SOLUTIONS => EQUATIONS OF A CIRLE #2

1. a) $x^2+y^2=49$

Center $(0,0)$

$r=\sqrt{49}=7$

b) $x^2+(y-3)^2=16$

Center $(0,3)$

$r=\sqrt{16}=4$

c) $(x-3)^2+y^2=49$

Center $(3,0)$

$r=\sqrt{49}=7$

d) $x^2+(y-2)^2=64$

Center $(0,2)$

$r=\sqrt{64}=8$

e) $(x-5)^2+(y+3)^2-16=0$

$(x-5)^2+(y+3)^2=16$

Center $(5,-3)$

$r=\sqrt{16}=4$

f) $(x+4)^2+(y-2)^2=100$

Center $(-4,2)$

$r=\sqrt{100}=10$

2a) $C(0,0)$; $r=2$

$(x-h)^2+(y-k)^2=r^2$
$(x-0)^2+(y-0)^2=(2)^2$

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

b) $C(0,-2)$; $r=5$

$(x-h)^2+(y-k)^2=r^2$
$(x-0)^2+(y--2)^2=(5)^2$
$x^2+(y+2)^2=25$

c) $C(4,0)$; $r=3$

$(x-h)^2+(y-k)^2=r^2$
$(x-4)^2+(y-0)^2=(3)^2$
$(x-4)^2+y^2=9$

d) $C(h,k)$; $r=p$

$(x-h)^2+(y-k)^2=r^2$
$(x-h)^2+(y-k)^2=(p)^2$
$(x-h)^2+(y-k)^2=p^2$

3. $x^2+y^2+8x-4y+3=0$

a) $M(-3,-2)$

If $x=-3$ and $y=-2$:

L.S	R.S
$x^2+y^2+8x-4y+3$	0
$=(-3)^2+(-2)^2+8(-3)-4(-2)+3$	
$=9+4-24+8+3$	
$=0$	

Since L.S = R.S, $M(-3,-2)$ is located on the circle.

b) $N(-2,1)$

If $x=-2$ and $y=1$

L.S	R.S
$x^2+y^2+8x-4y+3$	0
$=(-2)^2+(1)^2+8(-2)-4(1)+3$	
$=4+1-16-4+3$	
$=-12$	

Since L.S $\neq$ R.S, $N(-2,1)$ is <u>not</u> located on the circle.

c) S(1, 2)

If $x=1$ and $y=2$:

L.S	R.S
$x^2+y^2+8x-4y+3$	0
$=(1)^2+(2)^2+8(1)-4(2)+3$	
$=1+4+8-8+3$	
$=8$	

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

4. $x^2+y^2-4x+my-18=0$

If A(7, 3) $\Rightarrow x=7$ and $y=3$

$(7)^2+(3)^2-4(7)+m(3)-18=0$

$49+9-28+3m-18=0$

$30+3m-18=0$

$3m+12=0$

$\frac{\cancel{3}m}{\cancel{3}}=\frac{-12}{3}$

$m=-4.$

5 a) $C(0,0)$; $x\text{-int} = 4$

$(4,0)$

To find r^2:

$$x^2 + y^2 = r^2$$
$$(4)^2 + (0)^2 = r^2$$
$$16 + 0 = r^2$$
$$16 = r^2$$

EQUATION:

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

b) $(2,-7)$ and $(4,3)$

To find the Center:

$$M = \left(\frac{x_2+x_1}{2}, \frac{y_2+y_1}{2}\right)$$

$$M = \left(\frac{4+2}{2}, \frac{3-7}{2}\right)$$

$$= \left(\frac{6}{2}, \frac{-4}{2}\right)$$

$$= \underset{h}{(3}, \underset{k}{-2)}$$

Using: $C(\overset{h}{3}, \overset{k}{-2})$ and $(\overset{x}{4}, \overset{y}{3})$

$$(x-h)^2 + (y-k)^2 = r^2$$
$$(4-3)^2 + (3--2)^2 = r^2$$
$$(1)^2 + (5)^2 = r^2$$
$$1 + 25 = r^2$$
$$26 = r^2$$
$$\sqrt{26} = r$$

