

For the following:
 a) Write the functions in vertex form by completing the square.
 b) Identify the vertex.
 c) Find the axis of symmetry.
 d) State any transformations on the graph of $y = x^2$.
 e) State the domain and range.

1) $f(x) = x^2 + 10x - 13$
 $(\frac{10}{2})^2 = 25$
 $(5)^2 = 25$

$f(x) = x^2 + 10x + 25 - 13 - 25$
 $f(x) = (x+5)(x+5) - 38$

Vertex: $(-5, -38)$
 AOS: $x = -5$
 left 5, down 38
 Domain: $(-\infty, \infty)$ Range: $[-38, \infty)$

2) $f(x) = x^2 + 6x + 4$
 $(\frac{6}{2})^2 = 9$
 $(3)^2 = 9$

$f(x) = x^2 + 6x + 9 + 4 - 9$
 $f(x) = (x+3)(x+3) - 5$

Vertex: $(-3, -5)$
 AOS: $x = -3$
 left 3, down 5
 Domain: $(-\infty, \infty)$ Range: $[-5, \infty)$

3) $f(x) = 2x^2 - 8x + 3$
 $(\frac{-4}{2})^2 = 4$
 $(-2)^2 = 4$

$f(x) = 2(x^2 - 4x + 4) + 3 - 4 + 4$
 $f(x) = 2(x-2)(x-2) - 5$

Vertex: $(2, -5)$
 AOS: $x = 2$
 Vertical stretch of 2
 Right 2, down 5
 Domain: $(-\infty, \infty)$ Range: $[-5, \infty)$

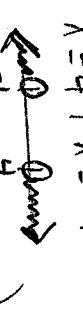
4) $f(x) = 3x^2 + 6x - 4$
 $(\frac{3}{2})^2 = \frac{9}{4}$
 $(\frac{3}{2})^2 = \frac{9}{4}$

$f(x) = 3(x^2 + 2x + 1) - 4 + \frac{9}{4} - \frac{9}{4}$
 $f(x) = 3(x+1)(x+1) - 7$

Vertex: $(-1, -7)$
 AOS: $x = -1$
 Vertical stretch of 3
 left 1, down 7
 Domain: $(-\infty, \infty)$ Range: $[-7, \infty)$

5) $x^2 - 3x - 4 > 0$

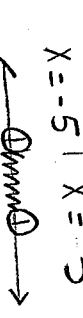
$(x-4)(x+1) = 0$
 $x = 4$ | $x = -1$



$x < -1$ or $x > 4$

6) $x^2 + 2x < 15$

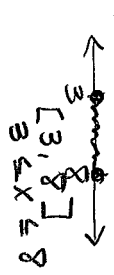
$x^2 + 2x - 15 < 0$
 $(x+5)(x-3) = 0$
 $x = -5$ | $x = 3$



$-5 < x < 3$

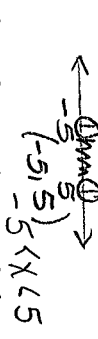
7) $2x^2 + 48 \leq 22x$

$2x^2 - 22x + 48 \leq 0$
 $2(x^2 - 11x + 24) = 0$
 $2(x-8)(x-3) = 0$
 $x = 8$ | $x = 3$



9) $4x^2 - 65 < 35$
 $-35 - 35 < 35$

$4x^2 - 100 < 0$
 $4(x^2 - 25) < 0$
 $4(x+5)(x-5) = 0$
 $x = -5$ | $x = 5$



Solve for roots by completing the square in simplest form.

11) $x^2 - 7 = -2x$
 $\pm 2x \pm 2x$
 $(\frac{7}{2})^2 = \frac{49}{4}$
 $(\frac{7}{2})^2 = \frac{49}{4}$

$x^2 + 2x - 7 = 0$
 $(x^2 + 2x + 1) - 7 - 1 = 0$
 $(x+1)(x+1) - 8 = 0$
 $\sqrt{(x+1)^2 - 8}$
 $x+1 = \pm \sqrt{4+2}$
 $x = -1 \pm \sqrt{2}$

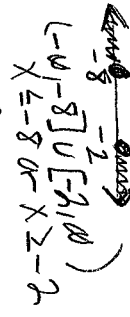
13) $x^2 = 24 - 4x$
 $(\frac{4}{2})^2 = 4$
 $(2)^2 = 4$

$x^2 + 4x - 24 = 0$
 $x^2 + 4x + 4 - 24 - 4 = 0$
 $(x+2)(x+2) - 28 = 0$
 $\sqrt{(x+2)^2 - 28}$
 $x+2 = \pm \sqrt{4+7}$
 $x = -2 \pm \sqrt{11}$

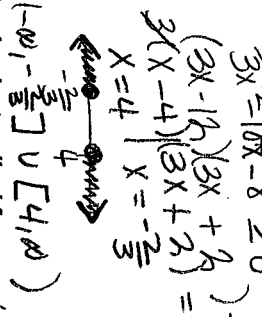
$x = -2 \pm \sqrt{11}$

8) $x^2 + 8x \geq -2x - 16$
 $\pm 16 \pm 2x \pm 2x \pm 16$

$x^2 + 10x + 16 \geq 0$
 $(x+8)(x+2) = 0$
 $x = -8$ | $x = -2$



10) $3x^2 - 4x \geq 6x + 8$
 $-8 - 10x - 10x - 8$
 $3x^2 - 10x - 8 \geq 0$
 $(3x-12)(3x+2) = 0$
 $3(x-4)(3x+2) = 0$
 $x = 4$ | $x = -\frac{2}{3}$



12) $2x^2 = 12 - 8x$
 $\pm 8x \pm 8x$
 $2x^2 + 8x - 12 = 0$
 $2(x^2 + 4x + 4) - 12 - 4 + 4 = 0$
 $2(x+2)(x+2) - 20 = 0$
 $\sqrt{(x+2)^2 - 10}$
 $x+2 = \pm \sqrt{10}$
 $x = -2 \pm \sqrt{10}$

14) $x^2 - 2x = 2$
 $(\frac{-2}{2})^2 = 1$
 $(-1)^2 = 1$

$x^2 - 2x - 2 = 0$
 $(x^2 - 2x + 1) - 2 - 1 = 0$
 $(x-1)(x-1) - 3 = 0$
 $\sqrt{(x-1)^2 - 3}$
 $x-1 = \pm \sqrt{3}$
 $x = 1 \pm \sqrt{3}$

$x = 1 \pm \sqrt{3}$

State the center and radius for each of the following circles. If the radius is not an integer, give its value in simplest radical form.

