May 2025
Upper School Summer Math
Rising 8th Grade (8MXLAB)

Algebra I and II Readiness Packet

Dear Upper School Students,

This summer, we encourage you to continue to foster a belief in the importance and enjoyment of mathematics at home. Being actively involved in mathematical activities enhances learning.

In preparation for the 2025-2026 school year, each student in middle school is required to complete a summer math review packet. Each packet focuses on the prerequisite concepts and skills necessary for student success in each math class. The topics within this packet are important foundational concepts. READ THE INSTRUCTIONS. Even if it doesn't say "Show Your Work" at the top of the page, **you are expected to show your work on all pages.** If you need extra space, you must use and attach scratch paper to the packet.

Please bring your completed math packet (with scratch work attached) with you on the first day of school in August. Your math teachers will be collecting them, and the packets will be graded for timeliness and thoroughness of completion.

Have a wonderful summer!

The Middle School Mathematics Department

Writing Rules for Linear Functions

REVIEW Write a rule for the function.

STEP 1 Calculate the slope.

x	y
–2	12
0	–2
2	8
4	18

$m = \frac{y_2 - y_1}{x_2 - x_1}$ ← **Write the slope formula.**

$m = \frac{12 - (-2)}{-2-0}$ ← **Substitute two pairs of coordinate in corresponding order.**

$m = \frac{14}{-2}$ ← **Simplify.**

$m =$ ☐

STEP 2 Identify the *y*-intercept.

The *y*-intercept always has an *x*-value of 0.
After analyzing the table, the *y*-intercept is (0, ☐)

STEP 3 Write the equation of the line in slope intercept form.

$y = mx + b$ ← **Write the slope intercept formula.**

$b = -2$ ← **Use the *y*-intercept to identify *b*.**

$y =$ ☐ $x +$ ☐ ← **Substitute in the values of *m* and *b*.**

$y =$ ____________ ← **Simplify.**

PRACTICE Write a rule for each function.

1.

x	y
–1	–7
0	0
1	7
2	14

2.

x	y
–9	–17
0	–8
9	1
18	10

3.

x	y
0	9
2	5
4	1
6	–3

4.

x	y
–6	7
–3	8
0	9
3	10

5.

x	y
4	0.5
5	1
6	1.5
7	2

6.

x	y
5	3
7	9
9	15
11	21

Name ____________________

Ratio and Proportion

REVIEW

An equation that represents equal ratios is called a proportion. A proportion is true if the unit rates for each ratio are equal.

Does the table represent a proportional relationship?

x	y	Unit Rate, $\frac{x}{y}$
3	4	$\frac{4}{3}$
6	8	$\frac{8}{6}$
9	12	$\frac{12}{9}$

Compare the unit rates. Write = or ≠ to complete each statement.

$\frac{4}{3}$ ☐ $\frac{8}{6}$

$\frac{8}{6}$ ☐ $\frac{12}{9}$

The unit rates ______ equivalent, so the table shows a proportional relationship.

Maria needs $3\frac{1}{3}$ cups of juice to make 4 quarts of fruit punch. How many cups of juice will she need to make 12 quarts of fruit punch?

$\frac{3\frac{1}{3}}{\square} = \frac{x}{\square}$ ← **Write a proportion.**

$\square \cdot \frac{3\frac{1}{3}}{4} = \frac{x}{12} \cdot \square$ ← **Solve for x.**

$x = \square$ ← **Simplify.**

Maria will need 10 cups of juice.

PRACTICE Find each unit rate and determine if the table represents a proportional relationship.

1.

x	y	Unit Rate, $\frac{x}{y}$
1	5	
3	6	
4	12	

2.

x	y	Unit Rate, $\frac{x}{y}$
1.5	3	
3.5	6	
10	20	

3. Jack records the cost of carpeting for different room areas. Is the relationship between the area of a room and the cost proportional? If so, find the cost of carpeting for a room that is 240 square feet.

