College Preparatory Integrated Mathematics Course II Notebook

College Preparatory Integrated Mathematics Course II
Learning Objective 1.1
Section 5.2

Learning Objective 1.1: Define polynomial, monomial, binomial, trinomial, and degree. (Section 5.2 Objective 1)
Read Section 5.2 on page 318 and 319 in the textbook an answer the questions below.

Definitions

1. A number or the product of a number and variables raised to powers is called ______________.
2. The ______________ of a term is the numerical factor of each term.
3. A ________________ is a finite sum of terms of the form ax^n , where a is a real number and n is a whole number.
4. A ________________ is a polynomial with exactly one term.
5. A ________________ is a polynomial with exactly two term.
6. A ________________ is a polynomial with exactly three term.
7. The________________of a polynomial is the greatest ________________ of any term of the polynomial.

Example 1: Find the degree of each term.

a) $5y^3$ **b)** $10xy$

c) z **d)** $-3a^2b^5c$ **e)** 8

Example 2: Find the degree of each polynomial and tell whether the polynomial is a monomial, binomial, trinomial, or none of these.

a)$5b^2 - 3b + 7$ **b)**$7t + 3$

c)$5x^2 + 3x - 6x^3 + 4$ **d)** $1 - x^3 + x^4 + x$

Learning Objective 1.1: Define polynomial functions (Section 5.2 Objective 2)
Read Section 5.2 on page 320 in the textbook an answer the questions below.

Example 3: If $P(x) = 2x^2 - 6x + 1$, find the following.

a)$P(1) =$

b)$P(-3) =$

c)$P(0) =$

Learning Objective 1.1: Simplifying polynomials by combining Like Terms (Section 5.2 Objective 3)
Read Section 5.2 on page 322 in the textbook an answer the questions below.

Definitions

1. Terms that contain exactly the same variables raised to exactly the same power called _______________.

Example 4: **Simplify each polynomial by combining any like terms.**

a) $-4y + 2y$

b) $z + 5z^3$

c) $15x^3 - x^3$

d) $7a^2 - 5 - 3a^2 - 7$

e) $\frac{3}{8}x^3 - x^2 + \frac{5}{6}x^4 + \frac{1}{12}x^3 - \frac{1}{2}x^4$

Learning Objective 1.1: Add and Subtract polynomials (Section 5.2 Objective 4)
Read Section 5.2 on page 323 in the textbook an answer the questions below.

Definitions

1. To add polynomials, combine all _______________.
2. To subtract two polynomials, _______________ the signs of the terms of the polynomial being subtracted and then add.

Example 5: **Add or subtract.**

a) $(2x^2 + 7x + 6) + (x^2 - 6x^2 - 14)$

b) $(-14x^3 - x + 2) + (-x^3 + 3x^2 + 4x)$

c) $(8x^2 - 6x - 7) - (3x^2 - 5x)$

d) $(2x - 5) - (7x^2 - 2x + 1)$

College Preparatory Integrated Mathematics Course II
Learning Objective 1.1
Section 5.3

Learning Objective 1.1: Multiply monomials (Section 5.3 Objective 1) **Read Section 5.3 on page 330 in the textbook an answer the questions below.**
Definitions 1. To multiply exponential expressions with a common base, _________ exponents.

Example 1: Multiply.

a) $5y \cdot 2y$

b) $(5z^3) \cdot (-0.4z^5)$

c) $(-\frac{1}{9}b^6) \cdot (-\frac{7}{8}b^3)$

Learning Objective 1.1: Use the distributive property to multiply polynomials (Section 5.3 Objective 2) **Read Section 5.3 on page 331 in the textbook an answer the questions below.**
Definitions 1. To multiply two polynomials, multiply each term of the first polynomial by each term of the second polynomial and then combine _____________.

Example 2: Multiply.

a) $(x-3)(x^2-6x+1)$

b) $(4a+3b)^2$

c) $(s+2t)^3$

Learning Objective 1.1: Multiply polynomials vertically(Section 5.3 Objective 3) **Read Section 5.3 on page 333 in the textbook an answer the questions below.**

Example 3: Find the product using a vertical format.

a) $(5x^2+2x-2)(x^2-x+3)$

b) $(2-x^2)(2x^2+4x-1)$

College Preparatory Integrated Mathematics Course II
Learning Objective 1.1
Section 5.4

Learning Objective 1.1: Multiply two binomial using the FOIL method. (Section 5.4 Objective 1)
Read Section 5.4 on page 337 in the textbook an answer the questions below.
Definitions **The FOIL method:** 1. F stands for the product of the ________________terms. 2. O stands for the product of the ________________terms. 3. I stands for the product of the ________________terms. 4. L stands for the product of the ________________terms.

Example 1: **Multiply.**

a) $3(4x+1)(5-2x)$

b) $(4x-1)^2$

Learning Objective 1.1: Square a binomial (Section 5.4 Objective 2)
Read Section 5.4 on page 338 in the textbook an answer the questions below.
Definitions 1. $(a+b)^2 = a^2 +$ _________ $+ b^2$ 2. $(a-b)^2 = a^2 -$ _________ $+ b^2$

Example 2: **Use a special product to square each binomial.**

a) $(b+3)^2$

b) $(x-y)^2$

c) $(3y+2)^2$

d) $(a^2-5b)^2$

Learning Objective 1.1: Multiplying the sum and difference of two terms. (Section 5.4 Objective 3)
Read Section 5.4 on page 339 in the textbook an answer the questions below.

Definitions

1. $(a + b)(a - b) =$ ____________.

Example 3: **Use a special product to multiply.**

a) $3(x + 5)(x - 5)$

b) $(4b - 3)(4b + 3)$

c) $(x + \frac{2}{3})(x - \frac{2}{3})$

d) $(5s - t)(5s + t)$

e) $(2y - 3z^2)(2y + 3z^2)$

Learning Objective 1.1: Using special products (Section 5.4 Objective 4)
Read Section 5.4 on page 340 in the textbook an answer the questions below.

Example 4: **Use a special product to multiply, if possible. .**

a) $(4x + 3)(x - 6)$

b) $(7b - 2)^2$

c) $(x + 0.4)(x - 0.4)$

d) $(x + 1)(x^2 + 5x - 2)$

e) $(x^2 - \frac{3}{7})(3x^4 + \frac{2}{7})$

College Preparatory Integrated Mathematics Course II
Learning Objective 1.1
Section 5.6

Learning Objective 1.1: Divide a polynomial by a monomial (Section 5.6 Objective 1)
Read Section 5.6 on page 353 in the textbook an answer the questions below.

Definitions

1. Fractions that have a common denominator are added by adding the______________ .

Example 1: **Divide.**

$$\frac{15x^4y^4-10xy+y}{5xy}$$

Example 2: **In which of the following is $\frac{x+5}{5}$ simplified correctly?**

a) $\frac{x}{5}+1$ **b)** x **c)** $x+1$

Learning Objective 1.1: Use long division to divide a polynomial by another polynomial (Section 5.6 Objective 2)
Read Section 5.6 on page 354 in the textbook an answer the questions below.

Definitions

1. In $18 \div 6 = 3$, the 18 is the __________ , the 3 is the __________ , and the 6 is the __________ .

Example 3: **Divide.**

a) x^3+27 **by** $x+3$

b) x^2+2x-6 **by** $x-2$

College Preparatory Integrated Mathematics Course II
Learning Objective 1.1
Section 5.7

Learning Objective 1.1: Use Synthetic division to divide a polynomial by a binomial (Section 5.7 Objective 1)
Read Section 5.7 on page 360 in the textbook an answer the questions below.

