Honors Algebra 2 Name: ______________________________________

Chapter 3 Review Packet

The problems are numbered (*Chapter number*).(*Section number*).(*Problem number*). Refer to your text for help or to seek similar problems for extra practice. Only use a calculator when you see the ▮ symbol.

Standard form: $y = a(x - h)^2 + k$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

3.1.1. Define the word linear.

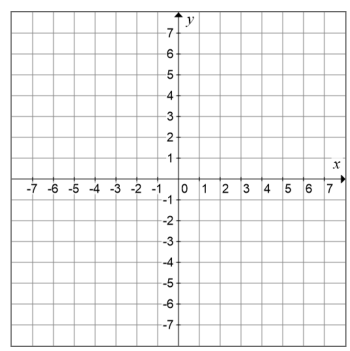
3.1.12. Define the word quadratic.

3.1.3. Give instructions on how to find the x-intercept(s) of an equation.

3.1.4. Give instructions on how to find the y-intercept(s) of an equation.

3.1.5. Write the quadratic function $y = \frac{2}{3}(x - 6)^2 + 5$ in the form $y = ax^2 + bx + c$.

3.1.6. Find the coordinates of the vertex and intercepts. Write your points as ordered pairs. Use them to graph the parabola.
$f(x) = -x^2 - 6x - 5$

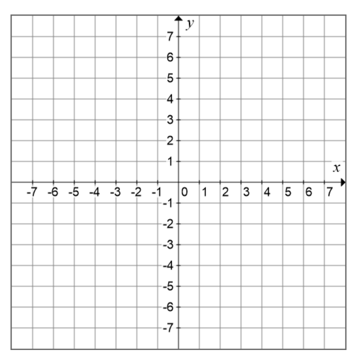


Vertex:

y-intercept:

x-intercept(s):

3.1.7. Find the coordinates of the vertex and intercepts. Write your points as ordered pairs. Use them to graph the parabola.
$g(x) = 2x^2 - 8x + 6$



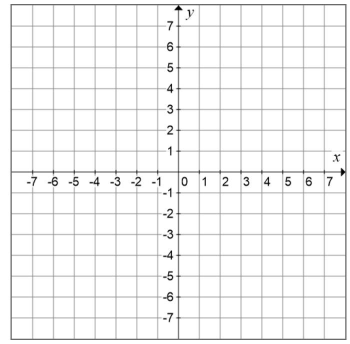
Vertex:

y-intercept:

x-intercept(s):

▌3.1.8. Find the coordinates of the vertex and intercepts. Write your points as ordered pairs. Use them to graph the parabola.

$f(x) = \frac{1}{2}x^2 - 2x - 3$



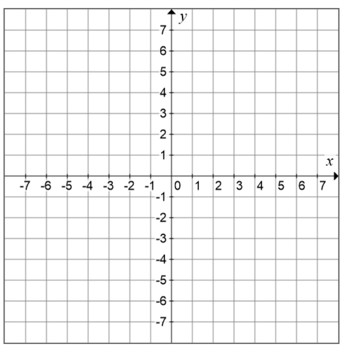
Vertex:

y-intercept:

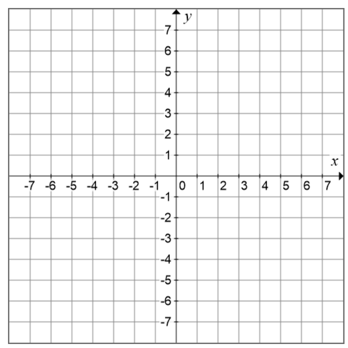
x-intercept(s):

Write the quadratic function in standard form, and give the coordinates of its vertex. Then use transformations to graph the function.

3.1.9. $f(x) = -2x^2 + 20x - 46$



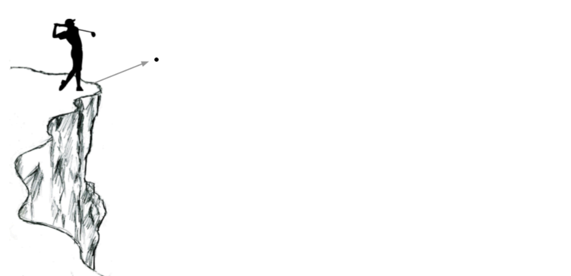
3.1.10. $g(x) = 3x^2 + 18x + 22$



3.1.11. Write the quadratic function $y = \frac{1}{4}x^2 - 4x + 7$ in standard form, and give the coordinates of its vertex.