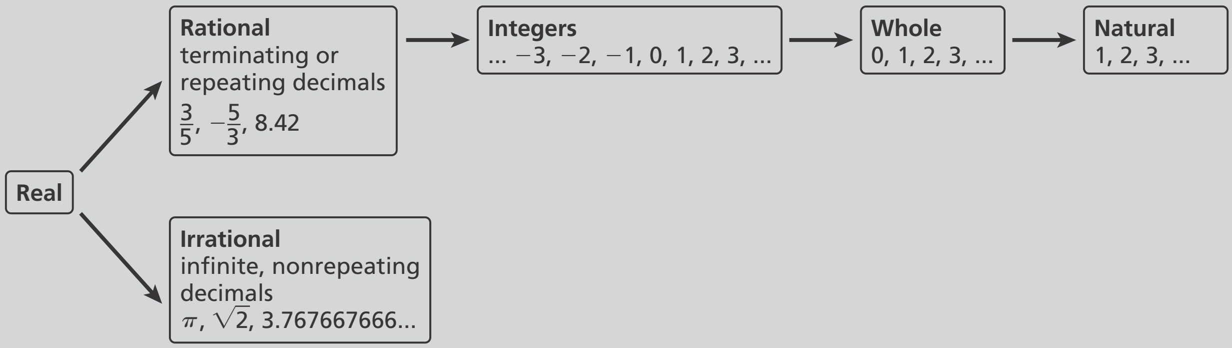
Area (ft)^2, x	Cost, y
100	\$175
320	\$560
460	\$805

4. Simone uses 2 cups of almonds for every 0.5 cups of raisins when she makes trail mix. How many cups of raisins should Simone use for 5 cups of almonds?

Exploring Real Numbers

REVIEW

Real numbers can be classified using the following system.



Given the numbers -4.4, $\frac{14}{5}$, 0, -9, $1\frac{1}{4}$, $-\pi$, and 32, identify which numbers belong to each set.

______________: 32 ← **numbers used to count**

Whole: ______________ ← **natural numbers and zero**

Integers: ______________ ← **whole numbers and their opposites**

______________: -9, -4.4, 0, $1\frac{1}{4}$, $\frac{14}{5}$, 32 ← **integers, and terminating and repeating decimals**

Irrational: ______________ ← **Infinite, nonrepeating decimals**

Real: -9, -4.4, $-\pi$, 0, $1\frac{1}{4}$, $\frac{14}{5}$, 32 ← **rational and irrational numbers**

PRACTICE Name the set(s) of numbers to which each number belongs.

1. $-\frac{5}{6}$

2. 35.99

3. 0

4. $4\frac{1}{8}$

5. $\sqrt{5}$

6. -80

7. $\frac{17}{5}$

8. $\frac{12}{3}$

9. $\sqrt{100}$

10. $-\sqrt{4}$

11. 3.2457946…

12. 3π

Give an example of each kind of number.

13. irrational number

14. whole number

15. negative integer

16. fractional rational number

17. rational decimal

18. natural number

Name ______________________ NS07

Product of Powers Property

REVIEW

- A *power* is an expression in the form a^n. The variable a represents the *base* and n is the *exponent*.
- **Product of Powers Property** To multiply powers with the same base, add the exponents: $a^m \cdot a^n = a^{m+n}$.

Simplify $4^6 \cdot 4^3$.

$4^6 \cdot 4^3$

$= 4^{6+\square}$ ← **Rewrite with one base and the exponents added.**

$= 4^9$ ← **Add the exponents.**

Simplify $x^3 \cdot x^{-5}$.

$x^3 \cdot x^{-5}$

$= x^{\square+(-5)}$ ← **Rewrite with one base and the exponents added.**

$= x^{-2}$ ← **Add the exponents.**

PRACTICE Complete each equation.

1. $8^2 \cdot 8^3 = 8^{\square}$

2. $2^{\square} \cdot 2^6 = 2^9$

3. $a^{12} \cdot a^{\square} = a^{15}$

4. $x^{\square} \cdot x^5 = x^6$

5. $b^{-4} \cdot b^3 = b^{\square}$

6. $6^4 \cdot 6^{\square} = 6^2$

7. $3^4 \cdot 3^8 = 3^{\square}$

8. $c^{\square} \cdot c^{-7} = c^{11}$

9. $10^{-6} \cdot 10^{-3} = 10^{\square}$

Simplify each expression.

10. $3x^2 \cdot 4x \cdot 2x^3$

11. $m^2 \cdot 3m^4 \cdot 6a \cdot a^{-3}$

12. $p^3q^{-1} \cdot p^2q^{-8}$

13. $5x^2 \cdot 3x \cdot 8x^4$

14. $x^2 \cdot y^5 \cdot 8x^5 \cdot y^{-2}$

15. $7y^2 \cdot 3x^2 \cdot 9$

16. $2y^2 \cdot 3y^2 \cdot 4y^5$

17. $x^4 \cdot x^{-5} \cdot x^4$

18. $x^{12} \cdot x^{-8} \cdot y^{-2} \cdot y^3$

19. $6a^2 \cdot b \cdot 2a^{-1}$

20. $r^6 \cdot s^{-3} \cdot r^{-2} \cdot s$

21. $3p^{-2} \cdot q^3 \cdot p^3 \cdot q^{-2}$

Name ______________________________ NS08

Power of a Power Property

REVIEW

- **Power of a Power Property** To raise a power to a power, multiply the exponents: $(a^m)^n = a^{m \cdot n}$.
- A variable or number can be rewritten as a power with an exponent of 1: $b = b^1$.
- Any power with an exponent of 0 is equal to 1.