Definitions

1. Which division problems are candidates for the synthetic division process?

a) $(3x^2+5) \div (x+4)$
b) $(x^3 - x^2 + 2) \div (3x^3 - 2)$
c) $(y^4 + y - 3) \div (x^2 + 1)$
d) $x^5 \div (x-5)$

Example 1: **If $P(x) = x^3 - 5x - 2$,**

a) Find $P(2)$ by substitution.

b) Use synthetic division to find the remainder when P(x) is divided by $x - 2$.

Learning Objective 1.1: Using the Remainder Theorem (Section 5.7 Objective 2)
Read Section 5.7 on page 362 in the textbook an answer the questions below.

Definitions

1. By Remainder Theorem, if a polynomial $P(x)$ is divided by $x - c$, then the remainder is _____.

Example 2: **Use the remainder theorem and synthetic division to find $P(3)$ if**

$$P(x) = 2x^5 - 18x^4 + 90x^2 + 59x$$

College Preparatory Integrated Mathematics Course II
Learning Objective 1.9
Section 6.6

Learning Objective 1.9: Solve quadratic equations by factoring (Section 6.6 Objective 1)
Read Section 6.6 on page 413-416 in the textbook an answer the questions below.

Definitions

1. An equation that can be written in the form $ax^2 + bx + c = 0$, with $a \neq 0$, is called a ___________ equation.
2. The form $ax^2 + bx + c = 0$ is called the _________________ of a quadratic equation.
3. If the product of two numbers is zero, then at least one of the numbers must be __________ .
4. If a and b are real numbers and if $a \cdot b = 0$, then ___________________________ .

Example 1: **Solve:**

a) $(x + 4)(x - 5) = 0$

b) $(x - 12)(4x + 3) = 0$

c) $x(7x - 6) = 0$

d) $x^2 - 8x - 48 = 0$

e) $9x^2 - 24x = -16$

f) $x(3x + 7) = 0$

g) $-3x^2 - 6x + 72 = 0$

Learning Objective 1.9: Solve equations with degree greater than 2 by factoring (Section 6.6 Objective 2)
Read Section 6.6 on page 417 in the textbook an answer the questions below.

Example 2: **Solve:**

a) $7x^3 - 63x = 0$

b) $(3x - 2)(2x^2 - 13x + 15) = 0$

c) $5x^3 + 5x^2 - 30x = 0$

Learning Objective 1.9: Find x-intercepts of the graph of a quadratic equation in two variables. (Section 6.6 Objective 3)
Read Section 6.6 on page 418 in the textbook an answer the questions below.

Definitions

1. The graph of a quadratic equation in the form $y = ax^2 + bx + c$ where $a \neq 0$, is called______________.

Example 3: **Find the x-intercepts of the graph of** $y = x^2 - 6x + 8$.

Example 4: **Find the x-intercepts of the graph of** $y = x^2 + 4x + 4$.

Example 5: **Find the x-intercepts of the graph of** $y = 2x^2 + 2$.

College Preparatory Integrated Mathematics Course II
Learning Objective 1.9
Section 6.7

Learning Objective 1.9: Solve problems that can be modeled by quadratic equations.(Section 6.7 Objective 1)
Read Section 6.7 on page 422-426 in the textbook an answer the questions below.

Definitions

1. In a right triangle, the side opposite the right angle is called the ___________ .
2. In a right triangle, each side adjacent to the right angle is called a ___________.
3. The Pythagorean theorem states that $(leg)^2 + (leg)^2 = (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)^2$

Example 1: The square of a number minus eight times the number is equal to forty-eight. Find the number.

Example 2: Find two consecutive integers whose product is 41 more than their sum.

Example 3: Find the dimensions of a right triangle where the second leg is 1 unit less than double the first leg, and the hypotenuse is 1 unit more than double the length of the first leg.

College Preparatory Integrated Mathematics Course II
Learning Objective 1.3
Section 7.2, 7.3, 7.4

Definitions

1. If $\frac{A}{B}$ and $\frac{C}{D}$ are rational expressions, then $\frac{A}{B} \cdot \frac{C}{D} =$ ____________.
2. To divide two Rational Expressions, multiply the first rational expression by the ________________ of the second rational expression.

Example 1: Multiply $\frac{6x^2}{8x^3} \cdot \frac{16x}{12}$

Example 2: Multiply and simplify. $\frac{(x-y)^2}{x+y} \cdot \frac{x}{x^2-xy}$

a.) Re-write above Rational expression by Factoring all numerators and denominators

b.) Multiply numerators and multiply denominators without distributing

c.) Simplify by dividing out common factors.

Example 3: Divide $\frac{4x^3y^7}{60} \div \frac{6x}{y^3}$

Example 4: Divide and simplify . $\frac{10}{x^2-4} \div \frac{5x}{2x+4}$

a.) Re-write above Rational expression by multiplying by Reciprocal of second rational expression

b.) Factor all numerators and denominators and multiply remaining factors

c.) Simplify by dividing out common factors.

Example 5: Divide. $\frac{(x+3)^2}{4} \div \frac{4x+12}{16}$

Learning Objective 1.3: Adding and Subtracting Rational Expressions with Common Denominators and Least Common Denominators

Read Section 7.3 on page 460 and answer the questions below.

Definitions

1. **If $\frac{A}{B}$ and $\frac{C}{B}$ are rational expressions, then $\frac{A}{B}+\frac{C}{B}=\frac{\_\_\_\_\_\_}{B}$**
2. **If $\frac{A}{B}$ and $\frac{C}{B}$ are rational expressions, then $\frac{A}{B}-\frac{C}{B}=\frac{\_\_\_\_\_\_}{B}$**
3. ***To add or subtract rational expressions, add or subtract ________________ and place the sum or difference over the common denominator.***
4. Us the distributive property to subtract 2x – (x + 3) = ______________

Example 6: Add. $\frac{5x-1}{4x} + \frac{2x-3}{4x}$

Example 7: Add. $\frac{4m-3}{2m+7}+\frac{3m+8}{2m+7}$

Example 8: Subtract. $\frac{8y}{y-3}-\frac{24}{y-3}$

Example 9: Subtract. $\frac{3x}{x^2+3x-10}-\frac{6}{x^2+3x-10}$

Example 10: Subtract. $\frac{7x+8}{9x+15}-\frac{5x-2}{9x+15}$

Learning Objective 1.3: Adding and Subtracting Rational Expressions with Unlike Denominators
Read Section 7.4 on page 468 and answer the questions below.

Definitions

1. The least common denominator (LCD) is the product of all unique factors
2. If $\frac{A}{B}$ and $\frac{C}{D}$ are rational expressions, then $\frac{A}{B}+\frac{C}{D}=\frac{\_\_\_\_\_\_}{B}$
3. If $\frac{A}{B}$ and $\frac{C}{D}$ are rational expressions, then $\frac{A}{B}-\frac{C}{D}=\frac{\_\_\_\_\_\_}{B}$

Four Steps to Adding and Subtracting Rational Expressions with Unlike Denominators.
Step 1: Find the LCD of all the rational expressions.
Step 2: Rewrite each rational expression as an equivalent expression whose denominator is the LCD found in Step 1.
Step 3: Add or subtract numerators and write the sum or difference over the common denominator.
Step 4: Simplify or write the rational expression in simplest form.

