Integrated Math 3 Name KEY

Chapter 4 Test Review Packet

Section 4.1 Review of Quadratic Functions and Graphs

→ 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!)

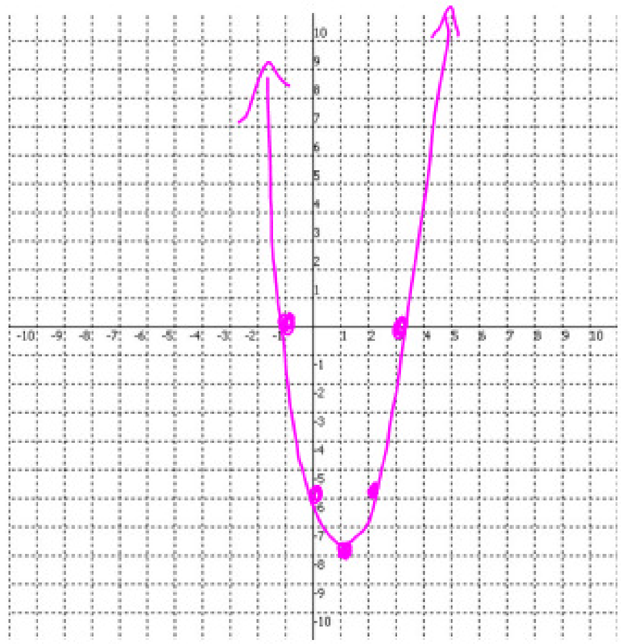
1. $f(x) = 2(x - 3)(x + 1)$ (3,0) (-1,0)

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!!



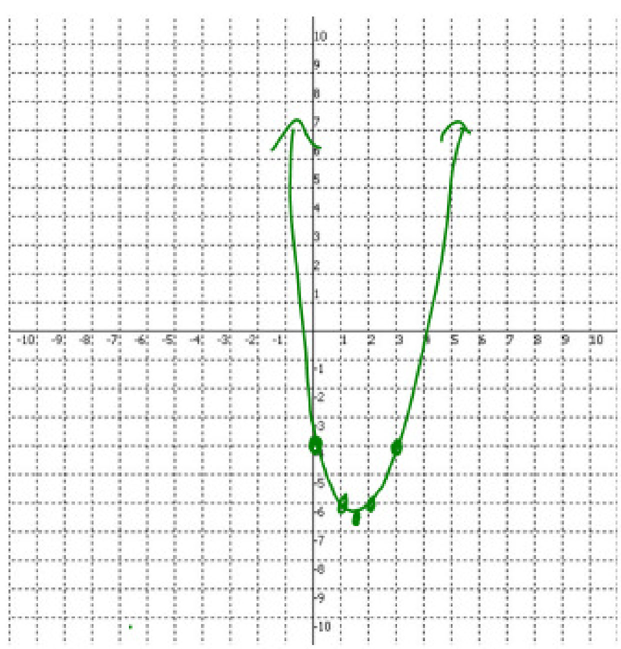
2. $f(x) = x^2 - 3x - 4$

Form: Standard Vertex: (1.5, -6.25)

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

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

Vertex should be middle point!!



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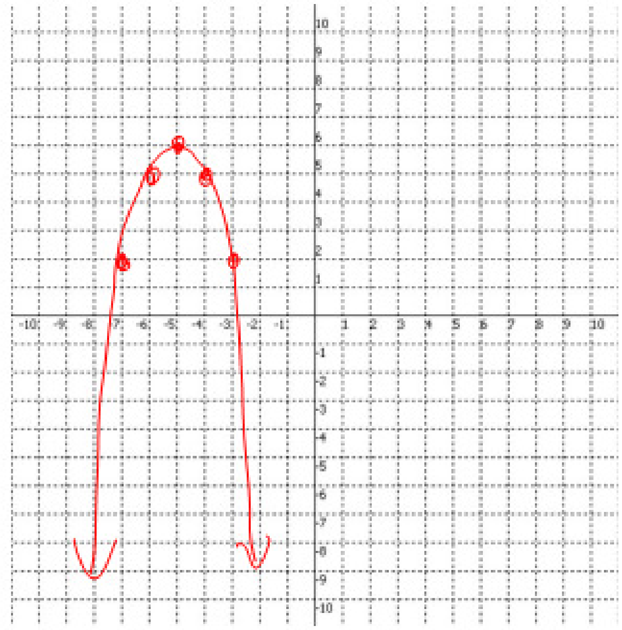
3. $f(x) = -(x+5)^2 + 6$

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

$-3 \rightarrow$ Stretch

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

$1 \rightarrow$ No Change

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

$\frac{1}{3} \rightarrow$ 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.

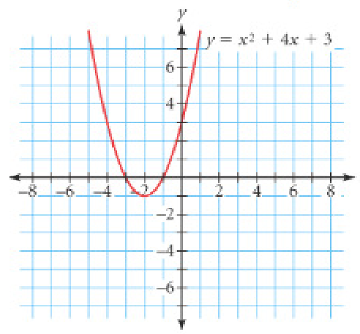
For #'s 14-15: State whether the function has a maximum or minimum AND what ordered pair it occurs at. ***(Hint: The maximum or minimum ALWAYS occurs at the Vertex!!!)***

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

Maximum or Minimum

Location: (1, 6)

15.



