

Chapter 2 Review

NON-CALCULATOR

1. On a separate piece of paper, thoroughly explain each of the following terms within the context of this chapter:

CHECK THE CHAPTER SECTIONS, OR THE GLOSSARY!

absolute value of a complex number axis of symmetry binomial completing the square complex conjugate complex number discriminant imaginary number	<i>OR THE REVIEW PAGE!</i>	imaginary part imaginary unit maximum value minimum value parabola quadratic function quadratic inequality in 2 variables	quadratic model quadratic regression real part root of an equation standard form trinomial vertex form vertex zero of a function
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Using $y = x^2$ as a guide, describe the transformations of each function below.

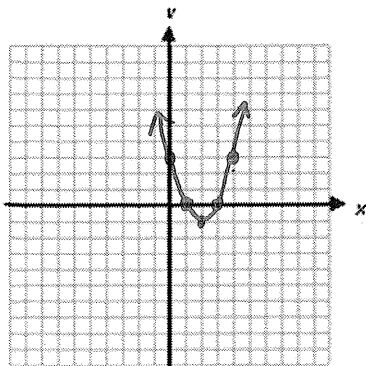
2. $g(x) = 4(x - 2)^2$ Right 2 ... Vertical Stretch by a factor of 4: $(x, y) \rightarrow (x+2, 4y)$
3. $g(x) = -2(x + 1)^2$ Left 1 ... Vertical Stretch by a factor of 2 ... Flip over x-axis: $(x, y) \rightarrow (x-1, -2y)$
4. $g(x) = -(x + 2)^2 + 6$ Left 2, up 6 ... Flip over x-axis $(x, y) \rightarrow (x-2, -y+6)$

Use the description to write each quadratic function in vertex form.

5. $f(x) = x^2$ is reflected across the x-axis and translated 3 units down to create $g(x)$.
 $g(x) = -1 \cdot f(x) - 3 = \boxed{-x^2 - 3}$
6. $f(x) = x^2$ is vertically stretched by a factor of 2 and translated 4 units right to create $g(x)$.
 ~~$g(x) = 2 \cdot f(x-4)$~~ $g(x) = 2 \cdot f(x-4) = \boxed{2 \cdot (x-4)^2}$
7. $f(x) = x^2$ is vertically compressed by a factor of $\frac{1}{4}$ and translated 1 unit left to create $g(x)$.
 $g(x) = \frac{1}{4} \cdot f(x+1) = \boxed{\frac{1}{4} (x+1)^2}$

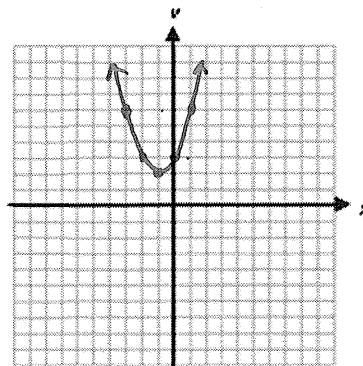
For each function, (a) determine whether the graph opens upward or downward, (b) find the axis of symmetry, (c) find the vertex, (d) find the y-intercept, and (e) graph the function.

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



- a) Up ... $a = 1 > 0$
 b) $x = -b/2a = \frac{4}{2 \cdot 1} = 2$
 c) $f(2) = (2)^2 - 4(2) + 3$
 $f(2) = 4 - 8 + 3$
 $f(2) = -1$
 $V(2, -1)$
 d) y-int = 3

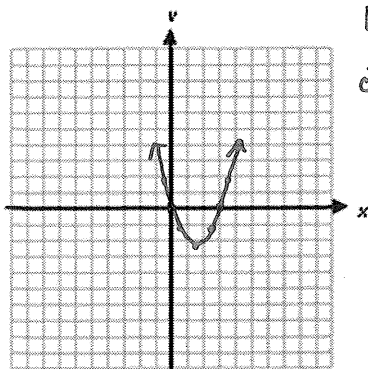
9. $g(x) = x^2 + 2x + 3$



- a) Up ... $a = 1 > 0$
 b) $x = -b/2a = \frac{-2}{2 \cdot 1} = -1$
 c) $f(-1) = (-1)^2 + 2(-1) + 3$
 $f(-1) = 1 - 2 + 3$
 $f(-1) = 2$
 $V(-1, 2)$
 d) y-int = 3