Example 11: Add. $\frac{15}{7a}+\frac{8}{6a}=$

Example 12: Add. $4+\frac{4}{x}$

Example 13: Add. $\frac{4}{x^2-x-6}+\frac{x}{x^2+5x+6}$

Example 14: Add. $\frac{9}{x^2+5x-6}+\frac{6}{x+6}$

Example 15: Subtract. $\frac{7}{2x-3}-3$

Example 16: Subtract. $1-\frac{1}{x}$

Example 17: Subtract. $\frac{5}{2x-6} - \frac{3}{6-2x}$

Example 18: Subtract. $\frac{x^2}{x} - \frac{2x+8}{2x}$

College Preparatory Integrated Mathematics Course I
Learning Objective 1.4
Section 7.7

Learning Objective 1.4: Simplifying Complex Fractions
Read Section 7.7 on page 495 and answer the questions below.

Definitions

Method 1: ***Simplifying a Complex Fraction***
Step 1: Simplify the numerator and the denominator of the complex fraction so that each is a single fraction.
Step 2: Perform the indicated division by multiplying the numerator of the complex fraction by the ________________________ of the denominator of the complex fraction.
Step 3: Simplify if possible

Method 2: ***Simplifying a Complex Fraction***
Step 1: Multiply the numerator and the denominator of the complex fraction by the ______________ of the fractions in both the numerator and the denominator.
Step 2: Simplify

Example 1: Use Method **1** above to simplify. $\dfrac{1+\frac{1}{x}}{4-\frac{4}{x}}$

Step1:

Step2:

Step3:

Example 2: Use Method **1** above to simplify. $\dfrac{\frac{x}{2}+2}{\frac{x}{4}-4}$

Example 3: Use Method **2** above to simplify. $\dfrac{\frac{6x^2}{8x^3}}{\frac{12}{16x}}$

Step1:

Step2:

Example 4: Use Method 2 above to simplify. $\dfrac{\frac{1}{y^2}+\frac{2}{3}}{\frac{1}{y}-\frac{5}{6}}$

College Preparatory Integrated Mathematics Course I
Learning Objective 1.6
Section 10.2 and 10.3

Learning Objective 1.6: Simplifying Rational Exponents

Read Section 10.2 on page 596 and answer the questions below.

Definitions

1. ***If n is a positive integer greater than 1, then fill in the blank*** $a^{\frac{1}{n}} = \sqrt{a}$
2. **If m and n are positive integers greater than 1, with m/n in simplest form, then fill in the blanks :** $a^{\frac{m}{n}} = \sqrt[n]{a} = (\sqrt[n]{a})$
3. **If** $a^{\frac{m}{n}}$ **is a nonzero real number, then fill in the blanks:** $a^{-\frac{m}{n}} = \frac{1}{a^{-}}$

Example 1: Use radical notation to write the following. Simplify if possible. $81^{\frac{1}{4}}$

Example 2: Use radical notation to write the following. Simplify if possible. $(32x^{10})^{1/5} =$

Example 3: Use radical notation to write the following. Simplify if possible. $-(16x^8)^{\frac{1}{2}}$

Learning Objective 1.6: Simplifying Radical Expressions
Read Section 10.3 on page 603 and answer the questions below.

Definitions

1. **Product Rule for Radicals: Fill in the blank** $\sqrt[n]{a} \cdot \sqrt[n]{b} = \sqrt[n]{\_\_\_\_\_\_}$
2. **Quotient Rule for Radicals: Fill in the blanks:** $\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{\_\_\_}}{\sqrt[n]{\_\_\_}}$

Example 4: Use rational exponents to write as a single radical. $\sqrt[3]{5} \cdot \sqrt{2} =$

Example 5: Use rational exponents to write as a single radical and Simplify. $\sqrt[3]{-343x^6}$

Example 6: Multiply and Simplify. $\sqrt{\frac{2}{a}} \cdot \sqrt{\frac{b}{3}}$

Example 7: Simplify. $\sqrt[3]{\frac{8}{27}}$

Example 8: Use the quotient rule to divide, and simplify if possible $\sqrt{\frac{20}{x^{16}}} =$

College Preparatory Integrated Mathematics Course II
Learning Objective 1.7
Section 10.4

Learning Objective 1.7: Add or subtract radical expressions (Section 10.4 Objective 1)
Read Section 10.4 on page 611 in the textbook an answer the questions below.

Definitions

1. Radicals with the same index and the same radicand are ___________________ .

Example 1: **Add or subtract. Assume that variables represent positive real numbers.**

a) $3\sqrt{17} + 5\sqrt{17}$

b) $7\sqrt[3]{5z} - 12\sqrt[3]{5z}$

Example 2: **Add or subtract. Assume that variables represent positive real numbers.**

a) $\sqrt{24} + 3\sqrt{54}$

b) $\sqrt[3]{24} - 4\sqrt[3]{81} + \sqrt[3]{3}$

c) $\sqrt{75x} - 3\sqrt{27x} + \sqrt{12x}$

d) $\dfrac{\sqrt{28}}{3} - \dfrac{\sqrt{7}}{4}$

Learning Objective 1.7: Multiply radical expressions (Section 10.4 Objective 2)
Read Section 10.4 on page 614 in the textbook an answer the questions below.

Example 3: **Multiply.**

a) $\sqrt{5}(2 + \sqrt{15})$

b) $(\sqrt{2} - \sqrt{5})(\sqrt{6} + 2)$

c) $(\sqrt{6} - 3)^2$

d) $(3\sqrt{z} - 4)(2\sqrt{z} + 3)$

e) $(\sqrt{x+2} + 3)^2$

College Preparatory Integrated Mathematics Course II
Learning Objective 1.7
Section 10.5

Learning Objective 1.7: Rationalize denominators (Section 10.5 Objective 1)
Read Section 10.5 on page 617 in the textbook an answer the questions below.

Definitions

1. The process of writing an equivalent expression, but without a radical in the denominator is called _________________ .

Example 1: **Rationalize the denominator of each expression.**

a) $\frac{5}{\sqrt{3}}$ b) $\frac{3\sqrt{25}}{\sqrt{4x}}$ c) $\sqrt[3]{\frac{2}{9}}$

Learning Objective 1.7: Rationalize denominators having two terms (Section 10.5 Objective 2)
Read Section 10.5 on page 619 in the textbook an answer the questions below.

Definitions

1. Two expressions $a + b$ and $a - b$ are called ______________.

Example 2: **Rationalize the denominator.**

a) $\frac{5}{3\sqrt{5}+2}$ b) $\frac{\sqrt{2}+5}{\sqrt{3}-\sqrt{5}}$ c) $\frac{3\sqrt{x}}{2\sqrt{x}+\sqrt{y}}$

Learning Objective 1.7: Rationalize numerators (Section 10.5 Objective 3)
Read Section 10.5 on page 620 in the textbook an answer the questions below.

Definitions

1. The process of writing an equivalent expression, but without a radical in the numerator is called _________________.

Example 3: **Rationalize numerator.**

a) $\frac{\sqrt{32}}{\sqrt{80}}$ b) $\frac{\sqrt[3]{5b}}{\sqrt[3]{2a}}$ c) $\frac{\sqrt{x}-3}{4}$

College Preparatory Integrated Mathematics Course I
Learning Objective 1.7
Section 10.6

Learning Objective 1.7: Simplifying Radical Expressions and Solve Radical Equations
Read Section 10.6 on page 624 and answer the questions below.

