1.1 Practice Worksheet

1. Write each English phrase as a mathematical expression.

   (a) Three less than twice a number

   (b) Four more than half of a number

   (c) Half of four more than a number

2. Write each mathematical expression as a phrase in English

   (a) $7x - 1$

   (b) $\dfrac{x + 4}{2}$

3. For each of the following pairs of numbers, draw a number line diagram comparing them and then determine if $a < b$ or $a > b$.

   (a) $a = 5$ and $b = -1$

   (b) $a = -10$ and $b = -7$

4. Evaluate each problem for the given variable values.

    (a) $(5x - 3)^2 + 7$ for $x = 1$

    (b) $3z^3 + (3z)^3$ for $z = 2$

    (c) $x^2 - 5x - 9$ for $x = 0$

    (d) $x^2 - 5z$ for $x = 10$ and $z = 2$

5. According to `mayoclinic.org`, a reasonable guess for a child's adult height is given by the formula

$$h_B = \frac{1}{2}(M + F + 5) \text{ if the child is a boy or}$$

$$h_G = \frac{1}{2}(M + F - 5) \text{ if the child is a girl,}$$

    where M is the mother's height in inches and F is the father's height in inches.

    (a) My husband and I are both 5′9″ tall. Approximately how tall will our daughter grow up to be? *(Hint: There are 12 inches in a foot.)*

    (b) Come up with two heights of your own (e.g. your parents or your favorite Hollywood couple) and calculate how tall their children would be if they had one boy and one girl.

1.2 Practice Worksheet

Simplify the following expressions completely.

1. $(1.2)(-0.7)(-3)$

2. $-\dfrac{2}{7} + \dfrac{1}{3}$

3. $14 \div 4 \cdot 2$

4. -4^4

5. $|-0.21|$

6. $|0|$

7. $-|5 - 17|$

8. $-6 - (-9)$

9. $4(-2)^2 - 10(-3)^3$

10. $\dfrac{10 \div 2 + 3 \cdot 3}{1 + 2 \cdot 3}$

11. $10 - 5[-1(4 - 2) - 7(3 - 5)]$

12. $\dfrac{12 \div 4 \cdot 2|2 - 5|^2}{10 - (3 - 4)^2}$

1.2 and 1.3 Practice Worksheet

1. A student submitted the following **incorrect** work to simplify an expression. Find where the student made their error(s), then redo the problem correctly.

$$5(x + 4) - (4x + 5) = 5x + 4 - 4x + 5$$
$$= 5x - 4x + 4 + 5$$
$$= x + 9$$

2. Simplify each of the following expressions completely
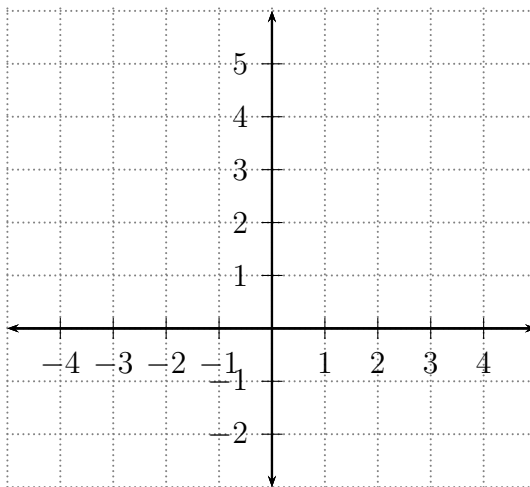
(a) $4x - 10x^2 + 2x^2 - 3x$

(b) $8(x - 2) - 3(6 - x)$

(c) $x + 7[4 - 2(2x + 11)]$
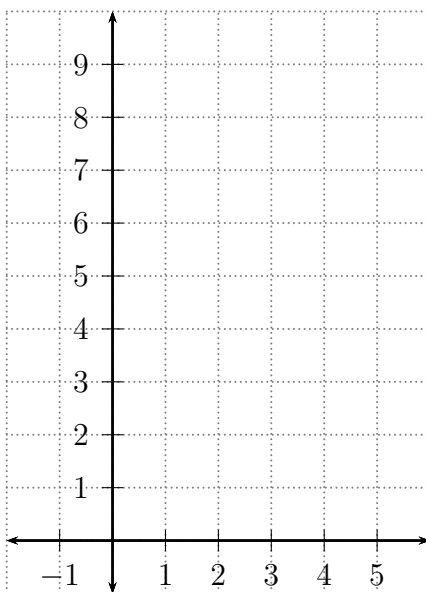
(d) $x^2 - 8x - 6(x - 3(x^2 + x))$

3. Sketch a graph of the equation $y = x^2 - x$ by first completing the table and plotting points.

x	-2	-1	0	1	2	3
y						

4. Sketch a graph of the equation $y = 2^x - 1$ by first completing the table and plotting points.

x	0	1	2	3	4
y					

1.4 Practice Worksheet

1. A student submitted the following **incorrect** work to solve a linear equation in one variable. Find where the student made their error(s), then redo the problem correctly.

$$x - 4 = 7$$
$$x - 4 - 4 = 7 - 4$$
$$x - 0 = 3$$
$$x = 3$$

Solve each of the following equations. Check your work by substitution.

2. $-\dfrac{5}{21} = \dfrac{4}{7}b$

3. $-8 = \dfrac{2x}{5}$

4. $-x = -2$

5. $-2x + 7 = 23$

6. $-6w - 3 = 4w + 17$

7. $-(x - 4) = 2x + 2$

8. $2x = 5(2x + 9) + 3$

9. $\dfrac{3}{8}x = \dfrac{5}{6}x - \dfrac{1}{4}$

10. $\dfrac{3x + 2}{2} = \dfrac{6x - 3}{5}$

11. $x - \dfrac{3x}{5} = \dfrac{x}{2} + \dfrac{17}{5}$

12. $\dfrac{2x - 1}{3} + 5 = \dfrac{2x + 1}{2}$

How did you use math this week? _____

1.5 Practice Worksheet - Part 1

1. You are trying to decide between two gym memberships. Gym A charges an $85 initiation fee and $45 in monthly dues. Gym B charges a $15 initiation fee and $50 in monthly dues.

   (a) After how many months will the total cost of membership at the two gyms be the same?

   (b) If you know you will be going to the gym that you choose for at least 18 months, which gym is the better deal?

2. After using a coupon for 25% off, you pay $190 for a couch. What was the original price of the couch?

3. Including a 9% sales tax, you pay $435 for a lawn mower. What is the price of the mower before the tax is added?

1.5 Practice Worksheet - Part 2

Formulas you need to have memorized:

- **Squares and rectangles:** $A = lw$, $P = 2l + 2w$

- **Circles:** $A = \pi r^2$, $C = \pi d = 2\pi r$

- **Triangles:** $A = \frac{1}{2}bh$, angles add up to $180°$

- **Right triangles only**: Pythagorean Theorem $a^2 + b^2 = c^2$

- **Cubes and rectangular solids:** $V = lhw$

1. A hotel has a rectangular swimming pool that is twice as long as it is wide. If the perimeter of the pool is 48 meters, what are its dimensions?

2. The length of a 6-lane lap pool is 5 meters longer than 3 times its width. If the pool's perimeter is 130 meters, what are it's dimensions?

3. In a triangle, the measure of the second angle is twice the measure of the first angle. The measure of the third angle is three times the measure of the first angle. What is the measure of each angle?

4. Solve each of the following equations for the given variable.

   (a) $P = VI$ for I

   (b) $A = \dfrac{1}{2}BH$ for H

   (c) $A = \dfrac{a + b + c}{3}$ for c

   (d) $\dfrac{x}{a} - \dfrac{y}{a} = 1$ for x

   (e) $A = 2lw + 2lh + 2hw$ for l

1.6 Practice Worksheet - Part 1

Simplify each of the following expressions. Your answers should not include any negative exponents.

1. $(-x^7y)(3xy^5)$

2. $(-4x)^0$

3. $5x^2y^{-4}$

4. $\dfrac{21x^9y^2}{7x^3y}$

5. $3x^2 \cdot 2x^5$

6. $2y^0$

7. -3^{-2}

8. $\dfrac{3x^5 z^5}{18x^5 z^3}$

9. $(-2x^2 y^7)(-4xy^3)$

10. $\dfrac{17xyz}{2x^2 z^{10}}$

11. -5^0

1.6 Practice Worksheet - Part 2

Simplify each of the following expressions. Your answers should not include any negative exponents.

