Integrated Math 3 Name KEY

What can you remember before Chapter 4?

<u>Section 4.1 Review of Quadratic Functions and Graphs (3 Days)</u>

→ I can determine the vertex of a parabola and generate its graph given a quadratic function in vertex form, standard form, or intercept form.

For #'s 1-3: Identify the form it's in, identify the vertex and graph the function using any method you recall. (No Calculator!)

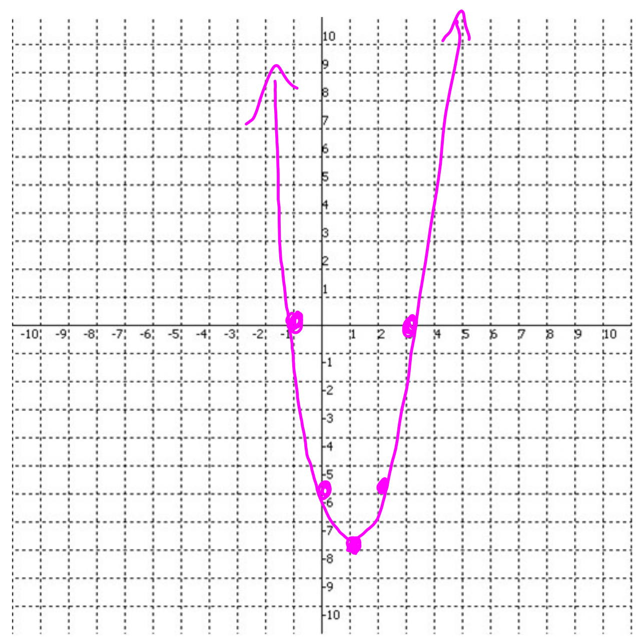
1. f(x) = 2(x – 3)(x + 1) (3,0) (-1,0)

Form: Factored Vertex: (1, -8)

$\frac{3-1}{2}$

X	y
-1	0
0	-6
1	-8
2	-6
3	0

Vertex should be middle point!!



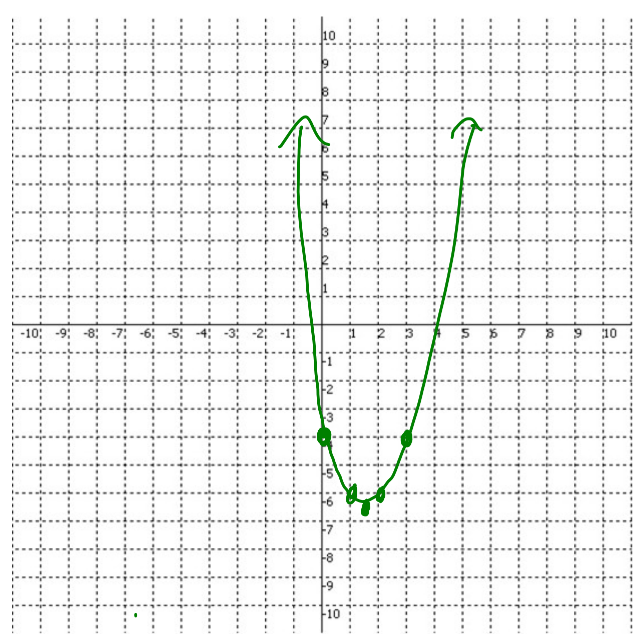
2. f(x) = x^2 – 3x – 4

Form: Standard Vertex: (1.5, -6.25)

$\frac{-b}{2a}$ $\frac{3}{2(1)} \approx \frac{3}{2}$

X	y
0	-4
1	-6
1.5	-6.25
2	-6
3	-4

Vertex should be middle point!!



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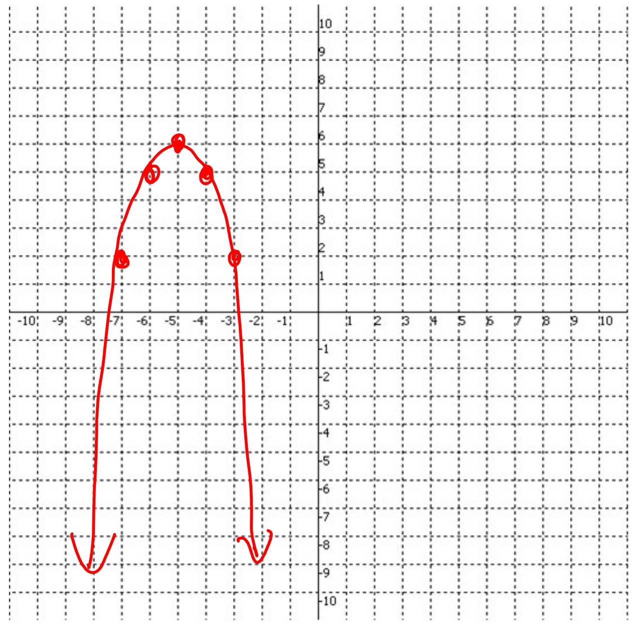
3. $f(x) = -(x + 5)^2 + 6$

Form: Vertex Vertex: (-5, 6)

X	y
-7	2
-6	5
-5	6
-4	5
-3	2

Vertex should be middle point!!