Definitions

1. **Power Rule: Fill in the blanks: If both sides of an equation are raised to the same power, ______ solutions of the original equation are *among* the solutions of the _________ equation.**
2. **Pythagorean Theorem: If *a* and *b* are lengths of the legs of a right triangle and *c* is the length of the hypotenuse, then fill in the blanks: ______ + ________ = _________**

Example 1: Solve. $\sqrt{x+1}=5$

Example 2: Solve $x\sqrt{2}=\sqrt{9}$

Example 3: Solve. $2x+\sqrt{x+1}=8$

Example 4: Solve. $\sqrt{5x}=-5$

Example 5: Solve. $\sqrt{y+5} = 2 - \sqrt{y-4}$

Example 6: Find the length of the hypotenuse of a right triangle when the length of the two legs are 2 inches and 7 inches.

Example 7: Find the length of the leg of a right triangle. Give the exact length and a two-decimal-approximation. Let a = 2 meters and c = 9 meters

College Preparatory Integrated Mathematics Course II
Learning Objective 1.9
Section 11.1

Learning Objective 1.9: Use the square root property to solve quadratic equations.(Section 11.1 Objective 1)
Read Section 11.1 on page 652 in the textbook an answer the questions below.

Definitions

1. A ___________________ equation is an equation that can written in the form $x^2 + bx + c$.
2. If b is a real number and if $a^2 = b$, then $a =$___________________.

Example 1: **Use square root property to solve equations.**

h) $\boldsymbol{x^2 = 32}$

b) $\boldsymbol{5x^2 - 50 = 0}$

c) $\boldsymbol{(x+3)^2 = 20}$

d) $\boldsymbol{(5x-2)^2 + 2 = -7}$

Learning Objective 1.9: Solving by completing the square (Section 11.1 Objective 2)
Read Section 11.1 on page 654 in the textbook an answer the questions below.

Definitions

1. The process of writing a quadratic equation so that one side is a perfect square trinomial is called ___________________ .
2. A perfect square trinomial is one that can be factored as a ___________________ squared.
3. To solve $x^2 + 6x = 10$ by completing the square, add ___________________ to both sides.
4. To solve $x^2 + bx = c$ by completing the square, add ___________________ to both sides.

Example 2: **Solve equations by completing the square.**

a) $\boldsymbol{b^2 + 4b = 3}$

b) $2x^2 - 5x + 7 = 0$

c) $3x^2 - 12x + 1 = 0$

Learning Objective 1.9: Solving problems modeled by quadratic equations (Section 11.1 Objective 3) **Read Section 11.1 on page 657 in the textbook an answer the questions below.**
Definitions 2. The formula $I = Prt$ is a formula for __________________ . 3. The interest computed on money borrowed or money deposited is __________________ .

Example 3: **Use the formula $A = P(1 + r)^t$ to find the interest rate r if $5000 compounded annually grows to $5618 in 2 years.**

College Preparatory Integrated Mathematics Course II
Learning Objective 1.9
Section 11.2

Learning Objective 1.9: Solve quadratic equations by using the quadratic formula.(Section 11.2 Objective 1)
Read Section 11.2 on page 662 in the textbook an answer the questions below.

Definitions

1. The quadratic equation written in the form $x^2 + bx + c = 0$, when $a \neq 0$ has the solutions __________________ .

Example 1: **Solve equations by using quadratic formula.**

a) $3x^2 - 5x - 2 = 0$

b) $3x^2 - 8x = 2$

c) $\frac{1}{8}x^2 - \frac{1}{4}x - 2 = 0$

Learning Objective 1.9: Determine the number and type of solutions of a quadratic equation by using the discriminant.(Section 11.2 Objective 2)
Read Section 11.2 on page 665 in the textbook an answer the questions below.

Definitions

1. The radicand $b^2 - 4ac$ is called __________________ .
2. If $b^2 - 4ac$ is positive, the quadratic equation has __________________ solutions.
3. If $b^2 - 4ac$ is zero, the quadratic equation has __________________ solutions.
4. If $b^2 - 4ac$ is negative, the quadratic equation has __________________ solutions.

Example 2: **Use the discriminant to determine the number and type of solutions of each quadratic equation.**

a) $x^2 - 6x + 9 = 0$

b) $x^2 - 3x - 1 = 0$

c) $7x^2 + 11 = 0$

Learning Objective 1.9: Solve problems modeled by quadratic equations.(Section 11.2 Objective 3)
Read Section 11.2 on page 666 in the textbook an answer the questions below.

Example 3: **A toy rocket is shot upward from the top of a building, 45 feet high, with an initial velocity of 20 feet per second. The height h in feet of the rocket after t seconds is**

$$h = -16t^2 + 20t + 45$$

How long after the rocket is launched will it strike the ground? Round to the nearest tenth of a second.

College Preparatory Integrated Mathematics Course II
Learning Objective 1.9
Section 11.3

Learning Objective 1.9: Solve various equations that are quadratic in form.(Section 11.3 Objective 1)

Read Section 11.3 on page 672 in the textbook an answer the questions below.

Definitions

1. The best way to solve the quadratic equation in the form $(ax+b)^2 = c$ is ________________.

Example 1: **Solve:**

a) $\boldsymbol{x - \sqrt{x+1} - 5 = 0}$

b) $\boldsymbol{\frac{5x}{x+1} - \frac{x+4}{x} = \frac{3}{x(x+1)}}$

c) $\boldsymbol{p^4 - 7p^2 - 144 = 0}$

d) $\boldsymbol{(x-3)^2 - 3(x-3) - 4 = 0}$

Learning Objective 1.9: Solve problems that lead to quadratic equations.(Section 11.3 Objective 2) **Read Section 11.3 on page 675 in the textbook an answer the questions below.**
Definitions 1. Four steps to solve a word problem are ____________________, ____________________, ____________________, and ____________________.

Example 2: **Together, Katy and Steve can groom all the dogs at the Barkin' Doggies Day Care in 4 hours. Alone, Katy can groom the dogs 1 hour faster than Steve can groom the dogs alone. Find the time in which each of them can groom the dogs alone.**

College Preparatory Integrated Mathematics Course II
Learning Objective 2.1
Section 11.4

Learning Objective 2.1: Solve polynomial inequalities of degree 2 or more.(Section 11.4 Objective 1)

Read Section 11.4 on page 682 in the textbook an answer the questions below.

Definitions

1. A ____________________ is an inequality that can be written so that one side is a quadratic expression and the other side is 0.
2. An inequality is written in standard form if one side is an ___________________ and the other side is ____________________.

Example 1: **Solve inequalities.**

a) $(x-4)(x+3)>0$

b) $x^2-8x\le 0$

c) $(x+3)(x-2)(x+1)\le 0$

Learning Objective 2.1: Solve inequalities that contain rational expressions with variables in the denominator.(Section 11.4 Objective 2)

Read Section 11.4 on page 685 and 686 in the textbook an answer the questions below.

Definitions

1. The first step to solve a rational inequality is solve for values that make all denominators ______________.
2. An _____________**interval** does not include its endpoints, and is indicated with parentheses.
3. A________________ **interval** includes its endpoints, and is denoted with square brackets.