1. $(2x^2y)^3$

2. $(-xy^2z^5)^{10}$

3. $\left(\dfrac{x^5z}{y^2}\right)^3$

4. $\left(-\dfrac{3x^7}{2y}\right)^2$

5. $-7w^4(w^3)^6$

6. $\dfrac{(x^3y^7)^2}{y^{10}}$

7. $\left(\dfrac{7b^4c^5}{14b^3c^2}\right)^0$

8. $\left(\dfrac{5x^5y^4}{2x^2y^3}\right)^2$

How did you use math this week? _____

2.1 Practice Worksheet - Part 1

Find the domain and range of each relation, then determine whether the relation is a function.

1. $\{(1, 2),\ (12, 2),\ (2, 5),\ (7, 9),\ (9, 9)\}$

   - Domain:

   - Range:

   - Is it a function? Why or why not?

2. $\{(7, \text{dog}),\ (5, \text{bird}),\ (2, \text{turtle}),\ (0, \text{tree})\}$

   - Domain:

   - Range:

   - Is it a function? Why or why not?

3. $\{(5, 5),\ (6, 0),\ (0, 6),\ (7, 9),\ (9, 9),\ (0, 5)\}$

   - Domain:

   - Range:

   - Is it a function? Why or why not?

4. $\{(\text{CA}, \text{Cupertino}),\ (\text{CA}, \text{Sunnyvale}),\ (\text{US}, \text{CA})\}$

- Domain:

- Range:

- Is it a function? Why or why not?

5. $\{(1, 1)\}$

- Domain:

- Range:

- Is it a function? Why or why not?

6. $\{(-2, 4),\ (-1, 1),\ (0, 0),\ (1, 1),\ (2, 4)\}$

- Domain:

- Range:

- Is it a function? Why or why not?

2.1 Practice Worksheet - Part 2

1. Find each of the following for $f(x) = 3x^2 - 7$

   (a) $f(-3)$

   (b) $f(2a)$

   (c) $f(0)$

2. Find each of the following for $g(x) = \dfrac{2x - 5}{3x + 6}$

   (a) $g(2)$

   (b) $g(-2)$

   (c) $g(b - 2)$

   (d) $g(2b)$

3. Find each of the following for $f(x) = 2 - 2x^2$

   (a) $f(-1)$

   (b) $f(2a)$

   (c) $f(-2a)$

4. Use the table below to find the following values.

x	$g(x)$
0	1
1	2
2	4
3	3
4	0

   (a) Find $g(2)$

   (b) Find x when $g(x) = 2$

2.2 Practice Worksheet - Part 1

1. Decide if the following relations are functions by plotting the points and determining if they satisfy the Vertical Line Test.

   (a) $\{(2,1),\ (2,5),\ (1,3)\}$
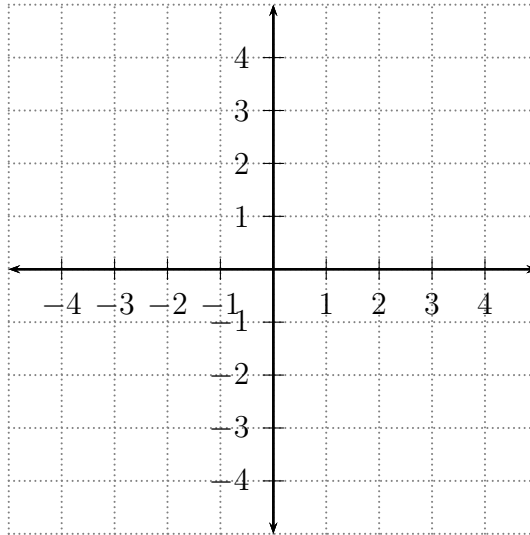
   (b) $\{(2,4),\ (3,4),\ (-1,4)\}$
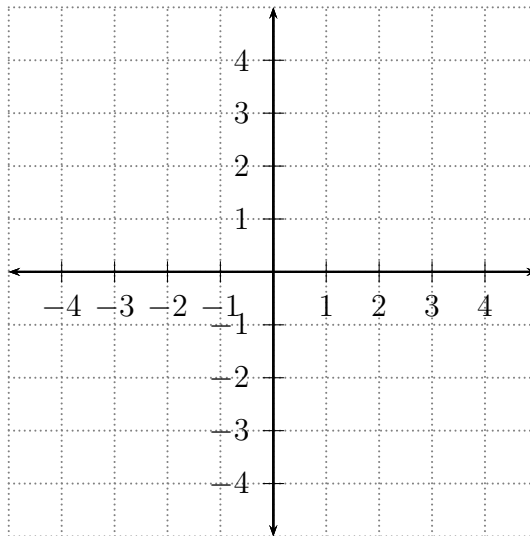
2. Determine whether each graph below is the graph of a function. Explain why or why not using input and output terminology.

(A)   (B)   (C)   (D)
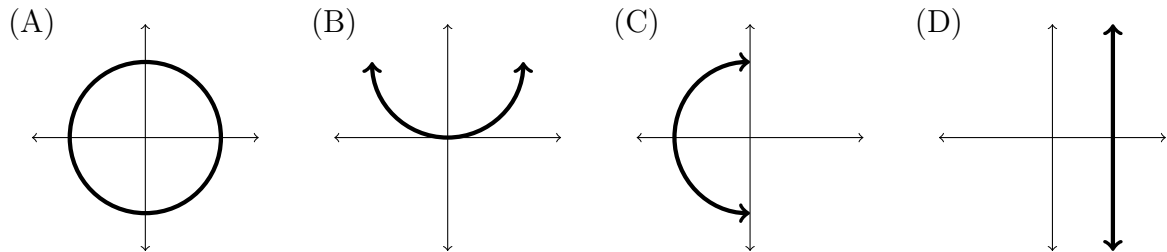
- Graph (A)

- Graph (B)

- Graph (C)

- Graph (D)

3. Use the graph below to find the following values.

$f(x)$
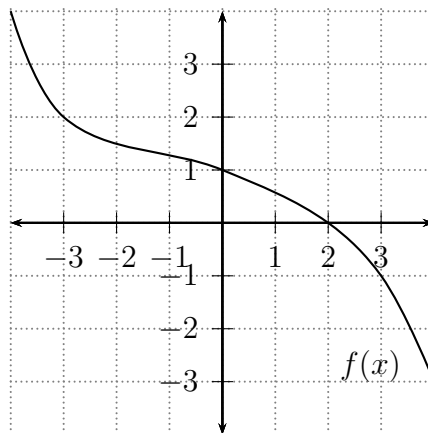
(a) Find $f(0)$

(b) Find $f(-3)$

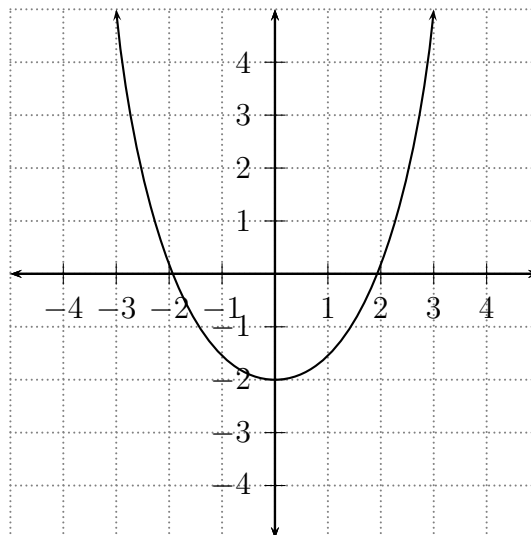(c) Find x when $f(x) = 0$

(d) Find x when $f(x) = -1$

2.2 Practice Worksheet - Part 2

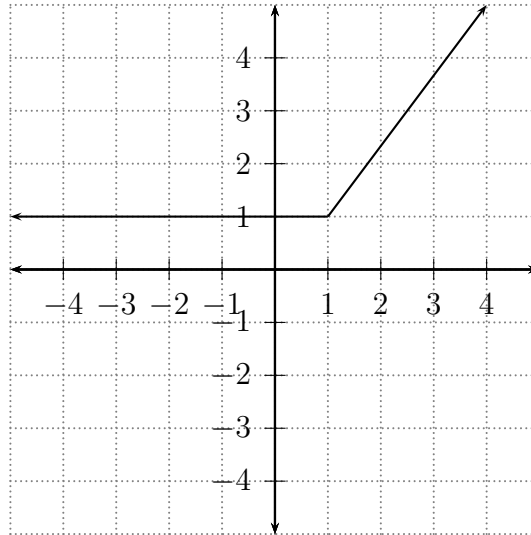Determine the domain and range of the following graphs of functions.
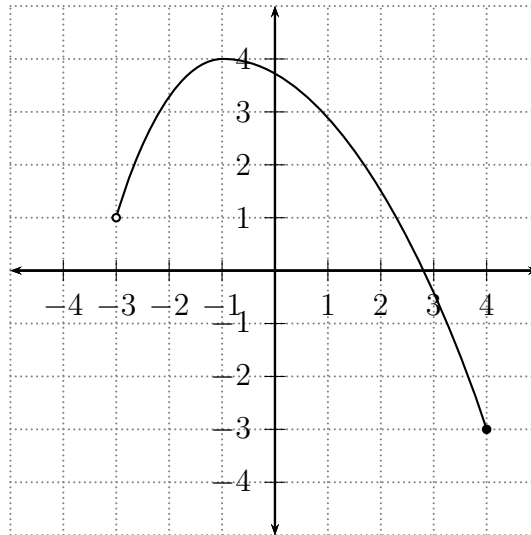
1. • Domain:

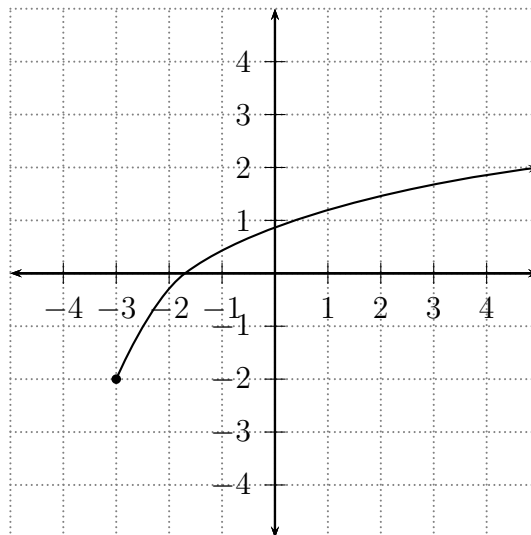   • Range:

2. • Domain:

    • Range:

3.   • Domain:

      • Range:

4.   • Domain:

      • Range:

How did you use math this week? _____

2.3 Practice Worksheet

Find the domain of each of the following functions.

1. $f(x) = 100x$

2. $g(x) = \dfrac{1}{x}$

3. $h(x) = \dfrac{2x - 7}{x + 4}$

4. $f(x) = \dfrac{3x}{x - 1} + \dfrac{2 - x}{x + 10}$

Side B – Review (Sections 1.1-1.4)

1. Evaluate the expression $(x + 1)^3 - 7x^5$ for $x = 1$

2. Completely simplify each of the following expressions.

   (a) $[-4 - (-10) + 3 \cdot 5^2] \div 3$

   (b) $\dfrac{10 \div 2 \cdot 5}{7 - 2}$

   (c) $2(2x - 1) - 3(1 - x)$

   (d) $x^2 - 7x + 3x - 2x^2$

3. Solve each of the following equations for x.

   (a) $\dfrac{2}{5}x - 1 = \dfrac{1}{4}x + 2$

   (b) $\dfrac{x - 1}{3} = \dfrac{2x + 3}{4} - 1$

   (c) $1 - \dfrac{2x}{5} = 7$

2.4 Practice Worksheet - Part 1

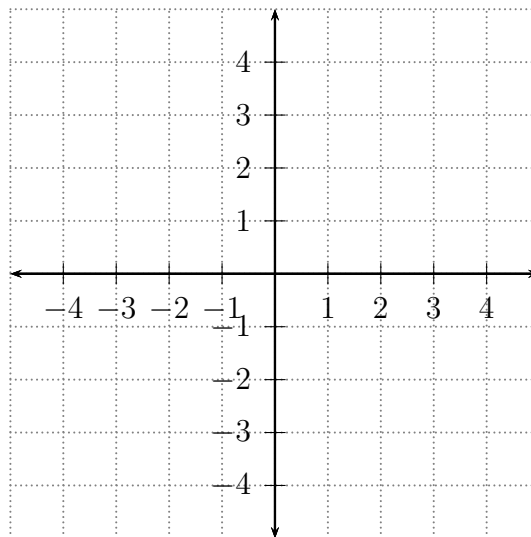$$m = \text{slope} = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$$

1. Find the slope of the line passing through each of the following pairs of points, then state whether the line is increasing, decreasing, horizontal or vertical.

   (a) $(3, 5)$ and $(6, 1)$

   (b) $(-3, -2)$ and $(-1, -4)$

   (c) $(4, -3)$ and $(8, -1)$

2. Graph the linear equation $2x - 3y = 6$ by first finding the x-intercept and y-intercept of the line. Check your work by finding two more points on the line.
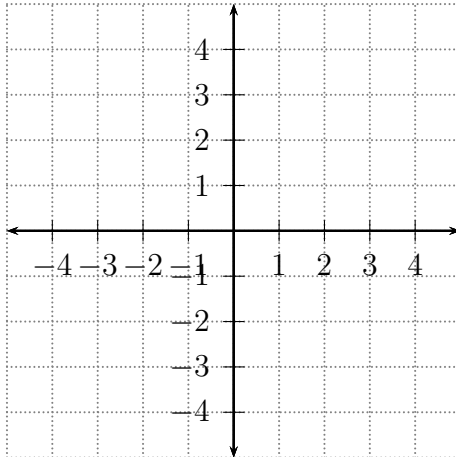
3. For each of the following linear equations in **slope-intercept form**, find the slope and the y-intercept of the line and then graph the function.
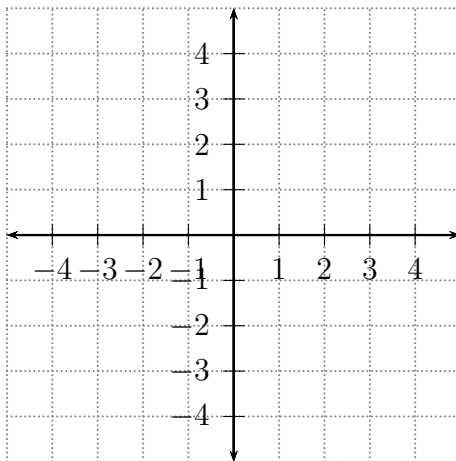
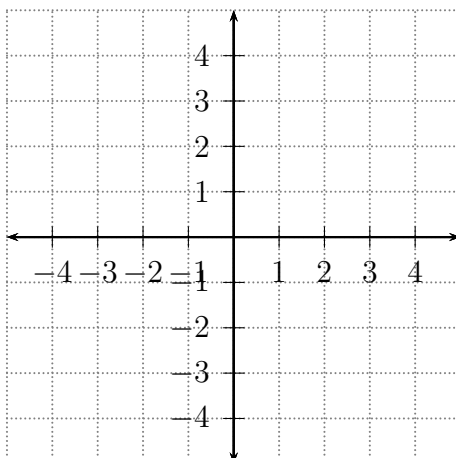(a) $y = -2x + 4$ Slope: y-intercept:

(b) $y = \dfrac{1}{3}x - 2$ Slope: y-intercept:

(c) $y = -2$ Slope: y-intercept:

Chapter 1 Review

Don't forget about the review problems on Side B of the Section 2.3 Practice Worksheet!

1. Company A charges $9 to rent a movie online for one week. Although only members can rent from the website, membership is free. Company B charges only $4 to rent a movie online for one week, but there is a one-time membership fee of $50. After how many movie rentals will the cost be the same at both websites, and what would be the total spent at each site?

