x^2 + y^2 &= r^2 \\(1)^2 + (-\sqrt{2})^2 &= r^2 \\1 + (2) &= r^2 \\1 + 2 &= r^2 \\3 &= r^2\end{aligned}$$

$$\text{Equation} \Rightarrow x^2 + y^2 = 3$$

Equation	Centre	Domain	Range	x-int	y-int
$x^2 + y^2 = 4$	(0,0)	$\{x   -2 \leq x \leq 2, x \in \mathbb{R}\}$	$\{y   -2 \leq y \leq 2, y \in \mathbb{R}\}$	-2 and 2	-2 and 2
$x^2 + y^2 = 16$	(0,0)	$\{x   -4 \leq x \leq 4, x \in \mathbb{R}\}$	$\{y   -4 \leq y \leq 4, y \in \mathbb{R}\}$	-4 and 4	-4 and 4
$x^2 + y^2 = 100$	(0,0)	$\{x   -10 \leq x \leq 10, x \in \mathbb{R}\}$	$\{y   -10 \leq y \leq 10, y \in \mathbb{R}\}$	-10 and 10	-10 and 10

$$7. \quad 4x^2 + 4y^2 = 1$$

a) If you divide by the common factor of 4:

$$\frac{4x^2}{4} + \frac{4y^2}{4} = \frac{1}{4}$$

$$x^2 + y^2 = \frac{1}{4} \quad * \text{ Now in standard form of circle with center at } (0,0)$$

b) The radius =  $\sqrt{\frac{1}{4}}$   
=  $\frac{1}{2}$  units.



8.

a) radius = 8 units

$$\text{Equation: } x^2 + y^2 = (8)^2$$
$$x^2 + y^2 = 64$$

b) Point (-4, 3)

If  $x = -4$  and  $y = 3$ :

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

$$(-4)^2 + (3)^2 = r^2$$

$$16 + 9 = r^2$$

$$25 = r^2$$

$$\sqrt{25} = r$$

$$5 = r$$

$$\text{Equation: } x^2 + y^2 = (5)^2$$
$$x^2 + y^2 = 25$$

c) Point  $(\sqrt{3}, -2)$

If  $x = \sqrt{3}$  and  $y = -2$ :

$$\begin{aligned}x^2 + y^2 &= r^2 \\(\sqrt{3})^2 + (-2)^2 &= r^2 \\3 + 4 &= r^2 \\7 &= r^2 \\\sqrt{7} &= r\end{aligned}$$

Equation:  $x^2 + y^2 = (\sqrt{7})^2$   
 $x^2 + y^2 = 7$

d)  $x$ -int = -5

↳ Point  $(-5, 0)$

If  $x = -5$  and  $y = 0$ :

$$\begin{aligned}x^2 + y^2 &= r^2 \\(-5)^2 + (0)^2 &= r^2 \\25 + 0 &= r^2 \\25 &= r^2 \\\sqrt{25} &= r \\5 &= r\end{aligned}$$

Equation:  $x^2 + y^2 = (5)^2$   
 $x^2 + y^2 = 25$

$$e) y\text{-int} = 4$$

↳ Point (0, 4)

If  $x=0$  and  $y=4$ :

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

$$(0)^2 + (4)^2 = r^2$$

$$0 + 16 = r^2$$

$$16 = r^2$$

$$\sqrt{16} = r$$

$$4 = r$$

$$\text{Equation: } x^2 + y^2 = (4)^2$$

$$x^2 + y^2 = 16$$

$$9. \quad x^2 + y^2 = 36$$

$$a) \quad (m, 3)$$

$$\text{If } y = 3:$$

$$x^2 + (3)^2 = 36$$

$$x^2 + 9 = 36$$

$$x^2 = 36 - 9$$

$$x^2 = 27$$

$$x = \pm \sqrt{27}$$

$$x = \pm \sqrt{9 \times 3}$$

$$x = \pm 3\sqrt{3}$$

$$b) \quad (-\sqrt{6}, k)$$

$$\text{If } x = -\sqrt{6}$$

$$(-\sqrt{6})^2 + y^2 = 36$$

$$6 + y^2 = 36$$

$$y^2 = 36 - 6$$

$$y^2 = 30$$

$$y = \pm \sqrt{30}$$

c)  $(8, k)$

If  $x=8$ :

$$x^2 + y^2 = 36$$

$$(8)^2 + y^2 = 36$$

$$64 + y^2 = 36$$

$$y^2 = 36 - 64$$

$$y^2 = -28$$

$$y = \pm \sqrt{-28}$$

↳ Since you cannot take the  $\sqrt{\quad}$  of a negative number in the real number system,  $(8, k)$  cannot be a point on the circle.