Example 2: **Solve inequalities.**

a) $\frac{x-5}{x+4} \leq 0$

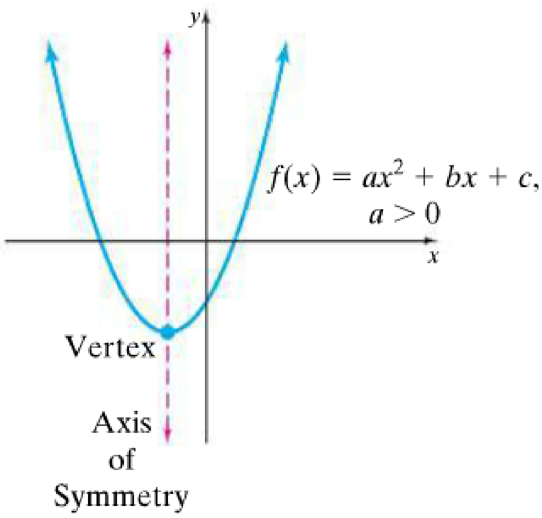
b) $\frac{7}{x+3} < 5$

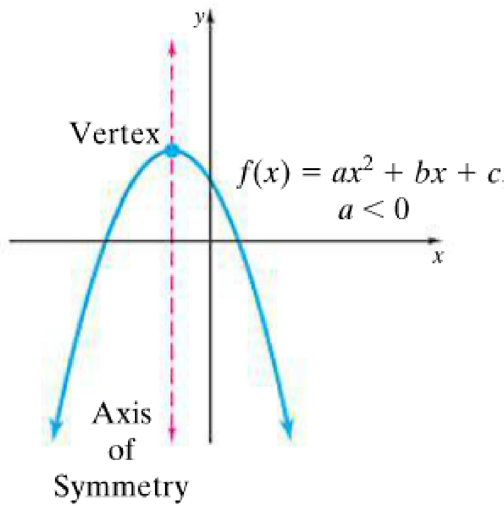
College Preparatory Integrated Mathematics Course II
Learning Objective 2.1
Section 11.5

Learning Objective 2.1: Graph Quadratic Functions and Inequalities
Read Section 11.5 on page 689 and answer the questions below.

Definitions

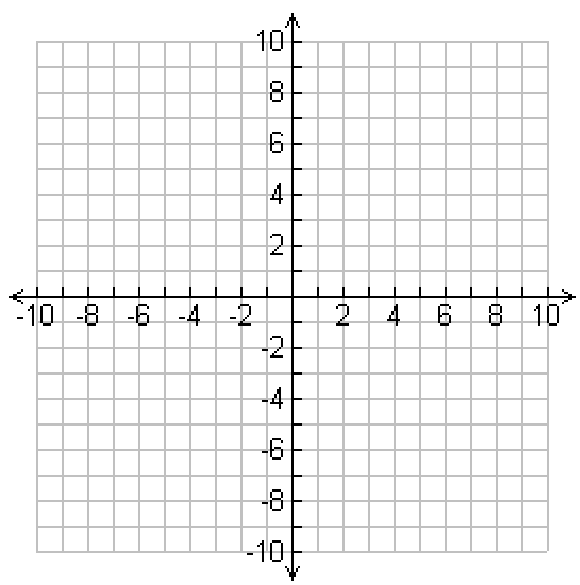
1. A ____ is a function that can be written in the form $f(x) = ax^2 + bx + c$, where a, b, and c are real numbers and $a \neq 0$.
2. If $a > 0$, the parabola opens ______________________.
3. If $a < 0$, the parabola opens ______________________.
4. The ________________ of a parabola is the _______________ point if the graph opens upward and the ________________ point if the parabola opens downward.
5. The ___________________________________ is the vertical line that passes through the vertex.





Example 1: Graph each quadratic function on the same coordinate plane. Label the vertex and sketch and label the axis of symmetry.

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

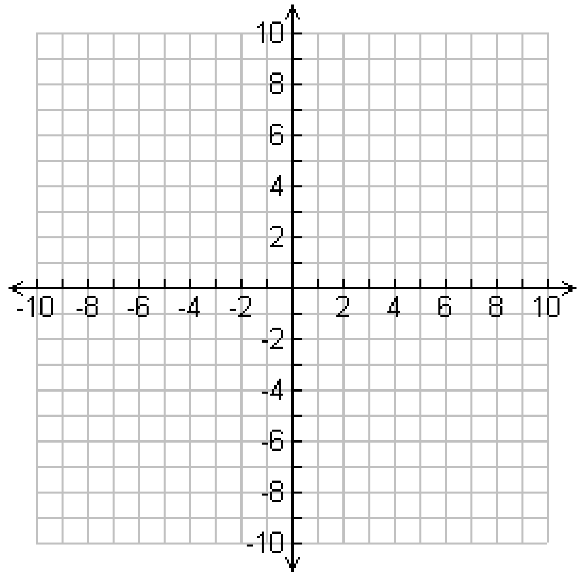


Definition: Graphing the Parabola Defined by $f(x) = x^2 + k$

1. If k is positive, the graph of $f(x) = x^2 + k$ is the graph of $y = x^2$ shifted ____________________________.
2. If k is negative, the graph of $f(x) = x^2 + k$ is the graph of $y = x^2$ shifted ____________________________.
3. The vertex is __________ and the axis of symmetry is _____________________________.

Example 2: Graph each quadratic function on the same coordinate plane. Label the vertex and sketch and label the axis of symmetry.

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



Definition: Graphing the Parabola Defined by $f(x) = (x-h)^2$

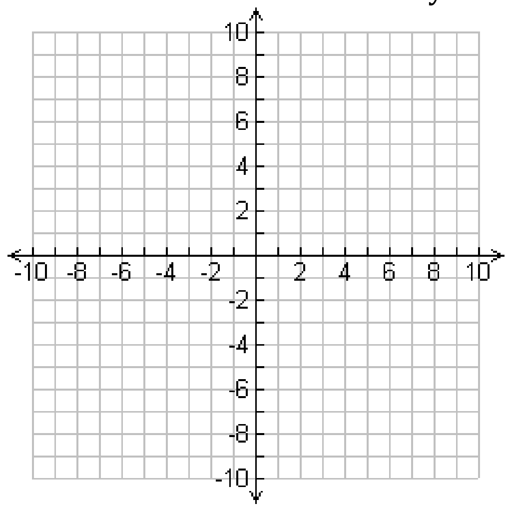
1. If h is positive, the graph of $f(x) = (x-h)^2$ is the graph of $y = x^2$ shifted to the ____________________________.
2. If h is negative, the graph of $f(x) = (x-h)^2$ is the graph of $y = x^2$ shifted to the ____________________________.
3. The vertex is __________ and the axis of symmetry is _____________________________.

Definition: Graphing the Parabola Defined by $f(x) = (x-h)^2 + k$

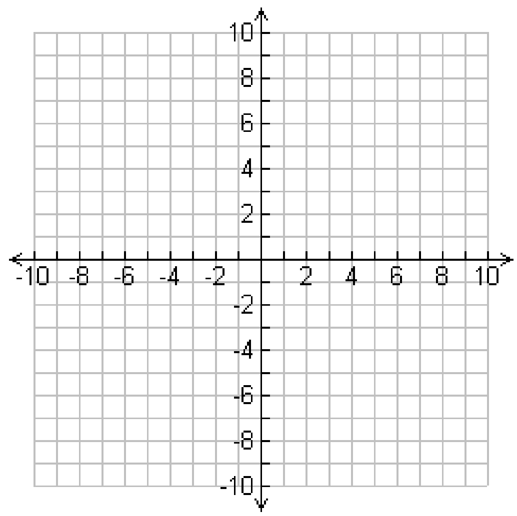
1. The parabola has the same shape as ________________.
2. The vertex is ___________ and the axis of symmetry is ____________________________.