Simplify $(4x^3)^2$.

$(4x^3)^2$

$= (4^1 \cdot x^3)^2$ ← **Rewrite each term as a power.**

$= 4^{1 \cdot 2} \cdot x^{3 \cdot \square}$ ← **Multiply to distribute the exponent 2.**

$= 4^2 \cdot x^{\square}$ ← **Multiply the exponents.**

$= 16x^6$ ← **Simplify.**

Simplify $3(x^4y^5)^0$.

$3(x^4y^5)^0$

$= 3(x^{4 \cdot 0} \cdot y^{5 \cdot \square})$ ← **Multiply to distribute the exponent 0.**

$= 3(x^0 \cdot y^{\square})$ ← **Multiply the exponents.**

$= 3(1 \cdot \square)$ ← **Simplify.**

$= 3$

PRACTICE Simplify each expression.

1. $(5^2)^4$ **2.** $(a^5)^4$ **3.** $(2^3)^2$ **4.** $(4x)^3$

5. $(7a^4)^2$ **6.** $(3g^2)^3$ **7.** $(g^2h^3)^5$ **8.** $(s^6)^2$

9. $(x^2y^4)^3$ **10.** $(3r^5)^0$ **11.** $(c^4)^7$ **12.** $(8ab^6)^3$

13. $(x^2y^3)^{-2}$ **14.** $(x^7)^2$ **15.** $(3x^2y)^2$ **16.** $(ab^{-3})^{-3}$

Name ______________________________ NS09

Quotient of Powers Property

REVIEW

- **Quotient of Powers Property** To divide powers with the same base, subtract the exponents: $\frac{a^m}{a^n} = a^{m-n}$.
- A power with a negative exponent is equivalent to its reciprocal with a positive exponent: $b^{-m} = \frac{1}{b^m}$.

Simplify $\frac{4^3}{4^5}$.

$\frac{4^3}{4^5} = 4^{3-\square}$ ← **Rewrite to subtract exponents.**

$= 4^{-2}$ ← **Subtract the exponents.**

$= \frac{1}{4^2}$ ← **Write with a positive exponent.**

$= \frac{1}{\square}$ ← **Simplify.**

Simplify $\left(\frac{x^3}{x^5}\right)^4$.

$\left(\frac{x^3}{x^5}\right)^4 = (x^{\square-5})^4$ ← **Rewrite expression in parentheses to subtract exponents.**

$= (x^{-2})^4$ ← **Subtract the exponents.**

$= x^{\square}$ ← **Apply the Power of a Power Property.**

$= \frac{1}{x^8}$ ← **Write with a positive exponent.**

PRACTICE Simplify each expression.

1. $\frac{z^6}{z^3}$ **2.** $\left(\frac{3^2}{4}\right)^3$ **3.** $\frac{m^{-3}}{m^{-4}}$ **4.** $\frac{5^3}{5^4}$

5. $\left(\frac{b^7}{b^5}\right)^3$ **6.** $\frac{5a^5}{15a^2}$ **7.** $\frac{2^2}{2^5}$ **8.** $\frac{d^8}{d^3}$

9. $\frac{x^3}{x^8}$ **10.** $\left(\frac{10^8}{10^2}\right)^3$ **11.** $\frac{14x^{11}}{7x^{10}}$ **12.** $\frac{8x^9}{12x^6}$

Name ____

Simplifying Radicals

REVIEW

- Simplify a square root that is not a perfect square by rewriting it as a product of perfect squares and other factors.

  $\sqrt{20} = \sqrt{4 \cdot 5} = \sqrt{4} \cdot \sqrt{5} = 2\sqrt{5}$

- Simplify a square root with variables by rewriting the expression to show the perfect square factors. Then remove them in the radicand.

  $\sqrt{45a^5} = \sqrt{9 \cdot 5 \cdot a^2 \cdot a^2 \cdot a}$ ← **Rewrite a^5 as $a^2 \cdot a^2 \cdot a$.**

  $= \sqrt{3 \cdot 3} \cdot \sqrt{5} \cdot \sqrt{a^2 \cdot a^2} \cdot \sqrt{a}$

  $= 3a^2\sqrt{5a}$

Simplify $\sqrt{2} \cdot \sqrt{12x^3}$.