Maximum or Minimum

Location: (-2, -1)

Section 4.5 Deriving Quadratic Functions

→ 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.

Write a quadratic function in vertex form for #'s 16 & 17 given the information for each. ***Recall that vertex form is $f(x) = a(x-h)^2 + k$***

16. Vertex: (1, -2)

Point: (3,2)

$y = a(x-1)^2 - 2$

$2 = a(3-1)^2 - 2$

$2 = a(2)^2 - 2$

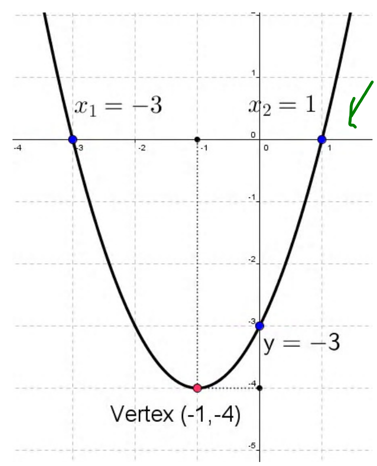
$2 = 4a - 2$

$4 = 4a$

$a = 1$

$f(x) = 1(x-1)^2 - 2$

17.



(1,0)

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

$0 = a(1+1)^2 - 4$

$0 = a(2)^2 - 4$

$0 = 4a - 4$

$4 = 4a$

$a = 1$

$f(x) = 1(x+1)^2 - 4$

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

18. Use a 3x3 system to write a quadratic equation in standard form for the parabola that passes through the points (-1,-3), (0,-4), and (2,6).

$-3 = a(-1)^2 + b(-1) + c$ $\quad -4 = a(0)^2 + b(0) + c$ $\quad 6 = a(2)^2 + b(2) + c$

$-3 = a - b + c$ $\quad -4 = c$ $\quad 6 = 4a + 2b + c$

$-3 = a - b - 4$
$+4 \qquad +4$

$1 = a - b$

$6 = 4a + 2b - 4$
$+4 \qquad +4$

$10 = 4a + 2b$

1. $2(1) = (a - b) \cdot 2$

$10 = 4a + \cancel{2b}$
$2 = 2a - \cancel{2b}$

$\frac{12}{6} = \frac{6a}{6}$

$a = 2$

$1 = 2 - b$
$-2 \quad -2$
$-1 = -b$
$b = 1$

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

19. Use your graphing calculator and the QuadReg feature to determine the quadratic equation for the following three points that lie on a parabola: (-4, 12), (-2, -14), and (2, 6).

L_1	L_2
-4	12
-2	-14
2	6

Stat → Calc → QuadReg

$f(x) = 3x^2 + 5x - 16$

Section 4.6 Operations within the Complex Number System

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

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

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.

21. 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

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

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

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

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

For numbers 25-32: Perform each operation and simplify. Make sure you realize which operation you're being asked to perform!

25. $(3 + 2i) + (-7 - 6i)$

$-4-4i$

26. $(12 - i) + (16 + 2i)$

$28+i$

27. $(-2 + 4i) - (6 + 6i)$

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

$-8-2i$

28. $(7 - 2i) - (7 + 2i)$

$7-2i-7-2i$

$-4i$

29. $(2i)(4 + 3i)$

$8i+6i^2$

$8i+6(-1)$

$-6+8i$

30. $(3 + 6i)(3 - 6i)$

$9-36i^2$

$9-36(-1)$

45

31. $\frac{3}{2-i} \cdot \frac{2+i}{2+i} = \frac{6+3i}{4-i^2}$

$\frac{6+3i}{4-(-1)}$

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

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

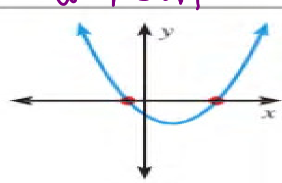
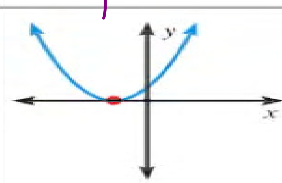
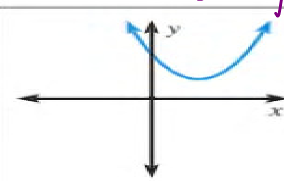
$= \frac{4-5i}{41}$

Section 4.7 Quadratics and Complex Numbers

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

33. 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	1 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 34-36.

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 1 Repeated Real Zero. 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.

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

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

$36 - 20$

$16 > 0$

2 Real Zeros

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

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

$36 - 36$

$0 = 0$

2 Repeated Real Zeros

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

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

$36 - 52$

$-16 < 0$

2 Imaginary Zeros

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

For #'s 37-39: Identify whether the zeros are real or imaginary. Then, write them as factors to create a quadratic in factored form.

37) -6, 2

Real or Imaginary

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

38) 3i, -3i

Real or Imaginary

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

39) $1 - \sqrt{5}$, $1 + \sqrt{5}$

Real or Imaginary

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