Example 3: Graph each quadratic function. Label the vertex and sketch and label the axis of symmetry.

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



b. $f(x) = (x + 1)^2 - 3$

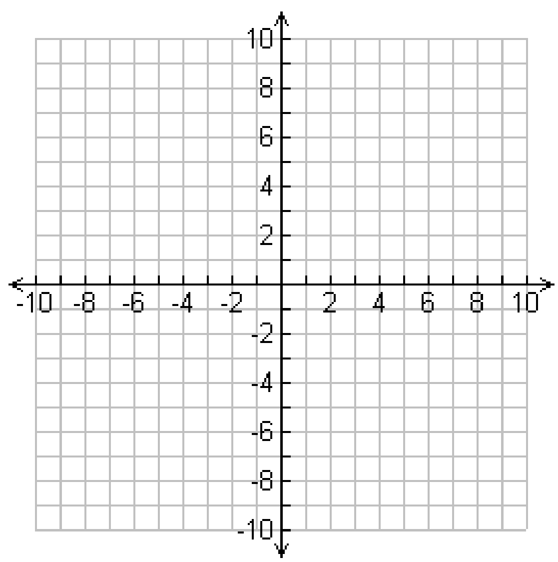


Example 4: Graph each quadratic function on the same coordinate plane. Label the vertex and sketch and label the axis of symmetry.

a. $f(x) = x^2$

b. $f(x) = 2x^2$

c. $f(x) = \frac{1}{2}x^2$

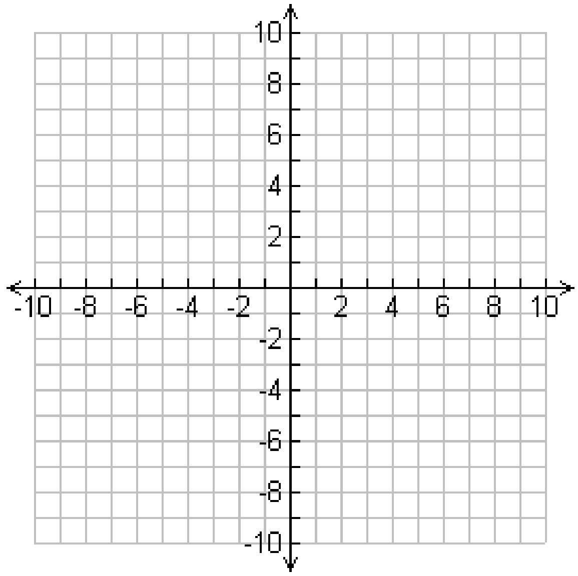


Definition: Graphing the Parabola Defined by $f(x) = ax^2$

1. If $|a| > 1$, the graph of the parabola is ____________________ than the graph of $y = x^2$.
2. If $|a| < 1$, the graph of the parabola is ____________________ than the graph of $y = x^2$.

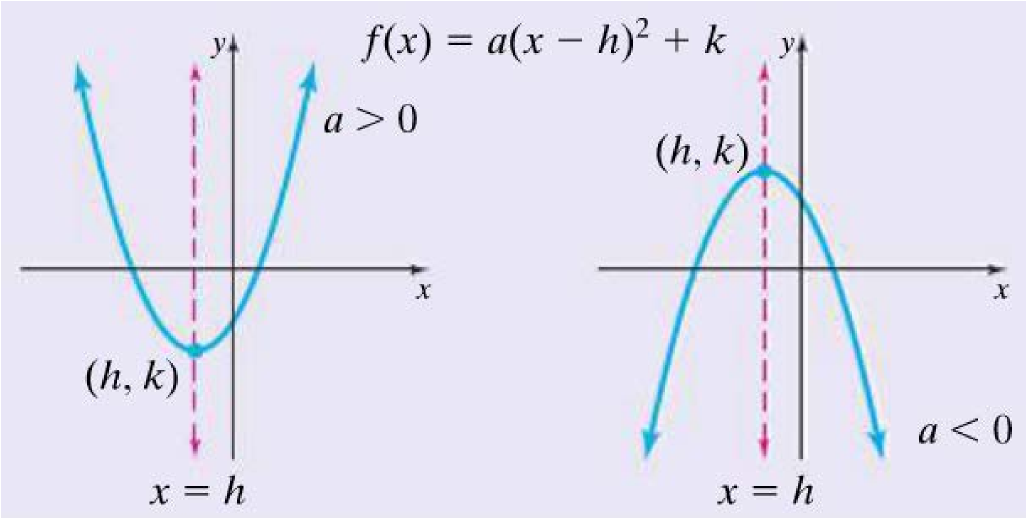
Example 5: Graph each quadratic function on the same coordinate plane. Label the vertex and sketch and label the axis of symmetry.

a. $f(x) = x^2$
b. $f(x) = -x^2$



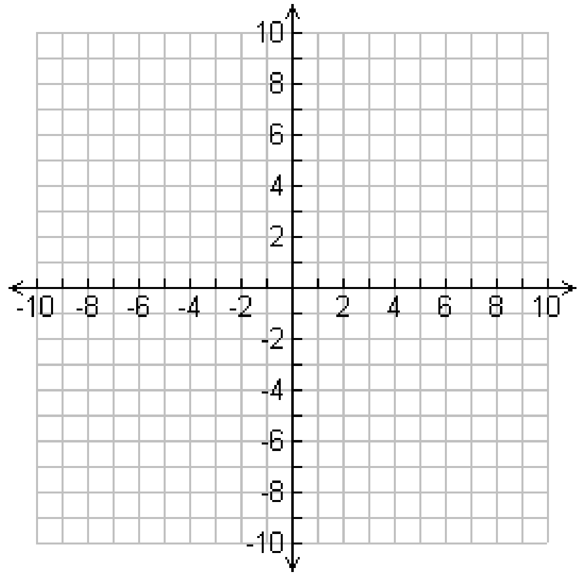
Definition: Graph of a Quadratic Function

1. The graph of a quadratic function written in the form $f(x) = a(x-h)^2 + k$ is a parabola with vertex ____________.
2. If $a > 0$, the parabola opens ________________.
3. If $a < 0$, the parabola opens ________________.
4. The axis of symmetry is the line whose equation is ____________.

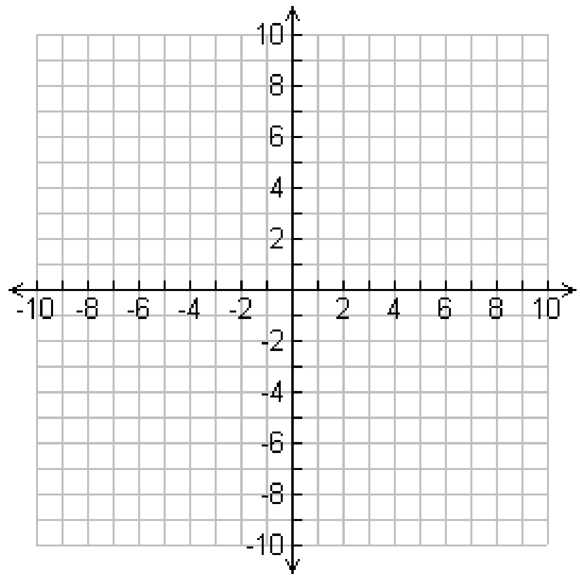


Example 6: Graph each quadratic function. Label the vertex and two other points on the graph. Sketch and label the axis of symmetry.