2. After a 30% reduction, you purchase a sweater for $30.80. What was the original price of the sweater?

3. A painting has a rectangular shape 60 inches high by 40 feet wide. There is a frame of equal width around the perimeter of the painting. The perimeter of the rectangle formed by the outside of the frame is 248 inches. Find the dimensions of the painting. *(Start by drawing a diagram!)*

4. Completely simplify each of the following.

   (a) $(-4x^3yz^5)^2$

   (b) $\left(\dfrac{x^2y^5}{xy^7}\right)^5$

   (c) $\dfrac{4x^8y^2z^5}{-2x^5y^2z^3}$
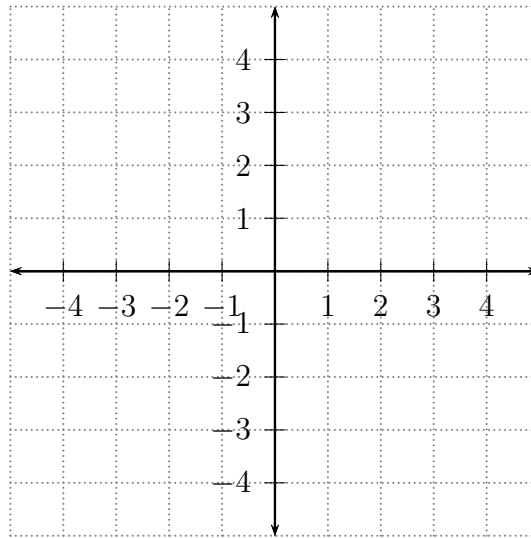
   (d) $(x^2y^3)^4(xy^7z^2)^3$

5. Solve $I = P + PXT$ for P
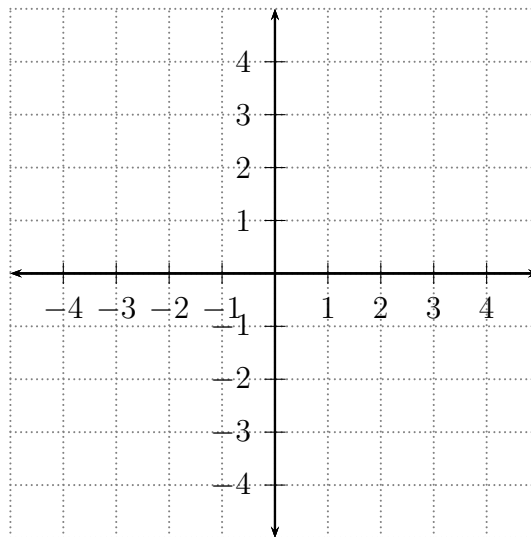
6. Solve $\dfrac{F}{a} = m$ for a

2.4 Practice Worksheet - Part 2

1. Graph each of the following lines on the same axes and label each one with its equation. Then decide whether each is horizontal or vertical.

   - $x = 2$
   - $y = -3$

2. Write the linear equation $x + 2y = 8$ in slope-intercept form. Then use the slope and the y-intercept to graph the function.

3. Write each of the following linear equations in slope-intercept form.

  (a) $2x = y - 7$

  (b) $x + y + 1 = 0$

  (c) $y - 2 = 7$

4. Suppose that the linear function $y = 0.01x + 57.7$ models the global average temperature of the Earth in degrees Fahrenheit x years after 1995.

  (a) What is the **slope** of this linear function?

  (b) What does x represent? What are the units of x?

  (c) What does y represent? What are the units of y?

  (d) What **rate of change** does the slope of this function represent? What are the units of this **rate of change**?

  (e) What are an appropriate **domain** and **range** for this function in the context of this problem?

5. Suppose that the linear function $y = -0.28x + 1.7$ models the percentage of US taxpayers that were audited x years after 1998.

  (a) What is the **slope** of this linear function?

  (b) What does x represent? What are the units of x?

  (c) What does y represent? What are the units of y?

  (d) What **rate of change** does the slope of this function represent? What are the units of this **rate of change**?

 (e) What are an appropriate **domain** and **range** for this function in the context of this problem?

How did you use math this week? _____

2.5 Practice Worksheet

For each of the following, find the slope of the line, an equation for the line in **point-slope form**, an equation for the line in **slope-intercept form**, the x-intercept and the y-intercept, then graph the line.
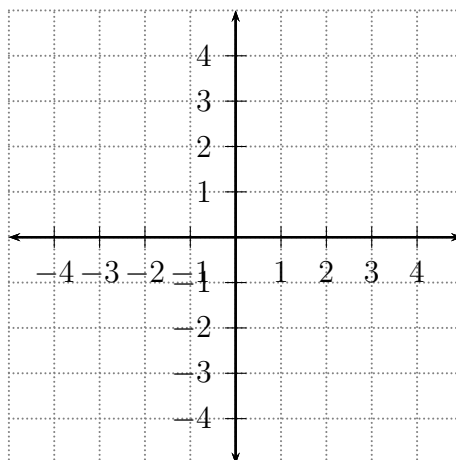
1. The line with slope $= -1$ passing through the point $(0, -1)$.

   - Slope:
   - Point-slope equation:
   - Slope-intercept equation:
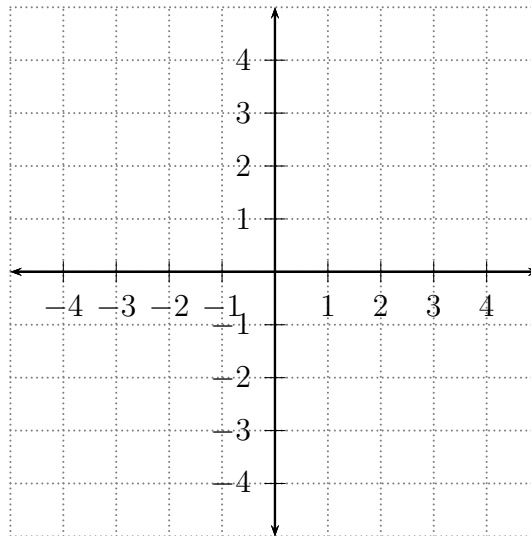   - x-intercept:
   - y-intercept:
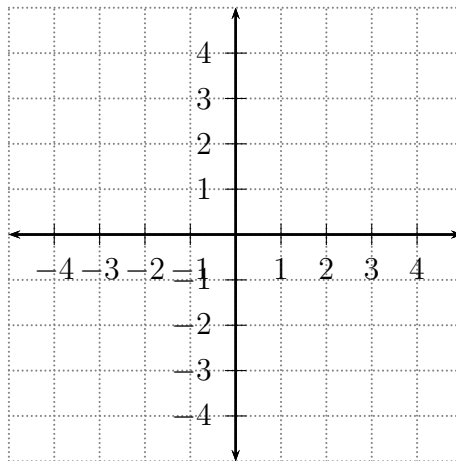
2. The line passing through the point $(-2, -1)$ and **parallel** to the line $2x - 5y = 0$. *(Please graph both lines and label them.)*

   - Slope:
   - Point-slope equation:
   - Slope-intercept equation:
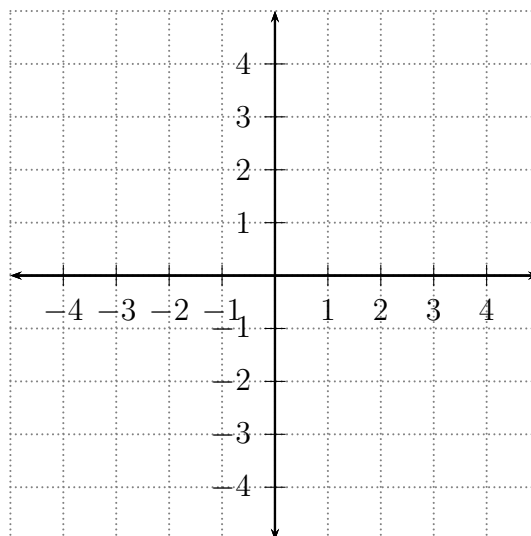   - x-intercept:
   - y-intercept:

3. The line passing through the point $(-2, -1)$ and **perpendicular** to the line $2x - 5y = 0$. *(Please graph both lines and label them.)*

- Slope:
- Point-slope equation:
- Slope-intercept equation:
- x-intercept:
- y-intercept:

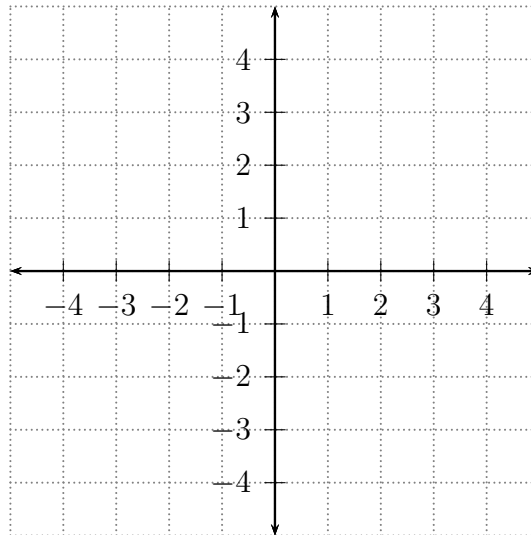4. The line passing through the points $(1, 2)$ and $(3, 2)$.