$C(\overset{h}{3}, \overset{k}{-2})$ $\quad r = \sqrt{26}$

EQUATION: $(x-h)^2 + (y-k)^2 = r^2$
$$(x-3)^2 + (y--2)^2 = (\sqrt{26})^2$$
$$(x-3)^2 + (y+2)^2 = 26$$

$C(\overset{h}{2},\overset{k}{3})$ $(\overset{x}{4},\overset{y}{-1})$

c) $(x-h)^2+(y-k)^2=r^2$

$(4-2)^2+(-1-3)^2=r^2$

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

$4+16=r^2$

$20=r^2$

$\sqrt{20}=r$

$2\sqrt{5}=r$

$\sqrt{20}=\sqrt{4\times5}$

$=2\sqrt{5}$

$C(\overset{h}{2},\overset{k}{3})$

$r=\sqrt{20}$

or

$2\sqrt{5}$

EQUATION: $(x-h)^2+(y-k)^2=r^2$

$(x-2)^2+(y-3)^2=(\sqrt{20})^2$

$(x-2)^2+(y-3)^2=20$

⑥ Center: $(4,-3)$ $h=4$ $k=-3$

passes through $(6,1)$ $x=6$ $y=1$

① Find r:

$(x-h)^2+(y-k)^2=r^2$

$(6-4)^2+(1-(-3))^2=r^2$

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

$4+16=r^2$

$\boxed{20=r^2}$

$\sqrt{20}=r$

$\sqrt{4\times 5}=r$

$2\sqrt{5}=r$

② Find Equation

$(x-h)^2+(y-k)^2=r^2$

$(x-4)^2+(y+3)^2=20$

6 a) $C(\overset{h}{4},\overset{k}{-3})$ $A(\overset{x}{6},\overset{y}{1})$

$(x-h)^2+(y-k)^2=r^2$
$(6-4)^2+(1--3)^2=r^2$
$(2)^2+(4)^2=r^2$
$4+16=r^2$
$20=r^2$
$\sqrt{20}=r$
$2\sqrt{5}=r$

$\sqrt{20}=\sqrt{4\times5}$
$=2\sqrt{5}$

$C(\overset{h}{4},\overset{k}{-3})$
$r=\sqrt{20}$
or
$2\sqrt{5}$

EQUATION: $(x-h)^2+(y-k)^2=r^2$
$(x-4)^2+(y--3)^2=(\sqrt{20})^2$
$(x-4)^2+(y+3)^2=20$

b) $C(-3,-4)$; Passes through point of intersection of $2x+y=3$ & $5x-3y=2$

h, k

To find the point of intersection, remember there are 3 methods (substitution, elimination, and graphing)

I will use substitution:

$2x+y=3$ ①
$5x-3y=2$ ②

① $2x+y=3$
$y=-2x+3$ sub in ②

② $5x-3y=2$
$5x-3(-2x+3)=2$
$5x+6x-9=2$
$11x=2+9$
$\frac{11x}{11}=\frac{11}{11}$
$x=1$ sub in ①

① $2x+y=3$
$2(1)+y=3$
$2+y=3$
$y=3-2$
$y=1$

Point $(1,1)$

$2x+y=3$ $\times 3$
$5x-3y=2$

$6x+3y=9$
$(+)\ 5x-3y=2$
$11x=11$
$\boxed{x=1}$

$2x+y=3$
$2(1)+y=3$
$2+y=3$
$\boxed{y=1}$

Point $(1,1)$

$$\begin{array}{cc} & h \quad K \\ \text{6b)} & C\,(-3,-4) \end{array} \qquad \begin{array}{c} x \quad y \\ \text{pt } (1,1) \end{array}$$

To find r^2:

$$(x-h)^2+(y-K)^2=r^2$$
$$(1+3)^2+(1+4)^2=r^2$$
$$(4)^2+(5)^2=r^2$$
$$16+25=r^2$$
$$41=r^2$$

EQUATION:

$$(x-h)^2+(y-K)^2=r^2$$
$$(x+3)^2+(y+4)^2=41$$