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



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



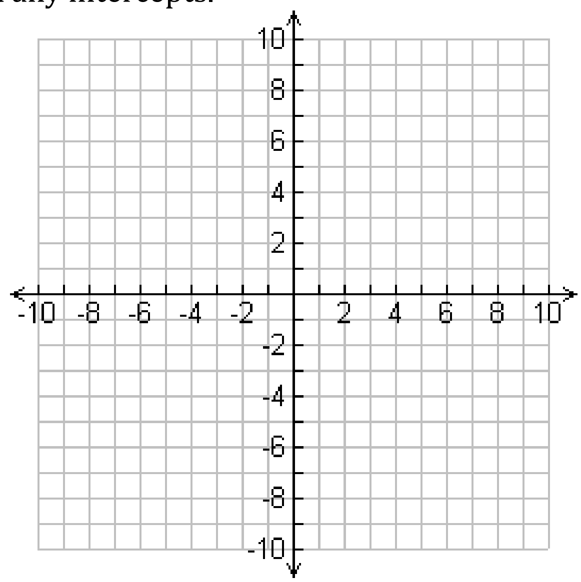
College Preparatory Integrated Mathematics Course II
Learning Objective 2.1
Section 11.6

Learning Objective 2.1: Graph Quadratic Functions and Inequalities
Read Section 11.6 on page 697 and answer the questions below.

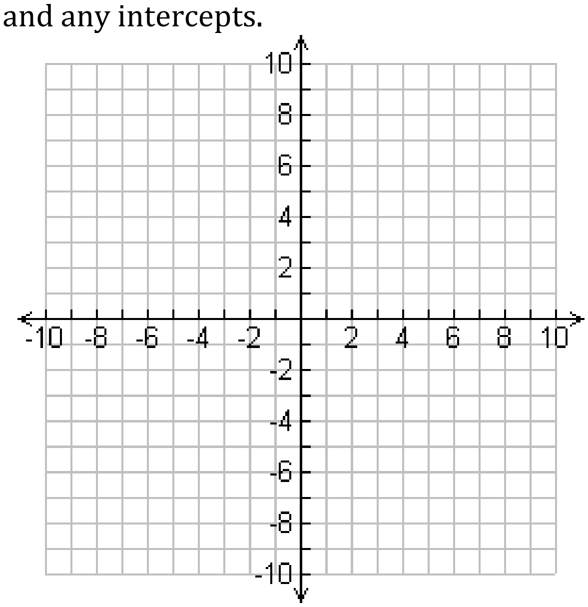
Definitions

1. The graph of a quadratic function is a ________________________.
2. To write a quadratic function in the form $f(x) = a(x-h)^2 + k$, we ____.

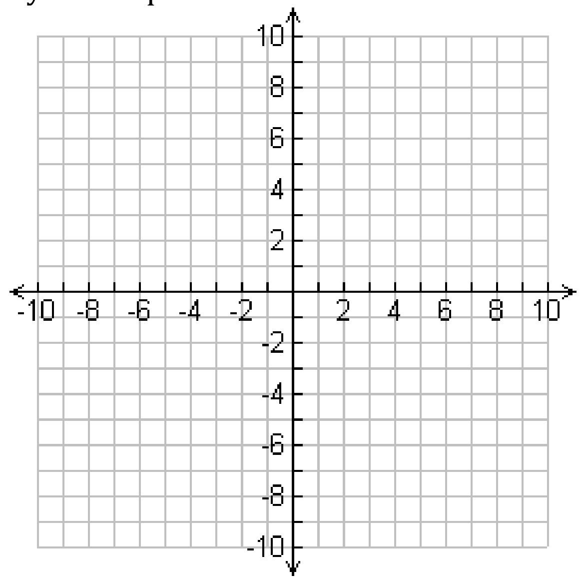
Example 1: Graph $f(x) = x^2 + 6x + 9$. Find the vertex and any intercepts.



Example 2: Graph $f(x) = -2x^2 + 4x + 6$. Find the vertex and any intercepts.



Example 3: Graph $f(x) = x^2 + x + 6$. Find the vertex and any intercepts.



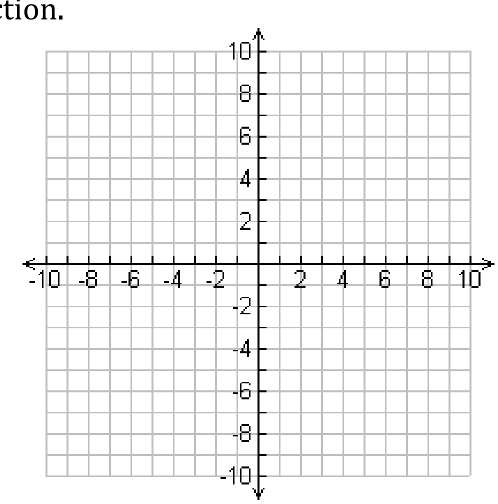
Example 4: Complete the square on $y = ax^2 + bx + c$ and write the equation in the form $y = a(x - h)^2 + k$

Definition: Vertex Formula

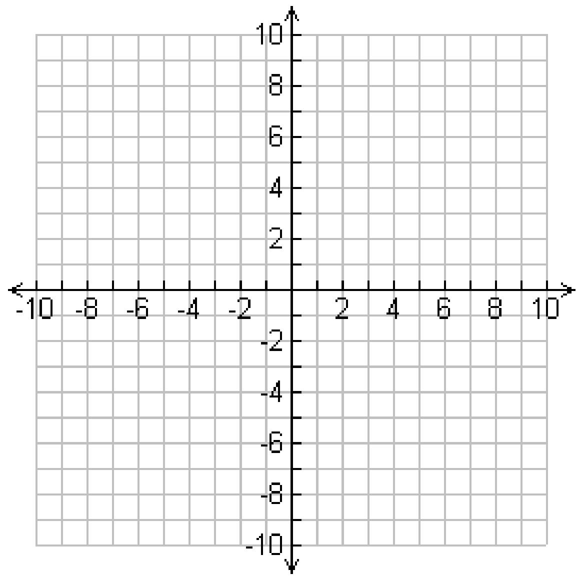
1. The graph of $f(x) = ax^2 + bx + c$, when $a \neq 0$, is a parabola with vertex ___________________.

Example 5: Find the vertex of the graph of each quadratic function. Determine whether the graph opens upward or downward, find any intercepts, and graph the function.

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



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



Definition: Minimum and Maximum Values

1. The quadratic function whose graph is a parabola that opens upward has a ____.
2. The quadratic function whose graph is a parabola that opens downward has a ____.
3. The ______________________ of the vertex is the minimum or maximum value of the function.

Example 6: An arrow is fired into the air with an initial velocity of 96 feet per second. The height in feet of the arrow t seconds after it was shot into the air is given by the function $h(x) = -16t^2 + 96t$. Find the maximum height of the arrow.

College Preparatory Integrated Mathematics Course II
Learning Objective 3.1
Section 2.4

Learning Objective 3.1: Solve Word Problems
Read Section 2.4 on page 104 and answer the questions below.