STEP 1 **Rewrite the second radical to show the perfect square factors.**

$\sqrt{2} \cdot \sqrt{12x^3}$

$= \sqrt{2} \cdot \sqrt{4 \cdot \square \cdot x^2 \cdot \square}$

$= \sqrt{2} \cdot \sqrt{4} \cdot \sqrt{3} \cdot \square \cdot \square$

STEP 2 **Simplify the perfect squares.**

$\sqrt{2} \cdot \sqrt{4} \cdot \sqrt{3} \cdot \sqrt{x^2} \cdot \sqrt{x}$

$= \sqrt{2} \cdot \square \cdot \sqrt{3} \cdot \square \cdot \sqrt{x}$

STEP 3 **Multiply the radicals.**

$\sqrt{2} \cdot 2 \cdot \sqrt{3} \cdot x \cdot \sqrt{x}$

$= 2x \cdot \sqrt{\square \cdot \square \cdot \square}$

$= 2x \cdot \sqrt{\square}$

$\sqrt{2} \cdot \sqrt{12x^3} = 2x\sqrt{6x}$

PRACTICE Simplify each radical expression.

1. $3\sqrt{5} \cdot 2\sqrt{5}$

2. $4\sqrt{80}$

3. $\sqrt{3} \cdot \sqrt{36}$

4. $\sqrt{18}$

5. $\sqrt{63}$

6. $2\sqrt{28}$

7. $\sqrt{25y^8}$

8. $6\sqrt{48b^7}$

9. $\sqrt{8} \cdot \sqrt{32x^9}$

Name ______________________________

Solving Linear Equation Problems

REVIEW Paige has lunch with 3 friends. Two friends order the special for \$9 and the other 2 friends order flatbreads. Each friend orders a lemonade for \$1.50. They add a 20% tip to the bill and evenly split the total cost. Each friend pays \$14.40. How much does each flatbread cost?

STEP 1 Write an equation using words to represent the situation.

$$\frac{\text{Total cost with tip}}{\text{Number of friends}} = \text{How much each pays}$$

STEP 2 Translate the words into numbers and variables.

Total cost with tip = 1.2 · (Cost of food + Cost of drinks)

Cost of food = 2 · 9 + ☐ · *f* Cost of drinks = ☐ · 1.5

How much each pays = ☐ Number of friends = ☐

STEP 3 Write and solve the equation.

$$\frac{1.2 \cdot (2 \cdot 9 + 2f + 4 \cdot 1.5)}{4} = 14.4$$

$1.2(2 \cdot 9 + 2f + 4 \cdot 1.5) = 14.4 \cdot \square$ ← **Multiply each side by the denominator.**

$1.2(24 + 2f) = 57.6$ ← **Simplify inside the parentheses.**

$28.8 + 2.4f = 57.6$ ← **Apply the Distributive Property.**

$2.4f = 28.8$ ← **Subtract the constant from each side.**

$f = 12$ ← **Divide to isolate the variable.**

The flatbreads cost \$12 each.

PRACTICE Solve.

1. The Drama Club sells 76 adult tickets for \$8 each, plus 54 student tickets. If the club makes a total of \$770 in ticket sales, how much does each student ticket cost?

2. Lily is driving 360 miles. After 4 hours of driving, she is halfway to her destination. What speed does she need to average the rest of the way to make the total drive in 7 hours?

3. The sum of 3 consecutive integers is 96. What are the 3 integers?

Name ______________________________

Transforming Formulas

REVIEW Solve the surface area formula $s = 2\pi r^2 + 2\pi rh$ for h.

$s = 2\pi r^2 + 2\pi rh$	← **Circle all terms that include *h*, and put a rectangle around all terms that do not include *h*. Plan steps to collect all terms with *h* on one side and all terms without *h* on the other.**
$s - 2\pi r^2 = 2\pi r^2 + 2\pi rh - 2\pi r^2$	← **To get $2\pi rh$ alone, subtract $2\pi r^2$ from each side.**
$s - 2\pi r^2 =$ __________	← **Simplify.**
$\frac{s - 2\pi r^2}{2\pi r} = \frac{2\pi rh}{2\pi r}$	← **Divide each side by __________ to isolate *h*.**
$\frac{s - 2\pi r^2}{2\pi r} = h$	← **Simplify.**

PRACTICE Solve for the indicated variable.