10. $h(x) = x^2 - 3x$

x	y
4	4
-1	4



a) $Up \dots a = 1 > 0$
 b) $x = -b/2a = 3/2(1) = 3/2$
 c) $h(3/2) = (3/2)^2 - 3(3/2)$
 $= \frac{9}{4} - \frac{9}{2}$
 $= \frac{9-18}{4} = -\frac{9}{4}$
 $V(3/2, -9/4)$
 d) $y-int = 0$

$(0,0)$ & $(3,0)$ on graph

Find the roots of each equation by factoring.

12. $x^2 - 7x - 8 = 0$

$(x-8)(x+1) = 0$

$x = 8$ & $x = -1$

14. $x^2 + 14x = 32$

$x^2 + 14x - 32 = 0$

$(x+16)(x-2) = 0$

$x = -16$ & $x = 2$

Write a quadratic in standard form for each given set of zeros.

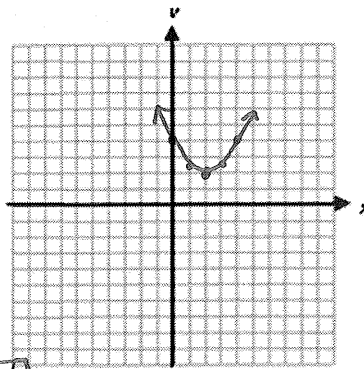
15. 2 and -3

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

$y = x^2 + x - 6$

$y = x^2 + 3x - 2x - 6$

11. $j(x) = \frac{1}{2}x^2 - 2x + 4$



a) $Up \dots a = 1/2 > 0$

b) $x = -b/2a = 2/(1/2) = 2$

c) $j(2) = \frac{1}{2}(2)^2 - 2(2) + 4$
 $= \frac{1}{2} \cdot 4 - 4 + 4$
 $= 2 - 4 + 4$
 $= 2$

$V(2,2)$

d) $y-int = 4$

13. $4x^2 - 16x + 16 = 0$

$4(x^2 - 4x + 4) = 0$

$4(x-2)(x-2) = 0$

$x = 2$

16. -2 and -3

16. -2 and -3

$y = (x+2)(x+3)$

$y = x^2 + 5x + 6$

$y = x^2 + 3x + 2x + 6$

Write each function in vertex form by completing the square, then identify its vertex.

17. $f(x) = x^2 - 4x + 9$

CTS: $\frac{1}{2}(-4) = -2$
 $(-2)^2 = 4$

$f(x) = (x-2)^2 + 5$
 $V(2,5)$

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

18. $g(x) = x^2 + 2x - 7$

CTS: $\frac{1}{2}(2) = 1$
 $1^2 = 1$

$g(x) = (x+1)^2 - 8$
 $V(-1,-8)$

$g(x) = x^2 + 2x + 1 - 7 - 1$

Solve each equation for its complex roots.

19. $\sqrt{x^2} = \sqrt{-81}$

$x = \pm i\sqrt{81}$

$x = \pm 9i$

20. $6x^2 + 150 = 0$

$6x^2 = -150$

$\sqrt{x^2} = \sqrt{-25}$

$x = \pm 5i$

21. What is the complex conjugate of $5i - 4$?

$\rightarrow -4 + 5i \dots$ so the complex conjugate is $\boxed{-4 - 5i}$

Find the zeros of each function using the quadratic formula.

