

Unit 2A: Quadratic Functions - Representations
PRE-TEST

Simplify each sum or difference

1. $(7p - 2p^3 - 3p^4) + (3p^3 + 8p^4 - 8p)$

$$-3p^4 + 8p^4 - 2p^3 + 3p^3 + 7p - 8p$$

$$\boxed{5p^4 + p^3 - p}$$

2. $(4m^2 + 2m + 2m^4) - (2m - 4m^2 + 6m^4)$

$$4m^2 + 2m + 2m^4 - 2m + 4m^2 - 6m^4$$

$$2m^4 - 6m^4 + 4m^2 + 4m^2 + \cancel{2m} - \cancel{2m}$$

$$\boxed{-4m^4 + 8m^2}$$

Watch
order for
1-4.

Find each product

3. $(7x - 7)(2x + 4)$

$$7x(2x + 4) - 7(2x + 4)$$

$$14x^2 + 28x - 14x - 28$$

$$\boxed{14x^2 + 14x - 28}$$

4. $(n^2 - 2n - 2)(5n^2 - 5n + 4)$

$$n^2(5n^2 - 5n + 4) - 2n(5n^2 - 5n + 4) - 2(5n^2 - 5n + 4)$$

$$\underbrace{5n^4 - 5n^3 + 4n^2} - \underbrace{10n^3 + 10n^2 - 8n} - \underbrace{10n^2 + 10n - 8}$$

$$\boxed{5n^4 - 15n^3 + 4n^2 + 2n - 8}$$

Factor each Quadratic expression completely.

5. $3x^2 + 42x + 144$

$$3(x^2 + 14x + 48)$$

$$\boxed{3(x + 6)(x + 8)}$$

6. $4n^2 + 56n + 180$

$$4(n^2 + 14n + 45)$$

$$\boxed{4(n + 5)(n + 9)}$$

7. $5k^3 - 44k^2 + 63k$

$$k(5k^2 - 44k + 63)$$

$$(5k^2 - 35k) - (9k - 63)$$

$$\boxed{k(5k - 9)(k - 7)}$$

8. $14x^2 - 152x + 120$

$$2(7x^2 - 76x + 60)$$

$$(7x^2 - 70x) - (6x - 60)$$

$$\boxed{2(7x - 6)(x - 10)}$$

9. $9x^2 - 11x - 14$

$$(9x^2 + 7x) - (18x + 14)$$

$$\boxed{(x - 2)(9x + 7)}$$

10. $12a^2 + 2a - 10$

$$2(6a^2 + a - 5)$$

$$(6a^2 + 6a) - (5a - 5)$$

$$\boxed{2(6a - 5)(a + 1)}$$

Factor each Special Case Quadratic expression completely.

11. $x^2 - 16$

$\sqrt{x^2} = x \quad \sqrt{16} = 4$
 $(x+4)(x-4)$

12. $9p^2 - 25$

$\sqrt{9p^2} = 3p \quad \sqrt{25} = 5$
 $(3p+5)(3p-5)$

13. $3a^2 + 18a + 27$

$3(a^2 + 6a + 9)$
 $(a^2 + 3a) + (3a + 9)$
 $3(a+3)(a+3)$
 $3(a+3)^2$

14. $k^2 + 2k + 1$

$(k^2 + k) + (k + 1)$
 $(k+1)(k+1)$
 $(k+1)^2$

Find the value of c that completes the square.

15. $a^2 + 26a + c$

$c = \left(\frac{26}{2}\right)^2 = (13)^2 = 169$

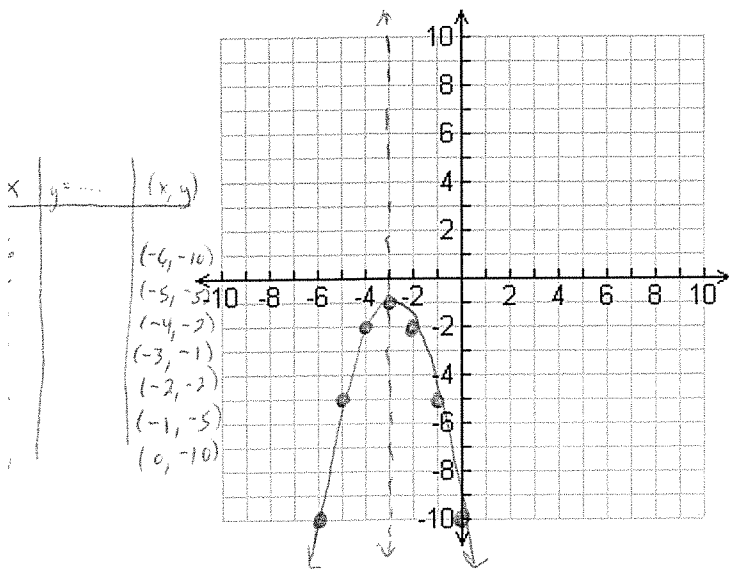
16. $x^2 + 24x + c$

$c = \left(\frac{24}{2}\right)^2 = (12)^2 = 144$

Sketch the graph of each Quadratic function. Identify each of the following components:

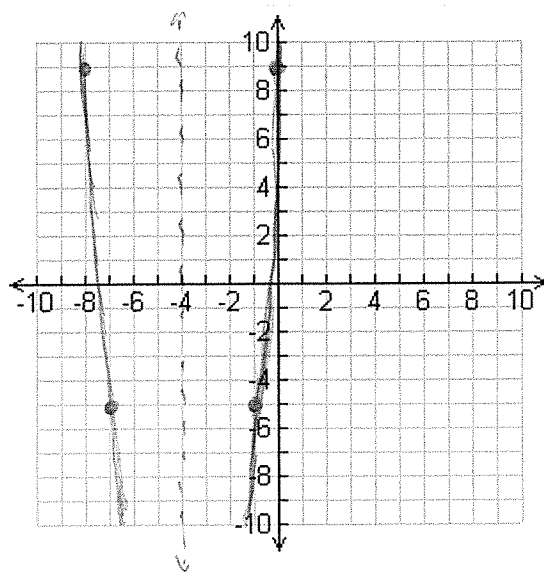
- a. Axis of Symmetry
- b. The ordered pair of the Vertex
- c. The y-intercept
- d. The x-intercept(s)

17. $y = -x^2 - 6x - 10$



- (A) $x = \frac{6}{2(-1)} = \frac{6}{-2} = -3$
- (B) $(-3, -1)$
- (C) $(0, -10)$
- (D) None

18. $f(x) = 2x^2 + 16x + 9$



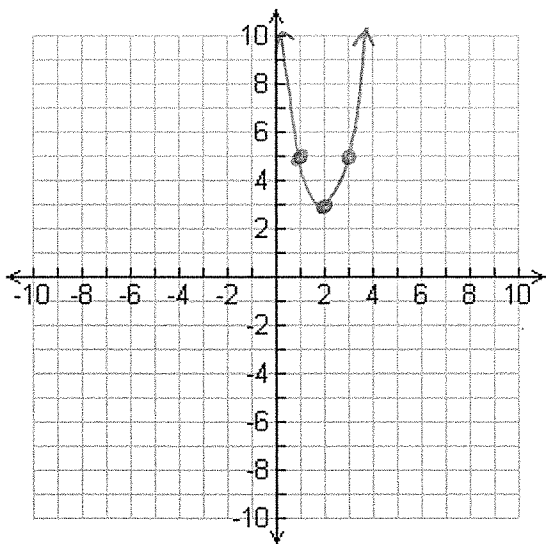
x	y
-8	9
-7	-5
-6	-15
-5	-21
-4	-23
-3	-21
-2	-15
-1	-5
0	9

- (A) $x = \frac{-16}{2(2)} = \frac{-16}{4} = -4$
- (B) $(-4, -23)$
- (C) $(0, 9)$
- (D) $-8 < x < -7, -1 < x < 0$

Sketch the graph of each Quadratic function. Identify each of the following components:

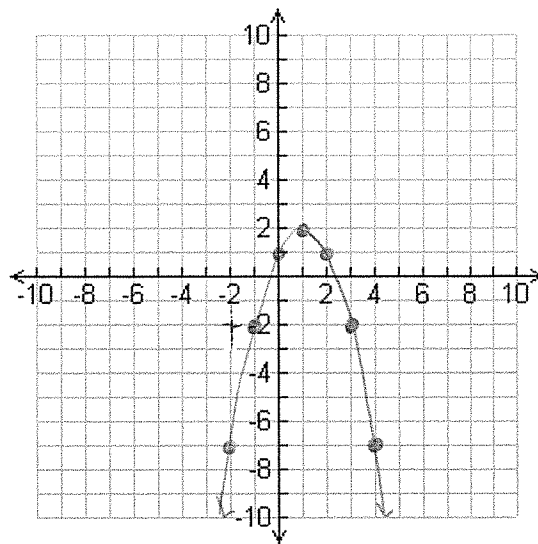
- Axis of Symmetry
- The ordered pair of the Vertex
- The y-intercept
- The x-intercept(s)

19. $y = 2(x - 2)^2 + 3$



- $x = 2$
- $(2, 3)$
- $(0, 11)$
- None

20. $f(x) = -(x - 1)^2 + 2$



- $x = 1$
- $(1, 2)$
- $(0, 1)$
- $-1 < x < 0, 2 < x < 3$

Using the graphs created in 17 – 20, compare and analyze the given functions with each other.

21. The graphs of 17 and 18.

AOS for both are negative.

Vertices are both in Q3

Y-intercept for #17 is on the neg y-axis, and #18 on the pos y-axis.

X-intercepts #17 has none while #18 has 2.

Domain $(-\infty, \infty)$ for both.

Range #17 $(-\infty, -1]$ and $[-23, \infty)$ for #18.

#17 Leading Coef. is $-50 \downarrow$

#18 Leading Coef. is $+50 \uparrow$

22. The graphs of 19 and 20.

AOS for both are positive

Vertices are both in Q1

Y-intercepts are both on positive y-axis.

X-intercepts #19 has none while #20 has 2.

Domain for both is $(-\infty, \infty)$

Range #19 $[3, \infty)$ for #20 $(-\infty, 2]$

#19 leading Coef. $+50 \uparrow$

#20 leading Coef. $-50 \downarrow$

