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

$$(x-h)^2+(y-k)^2=r^2$$
$$(x-0)^2+(y-0)^2=(2)^2$$
$$* \quad x^2+y^2=4$$

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) Given:

center $(0,0)$

x int: $(4,0)$

$x \quad y$

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

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

$$\boxed{x^2+y^2=16}$$

b) Given: $\boxed{(2,-7)}$ and $(4,3)$

① $M=\left[\dfrac{x_1+x_2}{2}, \dfrac{y_1+y_2}{2}\right]$

$=\left[\dfrac{2+4}{2}, \dfrac{-7+3}{2}\right]$

$=(3,-2)$ Center

h, k

② $(x-h)^2+(y-k)^2=r^2$

$$(2-3)^2+(-7+2)^2=r^2$$
$$(-1)^2+(-5)^2=r^2$$
$$1+25=r^2$$
$$26=r^2$$
$$\sqrt{26}=r$$

③ Equation:

$$(x-h)^2+(y-k)^2=r^2$$
$$(x-3)^2+(y+2)^2=26$$

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 $(\overset{x}{4}, \overset{y}{3})$

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

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

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

$$(x-3)^2 + (y--2)^2 = (\sqrt{26})^2$$
$$(x-3)^2 + (y+2)^2 = 26$$

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

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

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

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

$4+16=r^2$

$20=r^2$

$\sqrt{20}=r$

$2\sqrt{5}=r$

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

$=2\sqrt{5}$

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

$r=\sqrt{20}$

or

$2\sqrt{5}$

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

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

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

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

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

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

$C(\overset{h}{4},\overset{k}{-3})$

$r=\sqrt{20}$

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 $2x+y=3$ & $5x-3y=2$

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)

$$\overset{h\ \ k}{} \quad \overset{x\ \ y}{}$$

6b) $C(-3,-4)$ pt $(1,1)$

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:

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