→ I can explain how the parent graph $f(x) = x^2$ is translated (vertex form).

For #'s 4-5: Describe the horizontal and/or vertical shifts performed on the parent graph $f(x) = x^2$. (0, 0)

Hint: Find the vertex of both functions and compare.

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

Horizontal Shift: 4 Units Right

Vertical Shift: 2 Units Up

5. $f(x) = -3(x + 2)^2$ (-2, 0)

Horizontal Shift: 2 Units Left

Vertical Shift: None

→ I can explain how the parent graph $f(x)= x^2$ is reflected (sign of a; use terms "concave up" and "concave down").

For #'s 6-8: State whether the quadratic function will be concave up (opening up) or concave down (opening down).

6. $f(x) = -2(x - 1)^2 + 17$

Concave Down

7. $f(x)= 3x^2 + 19$

Concave Up

8. $f(x)= -(x - 1)(x + 1)$

Concave Down

→ I can explain how the parent graph $f(x)= x^2$ is dilated (based on the value of a).

For #'s 9-11: State the dilation factor and how the 'a' value is affecting the graph.

9. $f(x) = -3(x + 6)^2 - 13$

-3 → Stretch

10. $f(x)= x^2 - 16$

1 → No Change

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

$\frac{1}{3}$ → Shrink

→ I understand that the zeros of a function correspond to the x-intercept(s) of its graph.

12. Given f(x) has the zeros of 2 and -7, what ordered pairs does the function cross the x-axis?

(2,0) ______ (-7,0) ______

13. What are the x-intercepts of the following function: $g(x) = -7(x + 1)(x - 10)$?

(-1,0) ______ (10,0) ______

→ I can identify the maximum or minimum of a quadratic function.

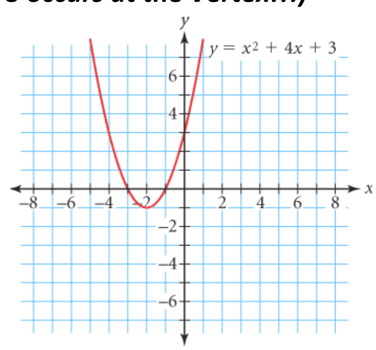
For #'s 14-15: State whether the function has a maximum or minimum AND what ordered pair it occurs at. *(Hint: The maximum or minimum ALWAYS occurs at the Vertex!!!)*

14. $f(x) = -2(x - 1)^2 + 6$

Maximum or Minimum

Location: (1, 6)

15.



Maximum or Minimum

Location: (-2, -1)

<u>**Section 4.5 Deriving Quadratic Functions (2 Days)**</u>

→ I understand it takes three points to determine a unique parabola.

→ I can write a quadratic function in vertex form given the vertex and one additional point on the graph.

→ I can solve a 3 x 3 system to determine the equation of a quadratic function given three points on the graph.

Most of Section 4.5 will be BRAND NEW so there will be no prerequisite problems provided other than the following two problems:

16. Solve the following system using Elimination:

$2x + 3y = 9$

$6x - 3y = 15$

$8x = 24$

$x = 3$

$2(3) + 3y = 9$

$6 + 3y = 9$

$3y = 3$

$y = 1$

(3, 1)

17. Solve the following system using Elimination:

$-2(5x - 2y = -5)-2$

$x - 4y = 17$

$-10x + 4y = 10$

$-9x = 27$

$x = -3$

$5(-3) - 2y = -5$

$-15 - 2y = -5$

$-2y = 16$

$y = -5$

(-3, -5)

Section 4.6 Operations within the Complex Number System (2 Days)

→ I can explain the difference between real and imaginary numbers.

18. Compare and contrast real and imaginary numbers using complete sentences. You should include at least one similarity and one difference.

★Many possible answers★

Imaginary numbers occur when you take the square root of a negative. Real numbers can be found on a number line while imaginary numbers cannot. They are similar in that they are both members of the Complex Number Set.

→ I understand that complex numbers contain all real and all imaginary numbers.

→ I understand the relationship between the different sets of numbers and I can sort numbers into these sets.