▌3.1.12. A golfer hits his golf ball from the top of a cliff, and the path of the ball can be modeled by the function below. $h(x)$ represents the height of the ball (in feet), and x is the ball's horizontal distance from the cliff (in feet). a. How high is the ball when it is hit? b. Horizontally, how far is the ball from the edge of the cliff when the ball is at its highest point? c. How far above the ground is the ball when it is at its highest point? d. Horizontally, how far does the golf ball land from the bottom of the cliff?

$h(x) = -0.01x^2 + 3.66x + 89.11$



▌3.1.13. The path of a thrown football can be modeled by the function $f(x) = -0.1x^2 + 1.2x + 6.4$, where $f(x)$ is the height of the football (in feet) and x is the football's horizontal distance (in feet) from the quarterback. a. How high is the football when it is released? b. What is the maximum height of the football? c. How far does the ball travel before landing?

▌3.1.14. A manufacturer of office chairs has daily production costs of $C = 5{,}800 - 27x + 0.03x^2$, where C is the total cost (in dollars) and x is the number of chairs produced. How many chairs should the manufacturer produce so the daily costs are a minimum?

3.2.1. What is a zero of a polynomial? Answer in a complete sentence.

3.2.2. State the Fundamental Theorem of Algebra.

3.2.3. If $(x + 6)$ is a factor of a polynomial, then __________ is a zero of the polynomial. If -8 is a zero of a polynomial, then __________ is a factor of that polynomial.

3.2.4. List the zeros of the polynomial function with their multiplicities.
$f(x) = -3x^4(x^2 - 9)(x + 3)(x^2 + 9)$

3.2.5. Write the polynomial function that has the given zeros and leading coefficient. Leave your answer in factored form. -3 (mult. 4), 0 (mult. 5), 6 (mult. 1); Leading coefficient: 7

3.2.6. Write the polynomial function that has the given zeros and leading coefficient. Leave your answer in standard form. 6 (mult. 2); Leading coefficient: 10

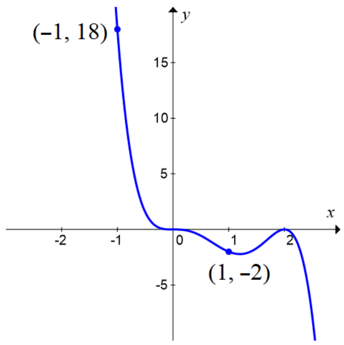
3.2.7. Write the polynomial function that has the given zeros and leading coefficient. Leave your answer in standard form. 2 (mult. 1), -3 (mult. 2); Leading coefficient: 5

3.2.8. Write the polynomial function $f(x) = x^3 - 2x^2 - 16x + 32$ as a product of linear factors. List its zeros and their multiplicities.

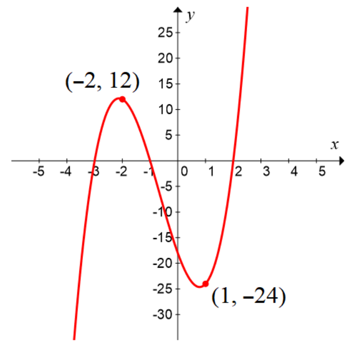
3.2.9. Write the polynomial function $g(x) = 15x^2 + 14x - 8$ as a product of linear factors. List its zeros and their multiplicities.

Write the equation of the polynomial function pictured, in standard form.

3.2.10.

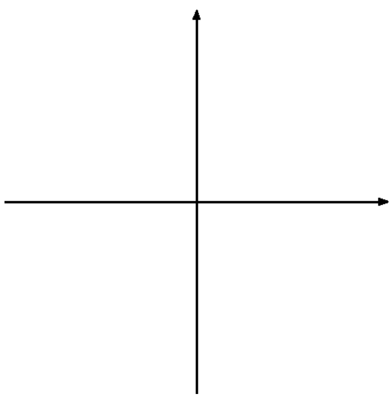


3.2.11.

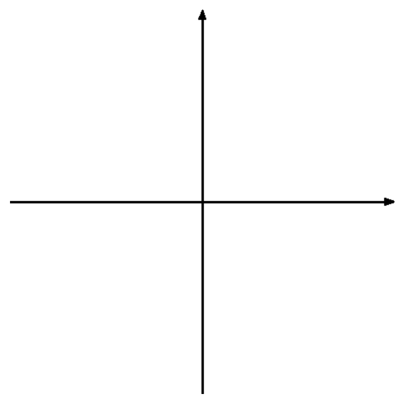


a. Write the function in factored form, and list its zeros with their multiplicities. b. Determine the function's behavior at its x-intercepts. c. Determine the function's y-intercept. d. Make a table of points outside each x-intercept. e. Choose a scale and sketch the graph.