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

22. $f(x) = x^2 - 3x - 8$

$x = \frac{3 \pm \sqrt{9 - 4(1)(-8)}}{2(1)} = \frac{3 \pm \sqrt{9 + 32}}{2}$

$x = \frac{3 \pm \sqrt{41}}{2}$

23. $f(x) = 2x^2 - 10x + 18$

$x = \frac{10 \pm \sqrt{100 - 4(2)(18)}}{2(2)} = \frac{10 \pm \sqrt{100 - 144}}{4}$

$x = \frac{10 \pm \sqrt{-44}}{4} = \frac{10 \pm 2i\sqrt{11}}{4} = \frac{5 \pm i\sqrt{11}}{2}$

24. Graph the inequality: $y \leq 2x^2 - x - 5$

Find vertex: $x = -\frac{b}{2a} = \frac{1}{2(2)} = \frac{1}{4}$

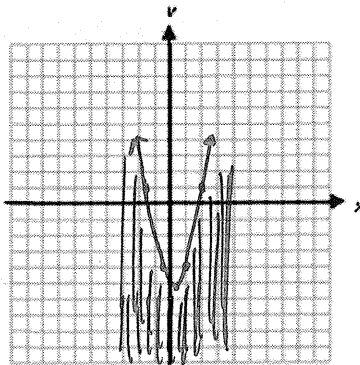
$= 2\left(\frac{1}{4}\right)^2 - \left(\frac{1}{4}\right) - 5$

$= 2 \cdot \frac{1}{16} - \frac{1}{4} - 5$

$= \frac{1}{8} - \frac{1}{4} - 5$

$= \frac{1 - 2 - 40}{8} = \frac{-41}{8} = -5\frac{1}{8}$

$V\left(\frac{1}{4}, -5\frac{1}{8}\right)$



x	y
1	-4
2	-1

Since $y \leq 2x^2 - x - 5$
SHADE BELOW

Perform each indicated operation, and write the result in the form $a + bi$.

25. $(1 + 5i) + (6 - i) = \boxed{7 + 4i}$

26. $(9 + 4i) - (3 + 2i) = 9 + 4i - 3 - 2i = \boxed{6 + 2i}$

27. $(5 - i) - (11 - i) = 5 - i - 11 + i = \boxed{-6}$

28. $-5i(3 - 4i) = -15i + 20i^2 = -15i - 20 = \boxed{-20 - 15i}$

29. $(5 - 2i)(6 + 8i) = 30 + 40i - 12i - 16i^2 = 30 + 18i + 16 = \boxed{46 + 18i}$

30. $(3 + 2i)(3 - 2i) = 9 - 6i + 6i - 4i^2 = 9 + 4 = \boxed{13}$

31. $(4 + i)(1 - 5i) = 4 - 20i + i - 5i^2 = 4 - 19i + 5 = \boxed{9 - 19i}$

32. $(7 + 4i)(3 + 9i) = 21 + 63i + 12i + 36i^2 = 21 + 75i - 36 = \boxed{-15 + 75i}$

33. $i^{32} = 1$
 $(i^4)^8$

34. $-5i^{21} = -5i$
 $i^{20} = (i^4)^5 \cdot i = 1 \cdot i = i$

CALCULATOR

ZOOM 6 ... RESETS WINDOW

Using your calculator, find the minimum or maximum value of each function.

- Put equation into Y_1
- 2ND TRACE ... "CALC"

35. $g(x) = 6x - 2x^2$

vertex (1.5, 4.5)

$\boxed{\text{MAX} = 4.5}$

36. $g(x) = 3x^2 + 7$

vertex (0, 7)

$\boxed{\text{MIN} = 7}$

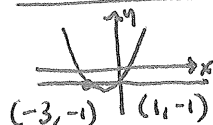
- CHOOSE 3: min or 4: max
- Left Bound? Choose x left of ans
- Right Bound? Choose x right of ans
- Guess? Enter

Solve each inequality by using tables or graphs.

Final intersection pts: Put Parabola in Y_1

37. $x^2 + 2x - 4 \geq -1$

$y_1 \geq y_2$

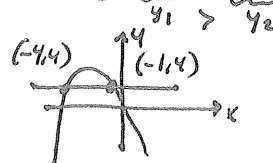


Put # in Y_2
2ND TRACE ... "CALC"

5: Intersection
ANSWERS ARE X-VALUES!

$\boxed{x \leq -3 \text{ or } x \geq 1}$

38. $-x^2 - 5x > 4$



$\boxed{-4 < x < -1}$