Definitions: General Strategy for Problem Solving

1. UNDERSTAND the problem. Some ways of doing this are to:
   -
   -
   -
   -
2. TRANSLATE the problem into an equation.
3. SOLVE the equation.
4. INTERPRET the result: *Check* the proposed solutions in the stated problem and state your conclusion.

Example 1 – Solving Direct Translation Problems: Eight is added to a number and the sum is doubled. The result is 11 less than the number. Find the number.

Example 2 – Solving Direct Translation Problems: Three times the difference of a number and 2 is equal to 8 subtracted from twice a number. Find the integers.

Example 3 – Solving Problems Involving Relationships Among Unknown Quantities: A 22-ft pipe is cut into two pieces. The shorter piece is 7 feet shorter than the longer piece. What is the length of the longer piece?

Example 4 – Solving Problems Involving Relationships Among Unknown Quantities: A college graduating class is made up of 450 students. There are 206 more girls than boys. How many boys are in the class?

Example 5 – Solving Consecutive Integer Problems: The room numbers of two adjacent hotel rooms are two consecutive odd numbers. If their sum is 1380, find the hotel room numbers.

College Preparatory Integrated Mathematics Course II
Learning Objective 3.1
Section 2.5

Learning Objective 3.1: Solve Word Problems

Read Section 2.5 on page 115 and answer the questions below.

Definitions

1. An equation that describes a known relationship among quantities, such as distance, time, volume, weight, and money, is called a ___________________.
2. These quantities are represented by ___________________ and are thus ________________________ of the formula.

Common Formulas

Formulas	*Their Meanings*
$A = lw$	
$I = PRT$	
$P = a + b + c$	
$d = rt$	
$V = lwh$	
$F = \left(\frac{9}{5}\right)C + 32$ or $F = 1.8C + 32$	

Example 1 – Using Formulas to Solve Problems: Substitute the given values into each given formula and solve for the unknown variable. If necessary, round to one decimal place.

a. Distance Formula
$d = rt;\ t = 9,\ d = 63$

b. Perimeter of a rectangle
$P = 2l + 2w;\ P = 32,\ w = 7$

c. Volume of a pyramid
$V = \frac{1}{3}Bh;\ V = 40, h=8$

d. Simple interest
$I = prt;\ I = 23,\ p = 230,\ r = 0.02$

Example 2 – Using Formulas to Solve Problems: Convert the record high temperature of 102°F to Celsius.

Example 3 – Using Formulas to Solve Problems: You have decided to fence an area of your backyard for your dog. The length of the area is 1 meter less than twice the width. If the perimeter of the area is 70 meters, find the length and width of the rectangular area.

Example 4 – Using Formulas to Solve Problems: For the holidays, Christ and Alicia drove 476 miles. They left their house at 7 a.m. and arrived at their destination at 4 p.m. They stopped for 1 hour to rest and re-fuel. What was their average rate of speed?

Example 5 – Solving a Formula for One of Its Variables: Solve each formula for the specified variable.

a. Area of a triangle
$A = \frac{1}{2}bh$ for b

b. Perimeter of a triangle
$P = s_1 + s_2 + s_3$ for s_3

c. Surface area of a special rectangular box
$S = 4lw + 2wh$ for l

d. Circumference of a circle
$C = 2\pi r$ for r

College Preparatory Integrated Mathematics Course II
Learning Objective 3.1
Section 2.6

Learning Objective 3.1: Solve Word Problems **Read Section 2.6 on page 126 and answer the questions below.**
Review: General Strategy for Problem Solving 1. UNDERSTAND the problem. 2. TRANSLATE the problem into an equation. 3. SOLVE the problem. 4. INTERPRET the results: *Check* the proposed solution in the stated problem and *state* your conclusion.

Example 1 – Solving Percent Equations: Find each number described.

a. 5% of 300 is what number?

b. 207 is 90% of what number?

c. 15 is 1% of what number?

d. What percent of 350 is 420?

Example 2 – Solving Discount and Mark-up Problems: A "Going-Out-Of-Business" sale advertised a 75% discount on all merchandise. Find the discount and the sale price of an item originally priced at $130. If needed, round answers to the nearest cent.

Example 3 – Solving Discount and Mark-up Problems: Recently, an anniversary dinner cost \$145.23 excluding tax. Find the total cost if a 15% tip is added to the cost.

Example 4 – Solving Percent Increase and Percent Decrease Problems: In 2004, a college campus had 8,900 students enrolled. In 2005, the same college campus had 7,600 students enrolled. Find the percent decrease. Round to the nearest whole percent.

Example 5 – Solving Mixture Problems: How much pure acid should be mixed with 4 gallons of a 30% acid solution in order to get an 80% acid solution? Use the following table to model the situation.

	Number of Gallons ·	Acid Strength =	Amount of Acid
Pure Acid			
30% Acid Solution			
80% Acid Solution Needed			

College Preparatory Integrated Mathematics Course II
Learning Objective 4.1
Section 8.2

Learning Objective 3.1: Recognize functional notation and evaluate functions.
Read Section 8.2 on page 519 and answer the questions below.

Definition: (Review from Section 3.6, pg. 226)

1. A ________________ is a set of ordered pairs that assigns to each x-value exactly one y-value.
2. The variable x is the ____________________________________ because any value in the domain can be assigned to x.
3. The variable y is the ____________________________________ because its value depends on x.
4. The symbol $f(x)$ means ____________________________________ and is read "f of x." This is called function notation and $y = f(x)$.

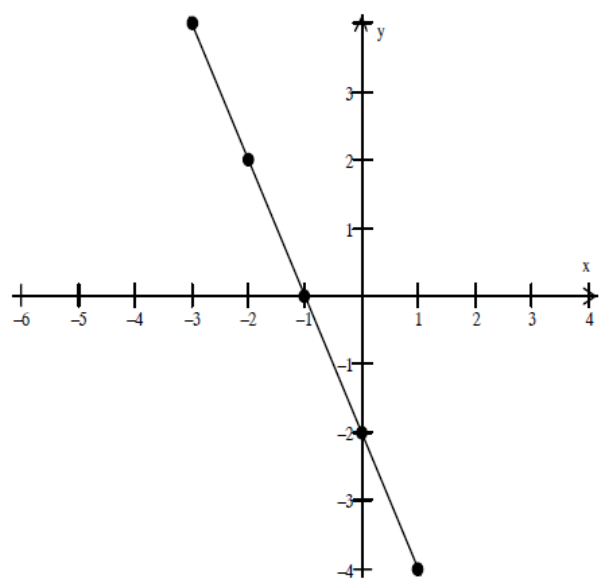
Example 1: For each given function value, write a corresponding ordered pair.

a. $f(3) = 6$

b. $g(0) = -\frac{1}{2}$

c. $h(-2) = 9$

Example 2: Use the graph of the following function $f(x)$ to find each value. Write the corresponding ordered pair for each.



a. $f(1) =$

b. $f(-3) =$

c. $f(0) =$

d. Find x such that $f(x) = 2$.

e. Find x such that $f(x) = 0$.

Example 2: For each function, find the value of $f(-3)$, $f(2)$, and $f(0)$. Then write the corresponding ordered pairs.

a. $f(x) = -\frac{1}{3}x - 5$

$f(-3) =$

$f(2) =$

$f(0) =$

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

$f(-3) =$

$f(2) =$

$f(0) =$

c. $f(x) = |-3 - x|$

$f(-3) =$

$f(2) =$

$f(0) =$