- Slope:
- Point-slope equation:
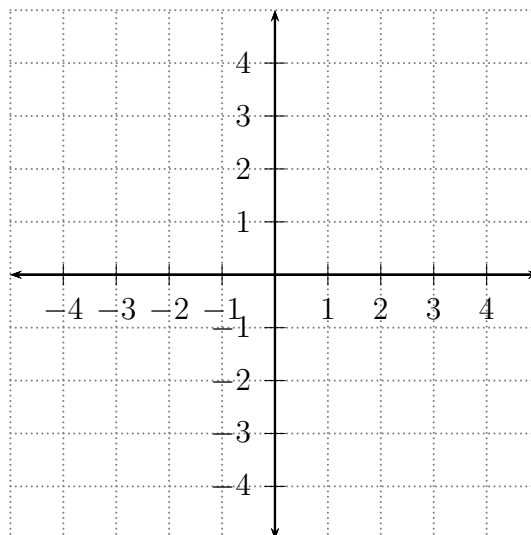- Slope-intercept equation:
- x-intercept:
- y-intercept:

3.1 Practice Worksheet

Solve each system of linear equations by graphing, then check that your solution satisfies both equations.

1. $\begin{cases} 2x - 3y = -6 \\ x + 3y = -3 \end{cases}$

2. $\begin{cases} 2x - y = 0 \\ x + y = -3 \end{cases}$

Solve each system of linear equations by **substitution**.

3. $\begin{cases} x = -2y + 5 \\ 7x + 2y = -13 \end{cases}$

4. $\begin{cases} y = -1.45x - 6.18 \\ y = 2.63x - 2.73 \end{cases}$

5. $\begin{cases} y = 4 - 2x \\ 4x + 2y = -6 \end{cases}$

6. $\begin{cases} -4x - 2y = -10 \\ y = -2x + 5 \end{cases}$

Solve each system of linear equations by **addition**.

7. $\begin{cases} 3x + 4y = -5 \\ -5x + 2y = 17 \end{cases}$

8. $\begin{cases} 5x - 2y = 8 \\ 2x - 3y = 1 \end{cases}$

9. $\begin{cases} \dfrac{1}{4}x + \dfrac{5}{2}y = 2 \\ \dfrac{5}{6}x - \dfrac{1}{3}y = -2 \end{cases}$

3.2 Practice Worksheet

1. A person plans to invest a total of $3,500 in an annuity at 3% annual interest and a mutual fund at 16% annual interest. How much should be invested in each account so that the total interest earned in one year is $200?

2. A person plans to invest a total of $6,500 in a CD account at 3% annual interest and an investment account at 14% annual interest. How much should be invested in each account so that the total interest earned in one year will be $400?

3. How many quarts of a 30% acid solution and a 50% acid solution should be mixed to make 10 quarts of a 42% acid solution?

4. How many liters of a 25% antifreeze solution and a 40% antifreeze solution need to be mixed to make 6 liters of a 30% antifreeze solution?

4.1 Practice Worksheet

1. Complete the table.

Inequaltiy	Set-builder	Interval	Number line
$x > 3$	$\{x \mid x > 3\}$	$(3, \infty)$	
$x \leq 2$			
		$(-2, 5]$	
$-2 < x \leq 0$			
	$\{x \mid x \leq 4\}$		
		$[4, \infty)$	

2. Solve each inequality and graph the solution on a number line.

   (a) $5x + 43 > 98$

   (b) $7x + 24 < 3x - 15$

3. Solve each inequality.

   (a) $-2(x - 3) > 3x - 24$

   (b) $\dfrac{x + 1}{2} + \dfrac{1}{4} \geq \dfrac{3x + 6}{8}$

   (c) $5[2 + 3(-2x - 1)] > 4(1 - x) - 5(3 - 2x)$

4. A car can be rented from Company A for \$150 plus 10 cents per mile. Company B charges \$80 per week plus 30 cents per mile to rent the same car. How many miles must be driven in a week to make the rental cost for Company A a better deal than Company B?
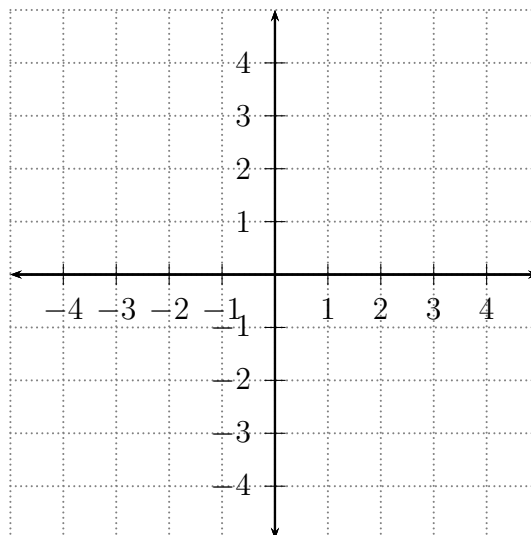
How did you use math this week? _____

4.4 Practice Worksheet

Shade the region that represents the solution set to each linear inequality or system of linear inequalities below.

1. $y < \dfrac{2}{3}x - 5$
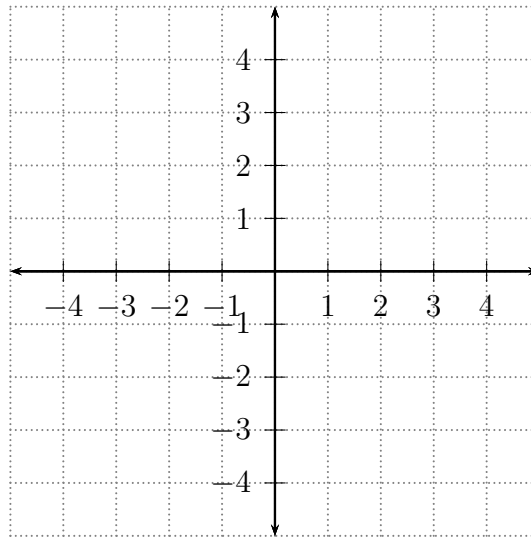
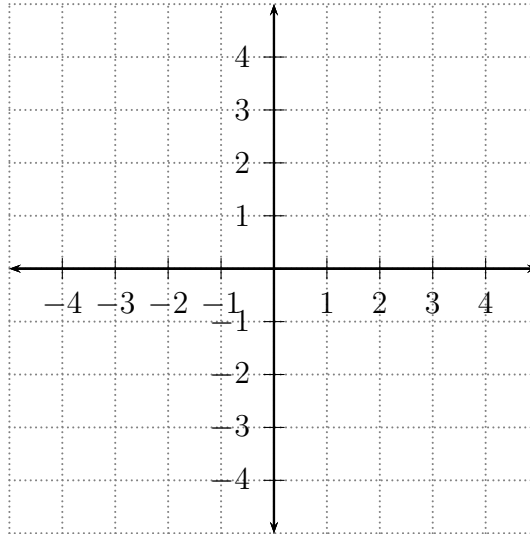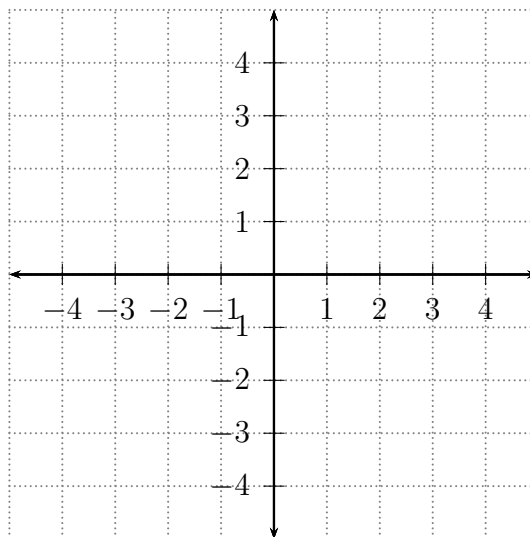2. $\begin{cases} y \geq -\dfrac{4}{3}x + 3 \\ x < 1 \end{cases}$

3. $\begin{cases} 3x - 2y \geq 6 \\ x + y < 0 \end{cases}$

4. $\begin{cases} y \leq -\dfrac{2}{3}x + 1 \\ y > -4x - 2 \end{cases}$

5.1 Practice Worksheet

1. Answer the following for the polynomial $f(x) = 4x^3 - 2x + 5x^4 - 3 + 7x^2$

   (a) Write $f(x)$ in standard form.

   (b) What is the degree of $f(x)$?

   (c) How many terms does $f(x)$ have?

   (d) Complete the table for each term of $f(x)$ written in standard form.

Term	Degree	Coefficient

2. Answer the following for the polynomial $f(x) = 2x^3 - x^2 + 5 + x^2 + 3x$

   (a) Write $f(x)$ in standard form.

   (b) What is the degree of $f(x)$?

   (c) How many terms does $f(x)$ have?

   (d) Complete the table for each term of $f(x)$ written in standard form.

Term	Degree	Coefficient

Add or subtract the following polynomials.

