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6.2 : Equation of a Circle.

1) a) $C = (-5, 3)$ $r = 8$

$(x+5)^2 + (y-3)^2 = 64$

b) $C = (7, -8)$ $r = 10$

$(x-7)^2 + (y+8)^2 = 100$

c) $C = (-1, -4)$ $r = 3\sqrt{2}$

$(x+1)^2 + (y+4)^2 = 18$

2) a) $(x+2)^2 + (y-9)^2 = 144$

Centre : $(-2, 9)$

Radius : $\sqrt{144} = 12$

b) $(x-5)^2 + (y+2)^2 = 32$

Centre : $(5, -2)$

Radius : $\sqrt{32} \rightarrow \sqrt{16} \times \sqrt{2} = 4\sqrt{2}$

c) $(x+6)^2 + y^2 = 45$

Centre : $(-6, 0)$

Radius : $\sqrt{45} \rightarrow \sqrt{9} \times \sqrt{5} = 3\sqrt{5}$

3) $x^2 + y^2 + 8x - 12y - 15 = 0$

$x^2 + 8x + y^2 - 12y = 15$

$(x+4)^2 - 16 + (y-6)^2 - 36 = 15$

$(x+4)^2 + (y-6)^2 - 52 = 15$

$(x+4)^2 + (y-6)^2 = 67$

Centre : $(-4, 6)$

Radius : $\sqrt{67}$

4) midpoint = centre $(-1, 8)$ $(7, 20)$
$x \quad y \qquad x \quad y$

$\left(\frac{-1+7}{2}, \frac{8+20}{2}\right)$

$= \left(\frac{6}{2}, \frac{28}{2}\right)$

$= (3, 14)$
$x \quad y$

Radius: $\sqrt{(7-3)^2 + (20-14)^2}$

$= \sqrt{(4)^2 + (6)^2}$

$= \sqrt{16 + 36}$

$= \sqrt{52}$

$(x-3)^2 + (y-14)^2 = 52$

5) $(2, 3)$
$x \quad y$

$(2-1)^2 + (3-k)^2 = 50$

$(1)^2 + (3-k)^2 = 50$

$1 + (3-k)^2 = 50$

$(3-k)^2 = 49$

$3-k = \sqrt{49}$

$3-k = \pm 7$

$3-k = 7 \qquad 3-k = -7$

$k = -4 \qquad k = 10$

$k = 10$ or -4

6) a) $x^2 + y^2 - 6x + 10y - 16 = 0$

$x^2 - 6x + y^2 + 10y = 16$

$(x-3)^2 - 9 + (y+5)^2 - 25 = 16$

$(x-3)^2 + (y+5)^2 - 34 = 16$

$(x-3)^2 + (y+5)^2 = 50$

a) Centre: $(3, -5)$

b) Radius: $\sqrt{50} \rightarrow \sqrt{25} \times \sqrt{2} = 5\sqrt{2} \quad k = 5$

$(1,6)\ (-3,4)$
$x\ y$

7) a) Radius: $\sqrt{(-3-1)^2+(4-6)^2}$

$= \sqrt{(-4)^2+(-2)^2}$

$\sqrt{16+4}$

$= \sqrt{20}$

$(x-1)^2+(y-6)^2 = 20$

b) $x=0$

$(0-1)^2+(y-6)^2=20$

$(-1)^2+(y-6)^2=20$

$1+(y-6)^2=20$

$(y-6)^2=19$

$y-6=\pm\sqrt{19}$

$y=6\pm\sqrt{19}$

$(0, 6+\sqrt{19})$ or $(0, 6-\sqrt{19})$

8) a) P ——— M ——— Q

$(5,8)$ $(-2,3)$

$x\ y$ $m\ y$

$5-7=-2$ $(-9,-2)$

$-2-7=-9$ a) $p=-9$

$x=-9$ $q=-2$

$8-3=5$

$3-5=-2$

$y=-2$

b) $(5,8)\ (-2,3)$

radius $= \sqrt{(5-(-2))^2+(8-3)^2}$

$= \sqrt{(7)^2+(5)^2}$

$\sqrt{49+25}$

$= \sqrt{74}$

c) $(x+2)^2+(y-3)^2 = 74$

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

$x^2+4x+4+y^2-6y+9$

$= x^2+y^2+4x-6y+13-0$

9)a) $x^2+y^2+4y-k=0$

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

$(x-0)^2+(y+2)^2-4=k$

$(x-0)^2+(y+2)^2=4+k$

$r^2=4+k$

$5^2=25=4+k$

$k=25-4$

$k=21$

Centre: $(0,-2)$

b) $(p,2)$ $(-4,1)$
$\quad x\ y \qquad x\ y$

$r=\sqrt{(p+4)^2+(2-1)^2}$

$2r=\sqrt{(p+4)^2+(1)^2}$

$2*5=\left(\sqrt{(p+4)^2+1}\right)^2$

$(10)^2$

$100=(p+4)^2+1$

$100=p^2+8p+16+1$

$p^2+8p-83=0$

$p=5\sqrt{2}$