1. $y = mx + b$, for x
2. $y = mx + b$, for m
3. $p = 6s$, for s
4. $A = \frac{1}{2}h(B + b)$, for h
5. $I = Prt$, for P
6. $y = \frac{2}{3}x - 5$, for x
7. $t = 0.05p$, for p
8. $V = \ell wh$, for w
9. $k = \frac{1}{2}mv^2$, for m
10. $W = p(V - L)$, for V
11. $F = \frac{gm_1m_2}{r^2}$, for G
12. $W = p(V - L)$, for L
13. $V = \frac{h}{e}v - \frac{E}{e}$, for e
14. $mv = (m + M)u$, for m

Solving Multi-Step Inequalities

REVIEW Solve $3x + 2 < 5 + 2x$. Graph and check the solution.

- If you multiply or divide both sides of an inequality by a negative number, reverse the direction of the inequality symbol.
- Use an open circle for < or >, and a closed circle for ≤ or ≥.
- Check three values on your graph: the number where the arrow starts, a number to the right of the starting value, and another to the left.

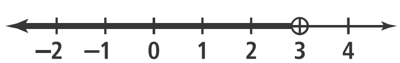
$3x + 2 < 5 + 2x$ ← **Circle all of the terms with variables and box all of the constants. Plan to collect the variable terms on one side and the constants on the other.**

$3x + 2 - 2x < 5 + 2x - 2x$ ← **To get all variables on the left side, subtract ☐ from each side.**

$x + 2 < 5$ ← **Simplify.**

$x + 2 - 2 < 5 - 2$ ← **To get constants on the right side, subtract ☐ from each side.**

$x < 3$ ← **Simplify.**



← **Graph your solution on a number line. Since 3 is not a solution, use an open circle. If 3 were a solution, you would use a closed circle.**

Check three values for the variable: 0, 3 (where the arrow starts), and 4.

$3(0) + 2 \overset{?}{<} 5 + 2(0)$	$3(3) + 2 \overset{?}{<} 5 + 2(3)$	$3(4) + 2 \overset{?}{<} 5 + 2(4)$
$2 < 5$	$11 \nless 11$	$14 \nless 13$

PRACTICE Use circles and boxes to identify the variable terms and constants. Then solve, graph, and check your solution for each inequality.

1. $4x + 3 < 11$

2. $3x + 2 < 2x + 5$

3. $5x + 4 > 14$

4. $4x - 3 < 3x - 1$

5. $2(x + 3) > x + 5$

6. $-3(x + 1) < 6$

7. $9 - x < 6 + 2x$

8. $\frac{2}{3}x + 2 \geq 2x + 6$

9. $-6x - 4 \leq -16$

10. $\frac{1}{2}x - 3 \leq x - 1$

11. $3.5x + 4 \geq 2x + 1$

12. $-0.2x + 0.6 > -1$

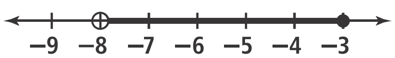
Name ______________________________

Compound Inequalities

REVIEW Solve and graph each compound inequality.

$-3 < x + 5 \le 2$

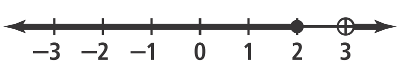
$-3 < x + 5 \le 2$	← **Rewrite the compound inequality with space in the middle for future operations.**
$-3 - \square < x + 5 - 5 \le 2 - \square$	← **Any operation you do to one part, you need to do to all three parts.**
$\square < x \le -3$	← **Simplify.**



← **Graph the inequality. The solution set contains all numbers that are solutions of both parts of the compound inequality.**

$-2x + 1 < -5$ or $-x + 4 \ge 2$

$-2x + 1 < -5$	or	$-x + 4 \ge 2$	← **Rewrite the compound inequality with space for future operations.**
$-2x + 1 - 1 < -5 - 1$	or	$-x + 4 - 4 \ge 2 - 4$	← **Solve each part of the *or* inequality.**
$-2x < \square$	or	$-x \ge -2$	← **Simplify.**
$\frac{-2x}{-2} > \frac{-6}{-2}$	or	$\frac{-x}{-1} \le \frac{-2}{-1}$	← **Reverse the inequality signs when multiplying or dividing by negative numbers.**
$x > 3$	or	$x \le 2$	← **Simplify.**



← **Graph the inequality. The solution set of an *or* inequality contains all numbers that are solutions of at least one of the parts.**

PRACTICE Solve each inequality and graph the solution.

