

Name Key Hour _____

12.12 Equations of a Circle by Completing the Square

Practice Completing the Square:

1. $x^2 + 5x$
 $x^2 + 5x + \frac{25}{4} - \frac{25}{4}$
 $(x + \frac{5}{2})^2 - \frac{25}{4}$

2. $x^2 - 2x$
 $x^2 - 2x + 1 - 1$
 $(x - 1)^2 - 1$

3. $3x^2 + 18x$ $3(x^2 + 6x)$
 $3(x^2 + 6x + 9 - 9)$
 $3(x + 3)^2 - 27$

4. $x^2 + 12x$
 $x^2 + 12x + 36 - 36$
 $(x + 6)^2 - 36$

5. $x^2 - 4x = 5$
 $x^2 - 4x + 4 = 5 + 4$
 $(x - 2)^2 = 9$

6. $x^2 - 5x = 10$
 $x^2 - 5x + \frac{25}{4} = 10 + \frac{25}{4}$ $\frac{40}{4} + \frac{25}{4}$
 $(x - \frac{5}{2})^2 = \frac{65}{4}$

7. $x^2 + 16x + 8 = 0$
 $x^2 + 16x + 64 = -8 + 64$
 $(x + 8)^2 = 56$

8. $x^2 + 10x + 15 = 0$
 $x^2 + 10x + 25 = -15 + 25$
 $(x + 5)^2 = 10$

Write the equation of the following circles in standard form. Then identify the center and radius. $(\frac{b}{2})^2$

9. $x^2 + y^2 + 8x - 14y + 61 = 0$
 $x^2 + 8x + 16 + y^2 - 14y + 49 = -61 + 16 + 49$
 $(x + 4)^2 + (y - 7)^2 = 4$
 $(-4, 7) \quad r = 2$

10. $x^2 + y^2 + 14x + 2y + 49 = 0$
 $x^2 + 14x + 49 + y^2 + 2y + 1 = -49 + 49 + 1$
 $(x + 7)^2 + (y + 1)^2 = 1$
 $(-7, -1) \quad r = 1$

11. $x^2 + y^2 + 6x + 14y + 49 = 0$
 $x^2 + 6x + 9 + y^2 + 14y + 49 = -49 + 9 + 49$
 $(x + 3)^2 + (y + 7)^2 = 9$
 $(-3, -7) \quad r = 3$

12. $x^2 + y^2 - 10x + 20y + 61 = 0$
 $x^2 - 10x + 25 + y^2 + 20y + 100 = -61 + 25 + 100$
 $(x - 5)^2 + (y + 10)^2 = 64$
 $(5, -10) \quad r = 8$

13. $x^2 + y^2 + 2x - 10y + 10 = 0$
 $x^2 + 2x + 1 + y^2 - 10y + 25 = -10 + 1 + 25$
 $(x + 1)^2 + (y - 5)^2 = 16$
 $(-1, 5), \quad r = 4$

14. $x^2 + y^2 - 8x + 2y - 8 = 0$
 $x^2 - 8x + 16 + y^2 + 2y + 1 = 8 + 16 + 1$
 $(x - 4)^2 + (y + 1)^2 = 25$
 $(4, -1), \quad r = 5$

15. $x^2 + y^2 + 4x + 18y + 84 = 0$

$$x^2 + 4x + 4 + y^2 + 18y + 81 = -84 + 4 + 81$$

$$(x+2)^2 + (y+9)^2 = 1$$

$$(-2, -9) \quad r=1$$

16. $4y + y^2 = -28x - x^2 - 191$

$$x^2 + 28x + y^2 + 4y = -191$$

$$x^2 + 28x + 196 + y^2 + 4y + 4 = -191 + 196 + 4$$

$$(x+14)^2 + (y+2)^2 = 9$$

$$(-14, -2) \quad r=3$$

Use the following information provided to write the standard form equation of each circle.

17. Center: $(-11, -14)$ and Area: 16π

$$\pi r^2 = 16\pi$$

$$r^2 = 16$$

$$r = 4$$

$$(x+11)^2 + (y+14)^2 = 16$$

18. Center: $(-5, 12)$ and Area: 36π

$$\pi r^2 = 36\pi$$

$$r^2 = 36$$

$$r = 6$$

$$(x+5)^2 + (y-12)^2 = 36$$

19. Center: $(10, -4)$ and Circumference: 4π

$$2\pi r = 4\pi$$

$$2r = 4$$

$$r = 2$$

$$(x-10)^2 + (y+4)^2 = 4$$

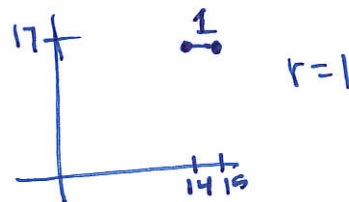
20. Center: $(15, 14)$ and Circumference: $2\pi\sqrt{15}$

$$2\pi r = 2\pi\sqrt{15}$$

$$r = \sqrt{15}$$

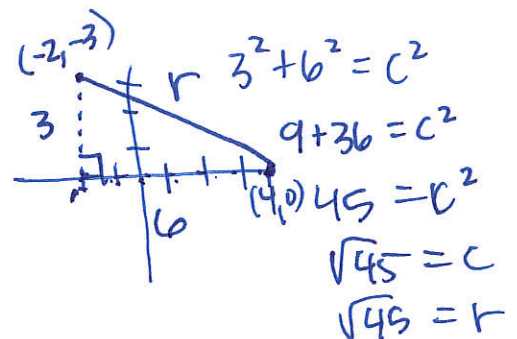
$$(x-15)^2 + (y-14)^2 = 15$$

21. Center: $(14, 17)$ and a point on the circle $(15, 17)$.



$$(x-14)^2 + (y-17)^2 = 1$$

22. Center: $(-2, -3)$ and a point on the circle $(4, 0)$.



$$(x+2)^2 + (y+3)^2 = 45$$