Algebra II
Linear/Quadratic Systems Review

Name _____
Period_____ Date_____

Use the points provided to write the quadratic in the form requested.

1. Given the roots x=3 and x=5 and the point (1,-16) write the equation root form and then standard form.

$r_1 = 3 \quad r_2 = 5$

Root Form

$y = a(x-r_1)(x-r_2)$

$y = a(x-3)(x-5)$

To solve for "a", use Pt $(\overset{x}{1}, \overset{y}{-16})$

$-16 = a(1-3)(1-5)$

$-16 = a(-2)(-4)$

$\frac{-16}{8} = \frac{8a}{8} \quad \therefore a = -2$

$y = -2(x-3)(x-5)$ root form

$= -2(x^2-8x+15)$

$y = -2x^2+16x-30$

$y = -2x^2+16x-30$ standard form

2. Given the vertex (2,5) and the point (3,8) write the equation in vertex form and then standard form.

$h = 2, \; k = 5$

Vertex Form

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

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

To solve for a, use Pt $(\overset{x}{3}, \overset{y}{8})$

$8 = a(3-2)^2+5$

$8 = a(1)^2+5$

$-5 \qquad -5$

$3 = a$ ✓

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

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

$= 3x^2-12x+12+5$

$y = 3x^2-12x+17$ standard form

3. Given the three points (1,6), (3,18), and (0,3) write the equation in standard form.

Using 3 equations and 3 unknowns:

At Pt $(\overset{x}{1}, \overset{y}{6})$ in $ax^2+bx+c=y$

$a(1)^2+b(1)+c=6$

eq.1 $a+b+c=6$

At Pt $(\overset{x}{3}, \overset{y}{18})$

$a(3)^2+b(3)+c=18$

eq.2 $9a+3b+c=18$

At Pt $(\overset{x}{0}, \overset{y}{3})$

$a(0)^2+b(0)+c=3$

eq.3 $c=3$ ✓

→ Substituting $c=3$ in Eq. 1 & 2

$a+b+3=6$

$-3 \quad -3$

eq.4 $a+b=3$ ✓

$9a+3b+3=18$

$-3 \quad -3$

eq.5 $9a+3b=15$

Using Elimination in Eq. 4 & 5:

$-3(a+b=3)$

$-3a-3b=-9$

$9a+3b=15$

$6a=6$

$a=1$ ✓

Eq. 1 $a+b+3=6$ or $b=2$ ✓

Answer:

$y = x^2+2x+3$

Solve by factoring

4.

$$0 = \frac{-2x^2}{-2} + \frac{26x}{-2} - \frac{84}{-2}$$

$0 = x^2 - 13 + 42$

$= (x-7)(x-6)$

$x = 7 \mid x = 6$ Ans.

5.

$$0 = \frac{4x^2}{4} - \frac{28x}{4} - \frac{72}{4}$$

$0 = x^2 - 7x - 18$

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

$x = 9 \mid x = -2$ Ans.

6.

$$0 = \left[\frac{1}{2}x^2 + x - 12\right] 2$$

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

$= (x+6)(-4)$

$x = -6 \mid x = 4$

7.

$$0 = \left[\frac{1}{3}x^2 - 5x + 18\right] 3$$

$0 = 3x^2 - 15x + 54$

$= (x-9)(x+6)$

$x = 9 \mid x = 6$

Solve by any means

8.

$$0 = \frac{2x^2}{2} + \frac{4x}{2} - \frac{16}{2}$$

$$0 = x^2 + 2x - 8$$

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

$x = -4$ | $x = 2$ Ans.