3. $(-7x^3 + 5x^2 - 9) + (2x^3 - 8x^2 + 3x)$

4. $(x^5 - 4x^2 - x + 9) - (2x^4 + x^3 + x^2 - 12x - 12)$

5. $(5a^3b - 2a^2b^2 + 9ab^3) - (8a^3b + 4a^2b^2 - ab^3)$

6. $(4a^2 - 2ab + 3b^2) + (2a^2 + ab - b^2) - (6a^2 - ab + 2b^2)$

7. $(2xy^2 - 7x^2y + 2xy - 4x) + (x^2y - 5xy^2 + 3xy + 7y)$

8. $(5x^3y + 3x^2y + 7xy - y) - (13x^3y - xy + 2y + 2)$

5.2 Practice Worksheet

1. A student submitted the following **incorrect** work to multiply two monomials. Find where the student made their error(s), then redo the problem correctly.

$$6x(-4x) = 6x - 4x$$
$$= 2x$$

Find the following products or powers.

2. $2a^3b^2(-7ab^2)$

3. $(10c^7d^2)(3c^5d)$

4. $6y(y+1)$

5. $4xy(3x+2y^2)$

6. $-2a^2(3a^2-a-4)$

7. $(x+3)(x+7)$

8. $(a-6)(a-5)$

9. $(6a+3)(2a-4)$

10. $(4x - 3)(4x + 3)$

11. $(6a - 5b)(6a + 5b)$

12. $(x + 3)(x^2 + 2x + 4)$

13. $(a - b)(a^2 + ab + b^2)$

14. $(4x^2 - x + 3)(3x^2 + 2x + 1)$

15. $(x - 3)^2$

16. $(5m^2 - 4c^2)^2$

17. $(3x + 7)^2$

18. $(4y + 5)(4y - 5)$

19. $(x + 3)(x - 3)(x^2 + 9)$

5.3 Practice Worksheet - Part 1

Factor out the GCF for each of the following polynomials.

1. $7x^2 + 49$

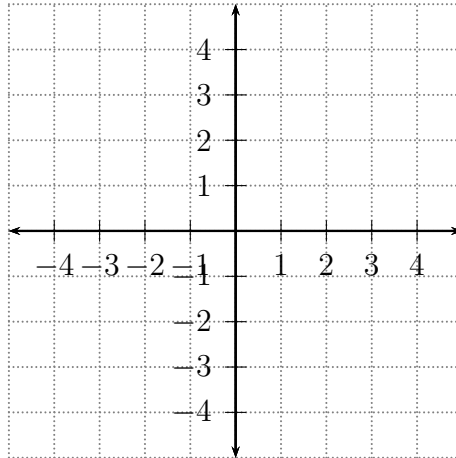2. $28p^2 + 21p$

3. $-8xy^3 - 6x^2y$

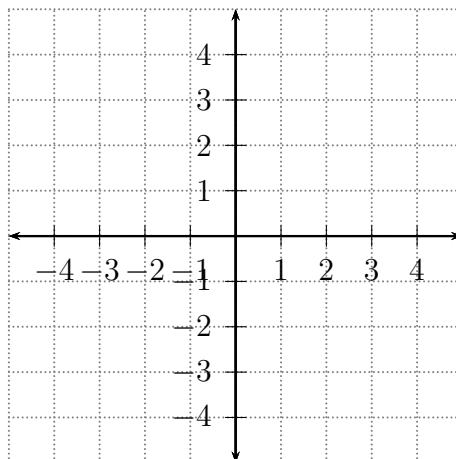4. $-6r^4 + 9r^2 - 12r$

5. $28x^3y + 12x^2y - 20xy$

6. $-2x^4 + 50x^2$

Side B - Review (Sections 2.4-2.5)

1. Find the slope of the line passing through the points $(1, 1)$ and $(3, 0)$.

2. Find the slope and the y-intercept of the line $y = 2x - 1$ and use them to graph the line.

3. Graph the line $2x - 4y = 6$ by first finding the x-intercept and y-intercept.

4. Write each of the following equations in **slope-intercept** form.

   (a) $4x - y = 0$

   (b) $x + 2y - 4 = 0$

How did you use math this week? _____

5.3 Practice Worksheet - Part 2

Factor by grouping. (The first two have been started already.)

1. $3x - 3 + 7x^3 - 7x^2 = 3(x - 1) + 7x^2(x - 1)$

2. $4x^2 + 2xy - 2xy^2 - y^3 = 2x(2x + y) - y^2(2x + y)$

3. $3x^2y + xy + 15x + 5$

4. $3b^2 - 9b + 2ab - 6a$

5. $2m^2 - 6mn + 7mn^2 - 21n^3$

6. $4x + x^3 + 8 + 2x^2$ *Hint: Try rearranging the terms.*

7. $6xy^2 + 3xy - 8y - 4$

8. $6x^2 - x^2y + 6y^2 - y^3$

5.4 Practice Worksheet - Part 1

Factor the following trinomials with leading coefficient 1. Check your answer by multiplying.

1. $x^2 + 13x + 12$

2. $m^2 - 4m - 21$

3. $x^2 + 7x + 10$

4. $t^2 - 5t + 6$

5. $a^2 - 12a + 27$

6. $z^6 - 6z^3 + 9$

7. $n^2 - 12np + 36p^2$

8. $x^8 - x^4 - 12$

9. $k^2 + 14kc + 24c^2$

10. $x^4 + 10x^2 + 9$

11. $x^2 - 12x + 20$

12. $y^6 - 25y^3 + 24$

13. $x^2 - 3xy - 18y^2$

14. $x^4 - 3x^2 + 10$

Bonus: $3xy^2 - 9xy - 120x$

Chapter 3 and 4 Review

Don't forget about the review problems on Side B of the Section 5.3 Practice Worksheet!

1. Solve each system of linear equations.

   (a) $\begin{cases} x - 2y = 5 \\ 7x + 2y = -13 \end{cases}$

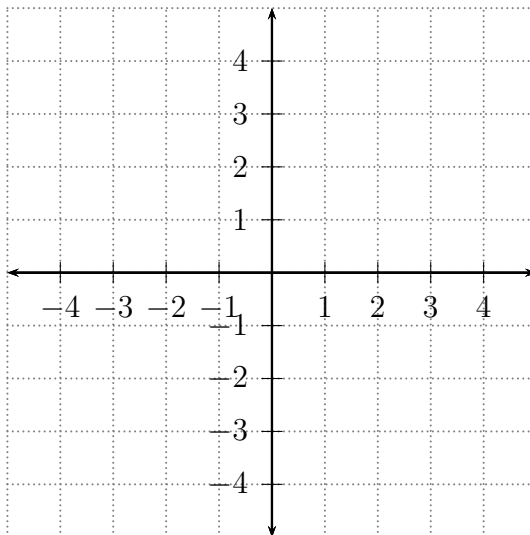   (b) $\begin{cases} 3x + 4y = 5 \\ -5x + 2y = 7 \end{cases}$

2. How many liters of a 10% acid solution and a 30% acid solution need to be mixed to make 5 liters of a 25% acid solution?
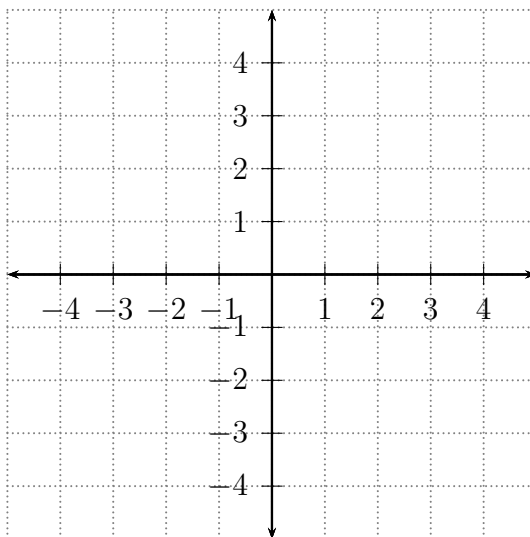
3. Solve each inequality.