19. Accurately complete the graphic organizer to represent how all sets of numbers are related.

1) F

3) B

2) D

4) G

5) C

6) E

7) H

8) A

Answer Choices:

A) Natural

B) Real

C) Irrational

D) Imaginary

E) Integers

F) Complex

G) Rational

H) Whole

20. Identify all number sets to which the number –4 belongs : E, G, B, F

21. Identify all number sets to which the number 4 + 3i belongs : D, F

22. Identify all number sets to which the number π belongs : C, B, F

→ I can add, subtract, multiply and divide imaginary numbers.

For numbers 23-30: Perform each operation and simplify. Make sure you realize which operation you're being asked to perform!

23. (3 + 2i) + (-7 – 6i)

$-4-4i$

24. (12 – i) + (16 + 2i)

$28+i$

25. (-2 + 4i) – (6 + 6i)

$-2+4i-6-6i$

$-8-2i$

26. (7 – 2i) – (7 + 2i)

$7-2i-7-2i$

$-4i$

27. (2i)(4 + 3i)

$8i+6i^2$

$8i+6(-1)$

$-6+8i$

28. (3 + 6i)(3 – 6i)

$9-36i^2$

$9-36(-1)$

45

29. $\frac{3}{2-i}$ $\frac{2+i}{2+i}$ $=\frac{6+3i}{4-i^2}$ $\frac{6+3i}{4-(-1)}$

$\frac{6+3i}{5}$

30. $\frac{1}{4+5i}$ $\frac{4-5i}{4-5i}$ $=\frac{4-5i}{16-25i^2}=\frac{4-5i}{16+25}$

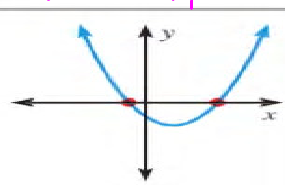
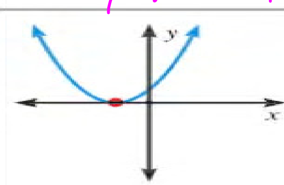
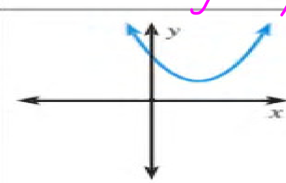
$=\frac{4-5i}{41}$

<u>Section 4.7 Quadratics and Complex Numbers (2 Days)</u>

→ I can relate the number of real zeros of a quadratic function to its x-intercepts.

30. Complete the following diagram.

Using the Discriminant of $ax^2 + bx + c = 0$

Value of discriminant	$b^2 - 4ac > 0$	$b^2 - 4ac = 0$	$b^2 - 4ac < 0$
Number and type of solutions	2 Real	2 Repeated Real	2 Imaginary
Graph of $y = ax^2 + bx + c$			

→ ***I can use the discriminant to determine the number and type of zeros a quadratic function has.***

→ ***I can make inferences about the number and type of zeros of a quadratic function in terms of its graph and its equation.***

Complete the following diagram using what you remember from last year. Then, complete #'s 31-33.

USING THE DISCRIMINANT OF $ax^2 + bx + c = 0$

When $b^2 - 4ac > 0$, the equation has 2 Real Zeros. The graph has 2 x-intercepts.

When $b^2 - 4ac = 0$, the equation has 2 Repeated Real Zeros. The graph has 1 x-intercept.

When $b^2 - 4ac < 0$, the equation has 2 Imaginary Zeros. The graph has 0 x-intercepts.

Find the discriminant of the quadratic equation and give the number and type of solutions of the equation.

31) $x^2 + 6x + 5 = 0$

$6^2 - 4(1)(5)$

$36 - 20$

$16 > 0$

2 Real Zeros

32) $x^2 + 6x + 9 = 0$

$6^2 - 4(1)(9)$

$36 - 36$

$0 = 0$

2 Repeated Real Zeros

33) $x^2 + 6x + 13 = 0$

$6^2 - 4(1)(13)$

$36 - 52$

$-16 < 0$

2 Imaginary Zeros

→ ***I can relate the zeros of a quadratic function to its factors.***

For #'s 34-36: Identify whether the zeros are real or imaginary. Then, write them as factors to create a quadratic in factored form.

34) -6, 2

Real or Imaginary

Factored Form: $(x+6)(x-2)$

35) 3i, -3i

Real or Imaginary

Factored Form: $(x-3i)(x+3i)$

36) $1 - \sqrt{5}$, $1 + \sqrt{5}$

Real or Imaginary

Factored Form: $(x-(1-\sqrt{5}))(x-(1+\sqrt{5}))$