9.

$$0 = \frac{-3x^2}{-3} - \frac{15x}{-3} + \frac{9}{-3}$$

$$0 = x^2 + 5x - 3$$

$a = 1$

$b = 5$

$c = -3$

Using quadratic formula:

$$x = \frac{-(5) \pm \sqrt{(5)^2 - 4(1)(-3)}}{2(1)}$$

$$= \frac{-5 \pm \sqrt{25 + 12}}{2}$$

$$x = \frac{-5 \pm \sqrt{37}}{2} \quad \surd\surd$$

$$x = -\frac{5}{2} \pm \frac{\sqrt{37}}{2} \quad \surd\surd$$

10.

$$0 = x^2 + 3x + 5$$

$a = 1$

$b = 3$

$c = 5$

Using quadratic formula:

$$x = \frac{-(3) \pm \sqrt{(3)^2 - 4(1)(5)}}{2(1)}$$

$$= \frac{-3 \pm \sqrt{9 - 20}}{2}$$

$$= \frac{-3 \pm \sqrt{-12}}{2}$$

$$= \frac{-3 \pm i\sqrt{12}}{2}$$

$$= \frac{-3 \pm i\sqrt{4}\sqrt{3}}{2}$$

$$= -\frac{3}{2} \pm \frac{2i\sqrt{3}}{2} \text{ or } -\frac{3}{2} \pm i\sqrt{3} \quad \surd\surd$$

Solve the quadratic inequalities (*sketch if needed*)

11.

$x^2 + 3x < 0$

common factor is x:

$x(x+3) < 0$

if $x(x+3) = 0$

$x = 0 \mid x + 3 = 0$

$x = -3$

For Section A:

Using -4

$-4(-4+3) \overset{?}{<} 0$

$-4(-1) \overset{?}{<} 0$

$4 < 0$

not true, so Section is not a solution

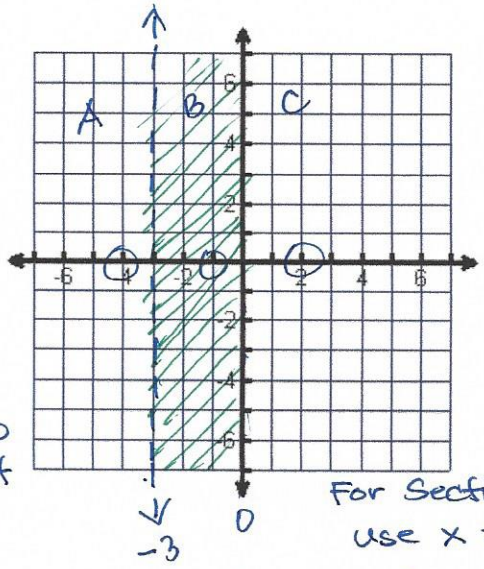
For Section B:

use $x = -1$

$(-1)(-1+3) \overset{?}{<} 0$

$(-1)(2) \overset{?}{<} 0$

$-2 \overset{?}{<} 0$ ✓



$(-3, 0)$

For Section C:

use $x = 2$

$2(2+3) \overset{?}{>} 0$

$2(5) > 0$

$10 < 0$ not true

12.

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

Factoring we get:

$(x-5)(x+1) > 0$

$x = 5 \mid x = -1$

For Section A,

Use $x = -2$

$(-2-5)(-2+1) > 0$

$(-7)(-1) > 0$

$7 > 0$ true, shade A

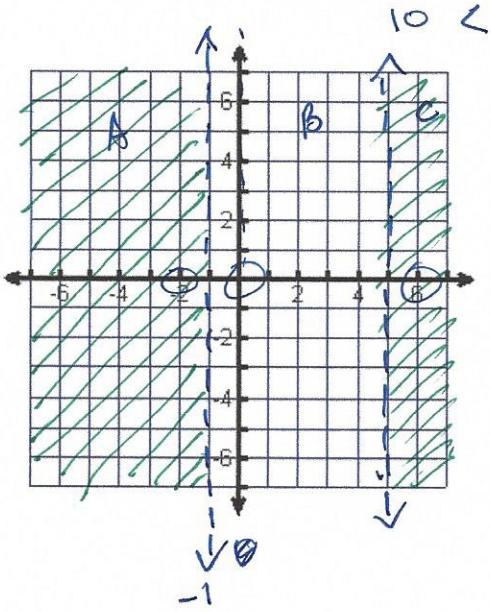
For Section B,

Use $x = 0$

$(0-5)(0+1) \overset{?}{>} 0$

$(-5)(1) \overset{?}{>} 0$

$-5 > 0$ not true, so don't shade



For Section C

using $x = 6$

$(6-5)(6+1) \overset{?}{>} 0$

$(1)(7) \overset{?}{>} 0$

$7 > 0$

true, so shade Section C

Identify the vertex, focus, directrix, and axis of symmetry.