3.2.12. $f(x) = x^5 - 4x^4 + 4x^3$



3.2.13. $f(x) = x^3 + 3x^2 - 9x - 27$



Divide. Leave your answer as a mixed number.

3.3.1. $3\overline{)2861}$

3.3.2. $8\overline{)6274}$

Divide the polynomials using long division. Write your answer in mixed-number form.

3.3.3. $(4x^3 - 7x + 8) \div (2x - 1)$

3.3.4. $(x^3 + 5x^2 + 6x - 3) \div (x^2 + 3x - 1)$

Divide the polynomials using synthetic division. Write your answer in mixed-number form.

3.3.5. $(x^3 - 2x + 12) \div (x + 3)$

3.3.6. $(5x^3 - 17x^3 - 14x + 4) \div (x - 2)$

3.3.7. $(6x^3 - 5x^2 + 9x - 4) \div (x - \frac{1}{2})$

3.4.1. Define the whole numbers.

3.4.2. Give the definition of the integers, in a complete sentence.

3.4.3. Give the definition of the rational numbers, in a complete sentence.

3.4.4. State the Linear Factorization Theorem.

3.4.5. The polynomial $x^3 + 3x^2 - 18x - 40$ has a zero of -2. Express the polynomial as a product of linear factors.

3.4.6. The polynomial $x^4 + 5x^3 - 19x^2 - 29x + 42$ has zeros of 3 and -7. Express the polynomial as a product of linear factors.

3.4.7. The polynomial $6x^4 + 7x^3 - 30x^2 - 21x + 10$ has zeros of -1 and 2. Express the polynomial as a product of linear factors.

a. List the possible rational zeros of the polynomial. b. Write the polynomial as a product of linear factors. c. Find the zeros of the polynomial. Write your answers in the spaces provided.

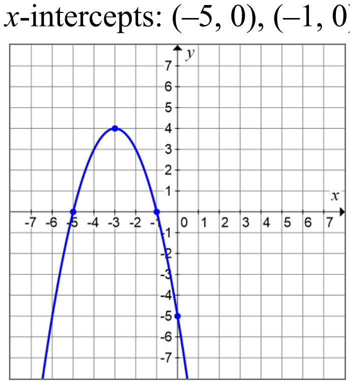
3.4.8. $x^3 + 4x^2 - 7x - 10$

3.4.9. $2x^3 - 9x^2 + 7x + 6$

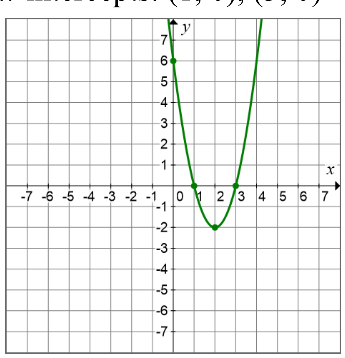
Answer Key

3.1.1. Linear means first degree.
3.1.2. Quadratic means second degree.
3.1.3. Let y equal 0, and solve for x.
3.1.4. Let x equal 0, and solve for y.
3.1.5. $y = \frac{2}{3}x^2 - 8x + 29$

3.1.6. Vertex: (–3, 4)
y-intercept: (0, –5)
x-intercepts: (–5, 0), (–1, 0)



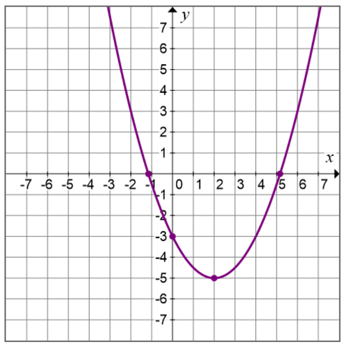
3.1.7. Vertex: (2, −2)
y-intercept: (0, 6)
x-intercepts: (1, 0), (3, 0)