   (a) $-2(4x - 32) \leq -40$

   (b) $\dfrac{x+1}{3} + \dfrac{1}{2} \geq \dfrac{3x+6}{2}$

4. $\begin{cases} 3x - 2y > 6 \\ x + y > 2 \end{cases}$

5. $\begin{cases} y \leq -\dfrac{2}{3}x + 1 \\ y \leq -4x - 2 \end{cases}$

5.4 Practice Worksheet - Part 2

Factoring using Big X and Grouping together for $ax^2 + bx + c$
– Multiply $a \cdot c$ *(Top of Big X)*
– Break the product up into two factors that add to b *(Bottom of Big X)*
– Break b up into the two factors and use the **grouping method** to factor the result

1. A student submitted the following **incorrect** work to simplify an expression. Find where the student made their error(s), then redo the problem correctly.

$$6x^2 - 5x - 4 = 6x^2 + 3x - 8x - 4$$
$$= 3x(2x + 1) - 4(2x - 1)$$
$$= (2x + 1)(2x - 1)(3x - 4)$$

Factor each trinomial with leading coefficient $\neq 1$.

2. $2x^2 + 9x + 7$

3. $5y^2 - 16y + 3$

4. $8x^2 - 18x + 9$

5. $6x^2 - 5x - 6$

Completely factor each trinomial. Make sure you factor out the GCF first if there is one.

6. $3x^2 + xy - 14y^2$

7. $5p^2 - 5p - 60$

8. $3b^2 - 10b - 8$

9. $-x^2 - 2x + 35$

10. $3m^2 - 8mn + 4n^2$

11. $2t^3 - 12t^2 - 32t$

12. $60y - 40y^2 + 5y^3$

13. $3a^3b - 3a^2b^2 - 36ab^3$

How did you use math this week? _____

5.5 Practice Worksheet

Factor each difference of squares.

1. $x^2 - 49$

2. $x^2 - 100$

3. $x^2 - 4$

4. $x^2 - 1$

5. $2x^2 - 50$

6. $9x^2 - 16$

7. $25x^6 - y^4$

Factor each perfect square trinomial.

8. $y^2 + 16y + 64$

9. $x^2 - 14x + 49$

10. $x^2 + 2x + 1$

11. $25x^2 + 20x + 4$

12. $16z^2 - 24z + 9$

Factor each sum or difference of cubes using the formulas

$$a^3 + b^3 = (a + b)(a^2 - ab + b^2) \text{ or } a^2 - b^2 = (a - b)(a^2 + ab + b^2)$$

13. $x^3 - 27$

14. $a^3 + 125$

15. $5x^3 - 40$

16. $y^6 + 125x^3$

5.5 and 5.6 Practice Worksheet

General Factoring Strategies:

1. Always factor out the GCF first.

2. Look at the number of terms remaining in parentheses.

   (a) **2 terms:** Try factoring as a difference of squares or as a sum or difference of cubes.

   $$a^2 - b^2 = (a+b)(a-b) \qquad\qquad a^2 + b^2 \text{ does not factor}$$

   $$a^3 + b^3 = (a+b)(a^2 - ab + b^2) \qquad\qquad a^2 - b^2 = (a-b)(a^2 + ab + b^2)$$

   (b) **3 terms:** If the leading coefficient is 1, use the Big X. If leading coefficient is not 1, use the Big X *and 2-2 grouping.*

   (c) **4 or more terms:** First try 2-2 grouping. Next, try 3-1 grouping (this makes a difference of squares, where the "3" is a perfect square trinomial).

3. **Always factor completely**, which means to go back and try to factor factors even further.

Factor using 3-1 grouping.

1. $x^2 - 8x + 16 - y^2$

2. $x^2 - y^2 - 12y - 36$

3. $a^2 - b^2 + 10b - 25$

4. $x^2 - 25a^2 + 8x + 16$

Factor completely using any method.

5. $3y^5 - 27y^3$

6. $4x^2y - 16xy - 20y$

7. $2x^5 + 16x^2$

8. $9b^2x + 9b^2y - 16x - 16y$

9. $4x^3 + 8x^2 - 100x - 200$

10. $x^3 - x$

11. $24x^3 - 3$

12. $ax^2 - 16a - 2x^2 + 32$

13. $x^2 - 49y^2 + 14x + 49$

How did you use math this week? _____

5.7 Practice Worksheet - Part 1

1. A student submitted the following **incorrect** work to solve a quadratic equation. Find where the student made their error(s), then redo the problem correctly.

$$3x^2 - 39x + 120 = 0$$
$$3(x^2 - 13x + 40) = 0$$
$$3(x - 5)(x - 8) = 0$$
$$x = 3, 5, 8$$

Solve the following quadratic equations by **factoring**.

2. $x^2 + 5x + 6 = 0$

3. $64y^2 - 9 = 0$

4. $x^2 = 11x + 12$

5. $3r + r^2 - 28 = 0$

6. $2x^2 + 6x - 80 = 0$

7. $5x^2 = 35x$

8. $x^2 - 4x - 45 = 0$

9. $x^2 - 12 = -36$

10. $x^2 - 6x = 0$

11. $x^2 - 49 = 0$

12. $16x^2 = 25$

13. $(x - 1)(x + 4) = 14$

14. $2x(x + 3) = -5x - 15$

15. $x^3 + 3x^2 = 3x + 9$

5.7 Practice Worksheet - Part 2

1. A person throws a ball into the air. The height (in feet) of the ball after t seconds is given by

$$f(t) = -16t^2 + 64t + 4.$$

   (a) When is the ball at a height of 4 feet? Explain why there are two such times.

   (b) When is the ball at a height of 68 feet? Explain why there is just one such time.

2. The percentage of Americans who think that the environment should be protected can be modeled by
$$f(t) = t^2 - 8t + 64,$$
   where t is years since 2000.

   (a) Find $f(10)$. What does it mean in this situation?

   (b) Find t so that $f(t) = 73$. What does it mean in this situation?

3. A rectangular garden has a length that is 3 feet greater than the width. The area of the garden is 180 square feet. Find the length and the width.

7.1 Practice Worksheet

Find each square root, if possible.

1. $\sqrt{64}$

2. $\sqrt{-64}$

3. $-\sqrt{64}$

4. $-\sqrt{-64}$

Use your calculator to approximate the following square roots to 2 decimal places.

5. $\sqrt{62}$

6. $\sqrt{256}$

7. $\sqrt{95}$

8. $\sqrt{2}$

Find each square root, if possible.

9. $\sqrt{16}$

10. $\sqrt{49}$

11. $-\sqrt{36}$

12. $-\sqrt{9}$

13. $\sqrt{-25}$

14. $\sqrt{-16}$

15. $\sqrt{\dfrac{4}{49}}$

16. $-\sqrt{\dfrac{1}{100}}$

17. $\sqrt{36 + 64}$

18. $\sqrt{36} + \sqrt{64}$

19. $\sqrt{5^2}$

20. $\sqrt{(-5)^2}$

21. $\sqrt{-5^2}$

Answer the following questions about functions involving square roots.

22. Let $f(x) = \sqrt{9x + 27}$

   (a) Find $f(1)$.

   (b) Find $f(-2)$

23. Let $g(x) = \sqrt{12 - 6x}$

   (a) Find $g(2)$.

   (b) Find $g(8)$

7.7 Practice Worksheet

Completely simplify the following square roots using **complex numbers** when appropriate. No decimal approximations.

1. $\sqrt{-16}$

2. $-\sqrt{16}$

3. $-\sqrt{-16}$

4. $\sqrt{90}$

5. $\sqrt{128}$

6. $\sqrt{-500}$

7. $\sqrt{-2}$

8. $\sqrt{-49}$

9. $-\sqrt{-72}$

10. $-\sqrt{-9}$

11. $\sqrt{-25}$

12. $\sqrt{-16}$

13. $4 + \sqrt{-49}$

14. $10 - \sqrt{-1}$

15. $\sqrt{-100}$

16. $3 + \sqrt{-64}$

17. $\sqrt{-5}$

18. $\sqrt{-10}$

How did you use math this week? _____

8.1 Practice Worksheet - Part 1

Solve each of the following using the **square root property**. No decimal approximations.

1. $x^2 = 16$

2. $x^2 = 20$

3. $(x + 4)^2 = 25$

4. $(4x + 7)^2 = 81$

5. $x^2 = -4$

6. $x^2 = -28$

7. $(x + 8)^2 = -45$

8. $x^2 = 36$

9. $2x^2 - 24 = 0$

10. $16x^2 - 25 = 0$

11. $x^2 + 24 = 0$

12. $(x + 6)^2 = 20$

13. $\left(x - \dfrac{2}{3}\right)^2 = \dfrac{5}{9}$

Chapter 5 Review

Factor using any method. Don't forget to factor out the GCF first! You may use the following formulas:

$$a^3 + b^3 = (a + b)(a^2 - ab + b^2) \qquad a^2 - b^2 = (a - b)(a^2 + ab + b^2)$$

1. $x^2 + x - 12$

2. $6x^2 - 5x - 4$

3. $10x^2 - 32x + 6$

4. $x^2 - 49$

5. $a^3 b^6 + 27c^3$

6. $5x^2 + 20$

7. $10a^2 b^2 - 40$

8. $x^2 - 6x + 9$

9. $x^3 - 8$

10. $9 + 9y - 16x - 16xy$

11. $2x^3 + 4x^2 + 50x + 100$

Solve each quadratic equation by **factoring** or using the **square root property**.