13.

$y = \frac{1}{4}(x+1)^2 + 1$ (h, k)

vertex $(-1, 1)$

focus $(-1, 2)$

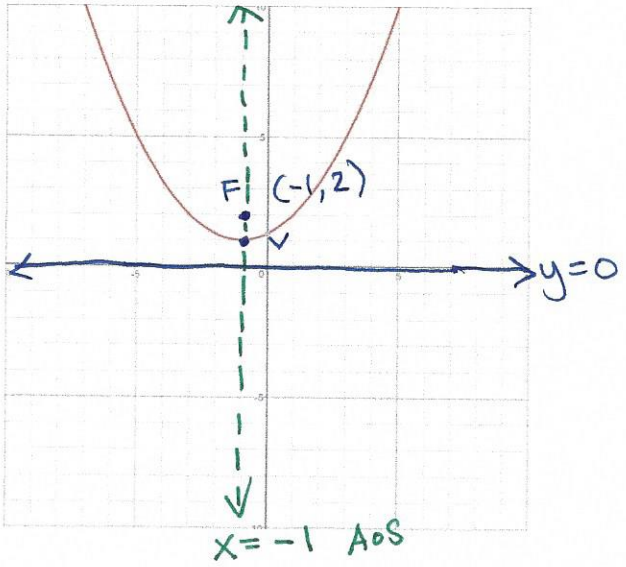
directrix $y = 0$

AoS $x = -1$

To solve for p:

$\frac{4}{4} = \frac{4p}{4}$

$1 = p$ ✓✓



14.

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

vertex $(2, 3)$

focus $(2, 5)$

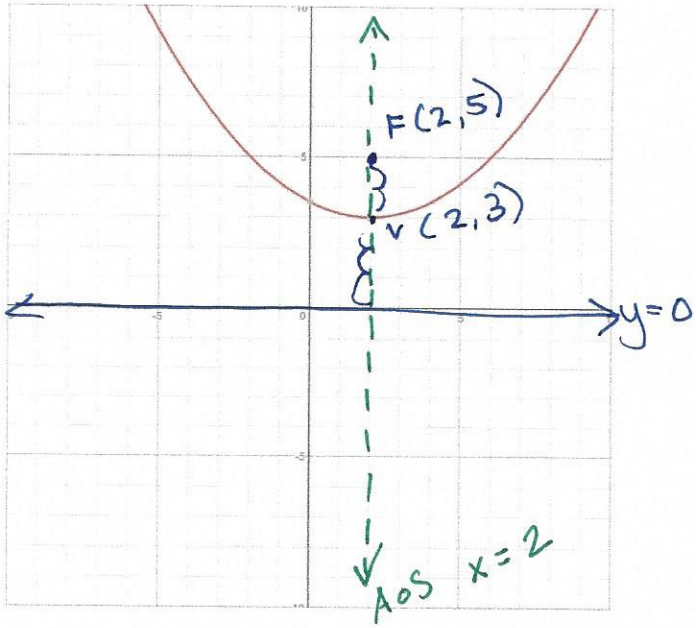
directrix $y = 0$

AoS $x = 2$

To solve for p:

$\frac{8}{4} = \frac{4p}{4}$

$2 = p$



15.

$y = \frac{1}{16}(x+2)^2 - 4$ (h, k)

vertex $(-2, -4)$

focus $(-2, 0)$

directrix $y = -8$

AoS $x = -2$

To solve for p:

$\frac{16}{4} = \frac{4p}{4}$

$4 = p$