1. $-3 \le x - 5$ or $x + 5 \le 2$

2. $x + 5 \le 4$ or $-2x < -6$

3. $x - 2 \ge -6$ and $5 + x < 7$

4. $x - 2 \le -6$ or $5 + x > 7$

5. $-2 \le x + 1 < 4$

6. $3 \ge \frac{1}{2}x > -2$

7. $-5 \le 2x - 1 < 7$

8. $3x < -6$ or $4x - 3 \ge 9$

9. $-5x < 15$ or $x \le -5$

10. $-1 \le \frac{1}{2}x + 1 < 0$

11. $1 - 2x \le -5$ or $2x < -10$

12. $-0.5 < 0.25x \le 2$

Name ______________________________

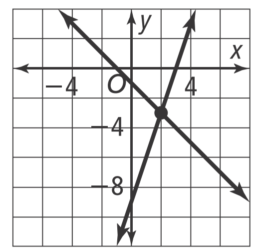
Solving Linear Systems by Graphing

REVIEW Solve the system by graphing.

$y = 3x - 9$
$y = -x - 1$

- Lines that have the same slope but different *y*-intercepts are parallel and will never intersect. These systems have *no solution*.
- Lines that have both the same slope and the same *y*-intercept are the same line and intersect at every point. These systems have *infinitely many solutions*.
- Lines that have different slopes will intersect, and the system will have *one solution* at the intersection point.

STEP 1 **Graph each equation on the same coordinate plane.**



You can use what you know about slope-intercept form.

$y = 3x - 9$: $m = 3$ and $b = -9$

$y = -x - 1$: $m =$ ☐ and $b =$ ☐

STEP 2 **Estimate the coordinates of the intersection point.**

The intersection point of these lines appears to be (2, –3).

STEP 3 **Check your solution.**

Substitute the *x*-coordinate of the intersection point for *x* and the *y*-coordinate for *y* in both equations in the system.

$y = 3x - 9$	$y = -x - 1$
$-3 \stackrel{?}{=} 3(2) - 9$	☐ $\stackrel{?}{=} -(2) - 1$
$-3 = -3$ ✓	$-3 = -3$ ✓

PRACTICE Solve each system of equations by graphing.

1. $y = 5x - 2$
$y = x + 6$

2. $y = 2x - 4$
$y = x + 2$

3. $y = x + 2$
$y = -x + 2$

4. $y - 3x = 2$
$y = 3x - 4$

5. $y = 2x + 1$
$2y = 4x + 2$

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

7. $y = \frac{3}{2}x + \frac{7}{2}$
$y = -\frac{1}{2}x - \frac{1}{2}$

8. $2x + 3y = 2$
$4x + y = -1$

9. $y - 0.5x = 2.5$
$x - 2y = 5$

Name ______________________________

Solving Systems Using Substitution

REVIEW Solve the system using substitution.

$$-4x + y = -13$$
$$x - y = 1$$

STEP 1 Solve one of the equations for either *x* or *y*.

$$x - y = 1$$
$$x = 1 + \square$$

STEP 2 Substitute for *x* in the other equation and solve for *y*.

$$-4x + y = -13$$
$$-4(1 + y) + y = -13$$
$$\square + (-4y + y) = -13$$
$$-3y = \square$$
$$y = \square$$

STEP 3 Substitute the value of *y* into one of the equations and solve for *x*.

$$x - y = 1$$
$$x - \square = 1$$
$$x = \square$$

The solution of the system of equations is ($\square$, $\square$).

STEP 4 Check to see whether (4, 3) makes both equations true.

$$-4(4) + 3 \stackrel{?}{=} -13 \qquad 4 - 3 \stackrel{?}{=} 1$$
$$-16 + 3 \stackrel{?}{=} -13 \qquad 1 = 1 ✓$$
$$-13 = -13 ✓$$

PRACTICE Solve each system using substitution.

1. $-3x + y = -2$
$y = x + 6$

2. $y + 4 = x$
$-2x + y = 8$

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

4. $6y + 4x = 12$
$-6x + y = -8$

5. $3x + y = 5$
$2x - 5y = 9$

6. $x + 4y = 5$
$4x - 2y = 11$

7. $2y - 3x = 4$
$x = -2$

8. $3y + x = -1$
$x = -3$

Solving Systems Using Elimination

REVIEW Solve the system of linear equations by elimination.

$$4x - 3y = -7$$
$$2x + y = -1$$

- When both equations are in the form $Ax + By = C$, you can solve a linear system by elimination.
- If all variables are eliminated and the equation is true, such as $0 = 0$, then the system has infinitely many solutions.
- If all variables are eliminated and the equation is false, such as $0 = 2$, then the system has no solution.