12. $36x^2 - 9 = 0$

13. $x^2 + 3x - 28 = 0$

14. $2x^2 = 16x$

15. $(x - 1)(x + 4) = 14$

How did you use math this week? _____

8.1 and 8.2 Practice Worksheet

To complete the square $x^2 + bx$, add $\left(\dfrac{b}{2}\right)^2$ to both sides.

Then use $x^2 + bx + \left(\dfrac{b}{2}\right)^2 = \left(x + \dfrac{b}{2}\right)^2$.

Determine the constant that should be added to "complete the square" (*i.e. find* $(\frac{b}{2})^2$). Then add the constant and factor the resulting trinomial.

1. $x^2 + 12x$

2. $x^2 - 18x$

3. $x^2 + 5x$

4. $x^2 - \dfrac{2}{3}x$

Solve each quadratic equation by **completing the square**.

5. $x^2 + 8x = 33$

6. $x^2 - 10x + 12 = 23$

7. $x^2 - 7x + 1 = 19$

8. $3x^2 + x = 30$

Solve each quadratic equation using the **quadratic formula**.

9. $2x^2 + 3x + 1 = 0$

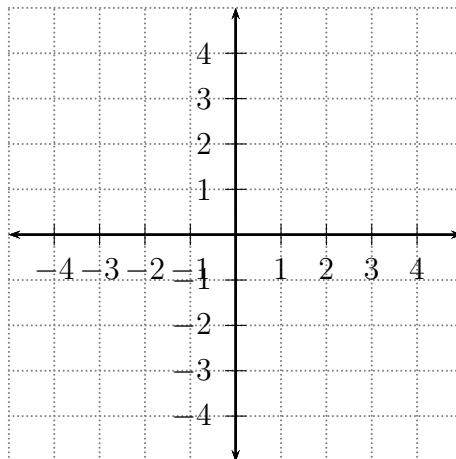10. $x^2 + 7x - 2 = 0$

11. $2x^2 - 5x = -6$

8.3 Practice Worksheet - Part 1

For each of the following quadratic equations in **vertex form**, sketch a graph and label the vertex, axis of symmetry x-intercepts and y-intercept.
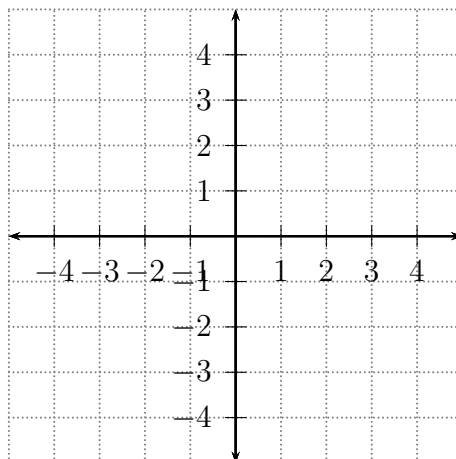
1. $y = -2(x + 1)^2 - 2$
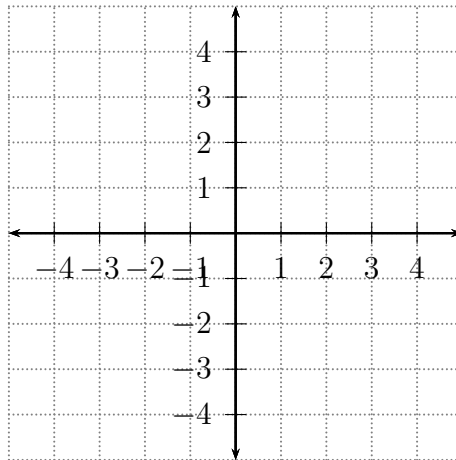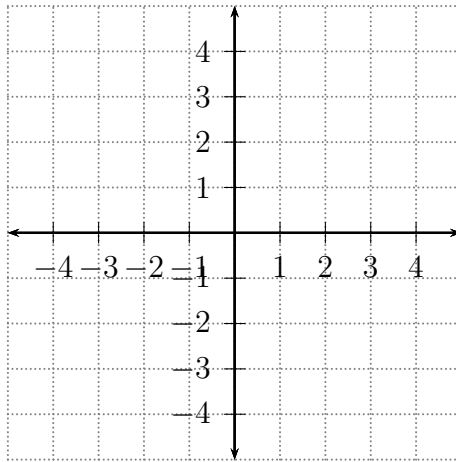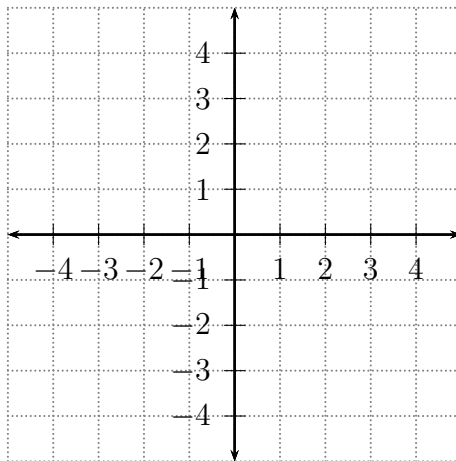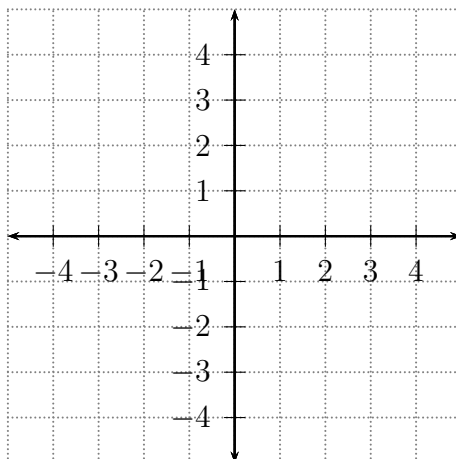
2. $y = (x - 2)^2 - 4$

3. $y = (x - 1)^2 - 3$

4. $y = -(x-1)^2$

5. $y = -x^2 + 2$

6. $y = 2(x+3)^2 - 4$

8.3 Practice Worksheet - Part 2

1. Consider the quadratic function $f(x) = 3x^2 + 12x + 8$

   (a) Use the formulas $h = -\dfrac{b}{2a}$ and $k = f\left(-\dfrac{b}{2a}\right)$ to write $f(x)$ in **vertex form**
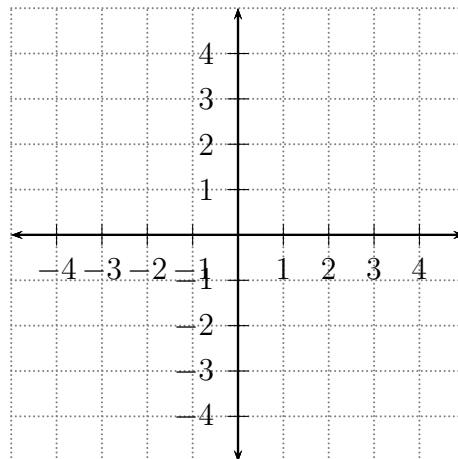
   $f(x) = a(x - h)^2 + k$.

   (b) Does the graph of $f(x)$ open upward or downward?

   (c) What is the vertex of $f(x)$? Is this a maximum or a minimum?

   (d) Does $f(x)$ have any x-intercepts? If so, find them and round your answers to 1 decimal place.

   (e) What is the y-intercept of $f(x)$?

   (f) Sketch a graph of $f(x)$. Label the vertex, axis of symmetry and x-intercepts.

2. Consider the quadratic function $f(x) = -2x^2 - 4x + 1$

   (a) Use the formulas $h = -\dfrac{b}{2a}$ and $k = f\left(-\dfrac{b}{2a}\right)$ to write $f(x)$ in **vertex form**
       $f(x) = a(x - h)^2 + k$.

   (b) Does the graph of $f(x)$ open upward or downward?

   (c) What is the vertex of $f(x)$? Is this a maximum or a minimum?

   (d) Does $f(x)$ have any x-intercepts? If so, find them and round your answers to 1 decimal place.

   (e) What is the y-intercept of $f(x)$?

   (f) Sketch a graph of $f(x)$. Label the vertex, axis of symmetry, x-intercepts and y-intercept.