3.1.8. Vertex: $(2, -5)$

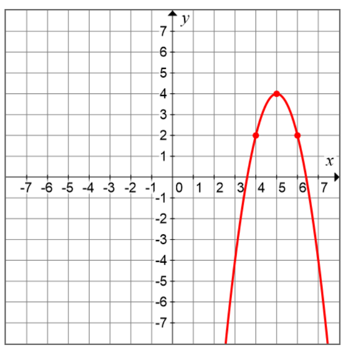
y-intercept: $(0, -3)$

x-intercepts: $(-1.163, 0)$, $(5.163, 0)$



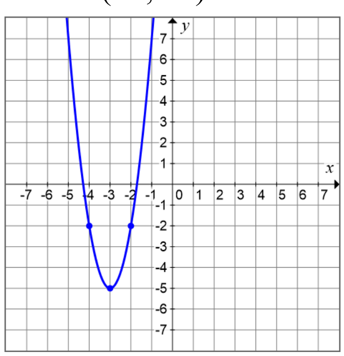
3.1.9. $f(x) = -2(x - 5)^2 + 4$

Vertex: $(5, 4)$



3.1.10. $g(x) = 3(x + 3)^2 - 5$

Vertex: $(-3, -5)$



3.1.11. $y = \frac{1}{4}(x - 8)^2 - 9$

Vertex: $(8, -9)$

3.1.12a. 89.11 feet

3.1.12b. 183 feet

3.1.12c. 424 feet

3.1.12d. 388.913 feet

3.1.13a. 6.4 feet

3.1.13b. 10 feet

3.1.13c. 16 feet

3.1.14. 450 chairs

3.2.1. A zero is a number that makes the polynomial zero when put in place of the variable.

3.2.2. A polynomial of degree n has exactly n zeros.

3.2.3. -6; $(x + 8)$

3.2.4. 0 (mult. 4), –3 (mult. 2), 3 (mult. 1)

3.2.5. $f(x) = 7x^5(x + 3)^4(x - 6)$

3.2.6. $g(x) = 10x^2 - 120x + 360$

3.2.7. $h(x) = 5x^3 + 20x^2 - 15x - 90$

3.2.8. $f(x) = (x - 4)(x + 4)(x - 2)$

2 (mult. 1), 4 (mult. 1), -4 (mult. 1)

3.2.9. $g(x) = (5x - 2)(3x + 4)$

$\frac{2}{5}$ (mult. 1), $-\frac{4}{3}$ (mult. 1)

3.2.10. $y = -2x^5 + 8x^4 - 8x^3$

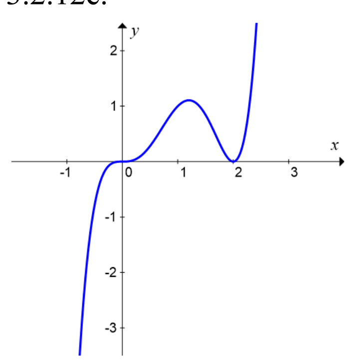
3.2.11. $y = 3x^3 + 6x^2 - 15x - 18$

3.2.12a. $f(x) = x^3(x - 2)^2$; 0 (mult. 3), 2 (mult. 2)

3.2.12c. $(0, 0)$

3.2.12d. Points may vary

3.2.12e.



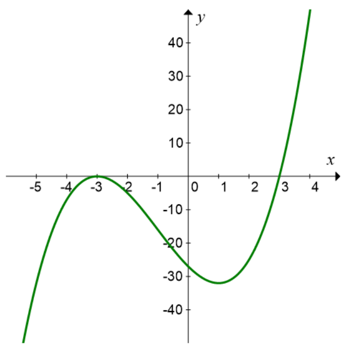
3.2.13a. $f(x) = (x - 3)(x + 3)^2$

3 (mult. 1), −3 (mult. 2)

3.2.13c. (0, −27)

3.2.13d. Points may vary

3.2.13e.



3.3.1. $953\frac{2}{3}$

3.3.2. $784\frac{1}{4}$

3.3.3. $2x^2 + x - 3 + \frac{5}{2x-1}$

3.3.4. $x + 2 + \frac{x-1}{x^2+3x-1}$

3.3.5. $x^2 - 3x + 7 - \frac{9}{x+3}$

3.3.6. $5x^4 + 10x^3 + 3x^2 + 6x - 2$

3.3.7. $6x^2 - 2x + 8$

3.4.1. 0, 1, 2, 3, …

3.4.2. The integers are the whole numbers and their opposites.

3.4.3. A rational number is a number that can be written as a fraction of two integers.

3.4.4. A polynomial of degree n has exactly n linear factors.

3.4.5. $(x + 2)(x - 4)(x + 5)$

3.4.6. $(x - 1)(x + 2)(x - 3)(x + 7)$

3.4.7. $(x + 1)(x - 2)(3x - 1)(2x + 5)$

3.4.8a. ±1, 2, 5, 10

3.4.8b. $(x + 1)(x + 5)(x - 2)$

3.4.8c. −5, −1, 2

3.4.9a. $\pm\frac{1}{2}, \frac{3}{2}$, 1, 2, 3, 6

3.4.9b. $(x - 2)(2x + 1)(x - 3)$

3.4.9c. $-\frac{1}{2}$, 2, 3