STEP 1 Multiply or divide one equation by a number so that coefficients for one variable match.

Multiply the second equation by 2 to get $4x$ in both equations.

$2(2x + y = -1)$ simplifies to $4x + \square y = -2$.

STEP 2 Subtract the second equation to eliminate the matched variable.

$$\begin{array}{r} 4x \quad - 3y = \quad -7 \\ (-)4x\ (-)+2y = (-)-2 \\ \hline -5y = \square \\ y = 1 \end{array}$$

← **Solve the resulting equation.**

STEP 3 Solve for the value of the eliminated variable in either equation.

$4x - 3(1) = -7$ ← **Substitute 1 for *y*.**

$4x = \square$ ← **Solve for *x*.**

$x = -1$

The solution is $(-1, 1)$.

STEP 4 Check. See whether $(-1, 1)$ makes the other equation true.

$$2x + y = -1$$
$$2(-1) + 1 \stackrel{?}{=} -1$$
$$-1 = -1 \checkmark$$

PRACTICE Solve each system by elimination.

1. $3x + 5y = 6$; $-3x + y = 6$
2. $2x + 4y = -4$; $2x + y = 8$
3. $y = x + 2$; $y = -x$
4. $\frac{1}{2}x - y = \frac{3}{2}$; $-x + 2y = 1$
5. $2x + 4y = 8$; $x + 2y = 4$
6. $y = 0.5x + 2.5$; $y = -1.5x + 0.5$

Applications of Linear Systems

REVIEW Last year, Zach received \$469.75 in interest from two investments. The interest rates were 7.5% on one account and 8% on the other. If the total amount invested was \$6000, how much was invested at each rate?

STEP 1 Define variables and write a system to relate them.

x = investment in first account; y = investment in second account

$$x + y = \square$$

$$0.075x + 0.08y = \square$$

STEP 2 Choose a solution method and use it to solve the system.

The first equation is almost in $y = mx + b$ form, which makes substitution a good choice.

$y = -x + 6000$ ← **Solve $x + y = 6000$ for y.**

$0.075x + 0.08(-x + 6000) = 469.75$ ← **Substitute $-x + 6000$ for y in the second equation.**

$-0.005x = -10.25$ ← **Simplify.**

$x = 2050$

$2050 + y = 6000$ ← **Substitute 2050 for x in the first equation.**

$y = 3950$ ← **Solve for y.**

The amount invested in the first account was \$2050.
The amount invested in the second account was \$3950.

PRACTICE Solve using elimination, substitution, or graphing.

1. A company provided lunch for several employees on Monday and Tuesday. On Monday, the company paid \$70 for five sandwiches and four salads. On Tuesday, they paid \$60 for four of each. Find the price of a sandwich and the price of a salad.

2. A landscape company had a one-week sale. On Monday, Brianna bought five plants and one cactus for \$82. On Friday, she bought two plants and one cactus for \$37. Find the price of a plant and the price of a cactus.

Name ____

Linear Inequalities

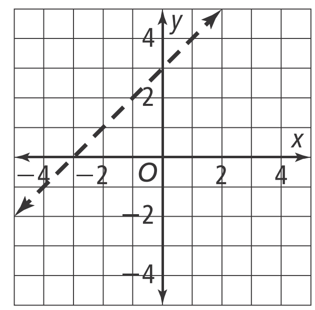
REVIEW Graph the inequality $y - 3 < x$.

STEP 1 Solve the inquality for *y*.

Solve $y - 3 < x$ for y.

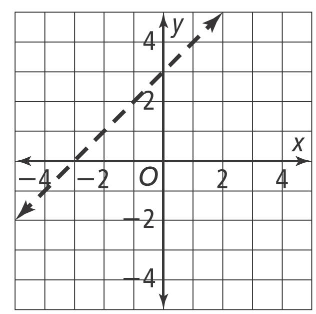
____

STEP 2 Graph the boundary line. Use a dashed line if the inequality symbol is $<$ or $>$ to show that points ON the line do not make the inequality true. Otherwise, use a solid line.



The boundary line is $y = x + 3$.
The inequality symbol is $<$, so use a dashed line.

STEP 3 Shade the solution of the inequality.



If the inequality sign is $<$, shade the lower region.
If the line is vertical, shade the left region.

If the inequality sign is $>$, shade the upper region.
If the line is vertical, shade the right region.

Shade the graph at the right to show the solution of the inequality.

STEP 4 Test a point for the shaded region.