15) $(x-2)^2 + y^2 = 144$

Center: (2, 0)

$r = \sqrt{144} = 12$

16) $(x+3)^2 + (y-6)^2 = 18$

Center: (-3, 6)

$r = \sqrt{18} = \sqrt{9 \cdot 2} = 3\sqrt{2}$

Write the equation of the circle for the following information:

17) Center = (0, -5); radius = 2

$x^2 + (y+5)^2 = 4$

18) Center = (-1, 3); radius = $\sqrt{10}$

$(x+1)^2 + (y-3)^2 = 10$

State center and radius of the circle by completing the square.

19) $x^2 + y^2 - 4x + 10y + 20 = 0$

$x^2 - 4x + 4 + y^2 + 10y + 20 = 0$

$(x-2)^2 + (y+5)^2 - 9 = 0$

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

Center: (2, -5)

$r = \sqrt{9} = 3$

20) $x^2 + y^2 - 4x - 6y + 8 = 0$

$x^2 - 4x + 4 + y^2 - 6y + 8 = 0$

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

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

Center: (2, 3)

$r = \sqrt{5}$

Given the parabola:

- a) Write the function in vertex form.
- b) Find the vertex.
- c) Write the equation for the axis of symmetry.
- d) State the "p" value.
- e) State the focus and directrix.

23) $-12(y+1) = (x-4)^2$

$y+1 = -\frac{1}{12}(x-4)^2$

$y = -\frac{1}{12}(x-4)^2 - 1$

Vertex: (4, -1)

AOS: $x = 4$

$p = 3$

24) $(x+2)^2 = 8(y-3)$

$\frac{1}{8}(x+2)^2 = y-3$

$\frac{1}{8}(x+2)^2 + 3 = y$

Vertex: (-2, 3)

AOS: $x = -2$

$p = 2$

Given the following information about a parabola:

- a) Write the function in vertex form.
- b) Write an equation for the axis of symmetry.
- c) Write the domain and range in interval notation.
- d) State the "p" value.
- e) State the focus and directrix.

25) Given a focus of (4, 2) and a directrix of $y = -2$.

F: (4, 2)

V: (4, 0)

D: $y = -2$

$y = \frac{1}{8}(x-4)^2$

AOS: $x = 4$

Domain: $(-\infty, \infty)$

Range: $[0, \infty)$

26) Given a focus of (2, 5) and a vertex of (2, -1)

F: (2, 5)

V: (2, -1)

D: $y = -7$

$y = \frac{1}{4}(x-2)^2 - 1$

AOS: $x = 2$

Domain: $(-\infty, \infty)$

Range: $[-1, \infty)$

27) Given a vertex of (3, -6) and a directrix of $y = 2$.

D: $y = 2$

V: (3, -6)

F: (3, -14)

$y = -\frac{1}{8}(x-3)^2 - 6$

AOS: $x = 3$

Domain: $(-\infty, \infty)$

Range: $(-\infty, -6]$

Algebraically, state the solutions to the following equations.

21) $x^2 + y^2 = 40$

$y = x - 4$

$x^2 + (x-4)^2 = 40$

$x^2 + x^2 - 4x + 16 = 40$

$2x^2 - 4x - 24 = 0$

$x^2 - 2x - 12 = 0$

$(x-6)(x+2) = 0$

$x = 6$
 $x = -2$

22) $(x-2)^2 + (y-1)^2 = 25$

$y + x = 10$

$(x-2)^2 + (10-x-1)^2 = 25$

$(x-2)^2 + (9-x)^2 = 25$

$x^2 - 4x + 4 + 81 - 18x + 9x^2 = 25$

$10x^2 - 22x + 84 = 25$

$10x^2 - 22x + 59 = 0$

$(10x-11)(x+30) = 0$

$x = \frac{11}{10}$
 $x = -30$

$y = 10 - \frac{11}{10} = 9.9$
 $y = 10 - (-30) = 40$

(11/10, 9.9) (5, 5)

open

open

open

open

Name: _____ Date: _____
Review Unit #6 (Quadratics) WS #20 Calc #: _____
Period: _____

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8) $x^2 + 8x \geq -2x - 16$

3) $f(x) = 2x^2 - 8x + 3$ 4) $f(x) = 3x^2 + 6x - 4$

Solve for roots by **completing the square in simplest radical form**.

11) $x^2 - 7 = -2x$

12) $2x^2 = 12 - 8x$

Algebraically solve the following inequalities and graph on a number line. State the solutions in interval **and** set builder notation.

13) $x^2 = 24 - 4x$

14) $x^2 - 2x = 2$

5) $x^2 - 3x - 4 > 0$ 6) $x^2 + 2x < 15$

State the center and radius for each of the following circles. If the radius is not an integer, give its value in simplest radical form.

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20) $x^2 + y^2 - 4x - 6y + 8 = 0$

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Algebraically, state the solutions to the following equations,

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26) Given a focus of (2, 5) and a vertex of (2, -1)

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