The point (0, 0) is included in the shaded region.
See whether (0, 0) satisfies the original inequality.

$y - 3 < x$

$0 - 3 < 0$

$\square < \square$

The inequality is true for (0, 0) so the shaded region is correct.

PRACTICE Graph each linear inequality on a coordinate plane.

1. $y < x + 2$ **2.** $y \leq 2x + 1$ **3.** $y + 5 > x$ **4.** $y \geq \frac{1}{2}x + 6$

5. $y - 6 < -4.5$ **6.** $-3y \geq 9$ **7.** $y > 3x - 5$ **8.** $x + 7 < y$

9. $y - \frac{1}{4}x \geq 5$ **10.** $0.6y - 1.8x \leq 3$ **11.** $-4y + 12 < 2x$ **12.** $\frac{1}{3}y + 1 > 2$

Systems of Linear Inequalities

REVIEW Solve this system of inequalities by graphing.

$y - x < 5$
$y + 6 \geq 2x$

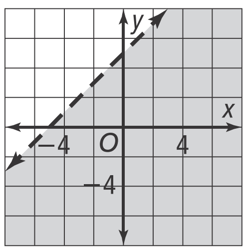
STEP 1 Rewrite the inequalities in slope-intercept form.

$y - x < 5 \rightarrow y < x + 5$
$y + 6 \geq 2x \rightarrow y \geq 2x - 6$

STEP 2 Graph the solutions to the first inequality ($y < x + 5$).

The boundary line is solid if the points on the line are included as solutions, or dashed if the points on the line are not included as solutions. The inequality uses the $<$ symbol, so the boundary line should be dashed.

Test the inequality $y < x + 5$ using the point (0, 0).



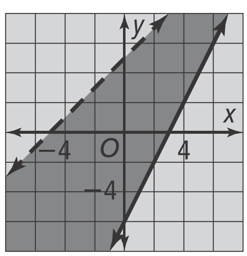
$0 < 0 + 5 \rightarrow$ ☐ $<$ ☐

The inequality is true, so shade the region ____________________ the dashed line.

STEP 3 Graph the solutions to the second inequality ($y \geq 2x - 6$).

The inequality uses the $\geq$ symbol, so the boundary line should be solid.

Test the inequality $y \geq 2x - 6$ using the point (0, 0).



☐ $\geq 2 \cdot$ ☐ $- 6 \rightarrow$ ☐ $\geq$ ☐

The inequality is true, so shade the region ____________________ the solid line.

The region where the shading overlaps contains all the points that represent solutions to the system of inequalities.

PRACTICE Solve each system of inequalities by graphing.

1. $y < 4x - 7$
   $y > \frac{1}{2}x + 4$
2. $y - 4 < x$
   $3y < x + 6$
3. $2x + 3y > 6$
   $x - y \geq 0$
4. $x + 2y < 6$
   $y \geq 0$
5. $y > 2x$
   $y \geq x + 1$
6. $y < 2x + 3$
   $y \geq -x + 4$
7. $\frac{1}{2}y > 2$
   $3x + y < 0$
8. $y > -4$
   $x + 2y \leq 8$

Multiplying Binomials

REVIEW Find the product of $(x + 7)(x + 2)$.

STEP 1 Multiply each term of one binomial by each term of the other binomial. You can draw arrows as a visual reminder of what to do.

$(x + 7)(x + 2)$ ← **Draw arrows from the first term in the first binomial to both terms in the second binomial.**

$x^2 + 2x$ ← **Multiply each term of the second binomial by *x*.**

$(x + 7)(x + 2)$ ← **Draw arrows from the second term in the first binomial to both terms in the second binomial.**

$7x + 14$ ← **Multiply each term of the second binomial by ☐.**

$x^2 + 2x + 7x +$ ☐ ← **Add the two expressions.**

STEP 2 Combine like terms.

$x^2 + (2x) + (7x) + 14$ ← **Circle like terms and combine.**

$x^2 +$ ☐ $x + 14$ ← **Solution**

PRACTICE Use arrows as shown above to simplify each product.

1. $(x + 6)(x - 2)$ **2.** $(x - 8)(x - 4)$ **3.** $(x - 3)(x + 9)$

4. $(x + 2)(x - 7)$ **5.** $(2x + 3)(x + 4)$ **6.** $(x + 4)(2x + 5)$

Simplify each product.

7. $(7x + 4)(2x - 4)$ **8.** $(3x + 2)(3x + 2)$ **9.** $(5x + 1)(x + 1)$

10. $(2x + 1)(x + 1)$ **11.** $(4x + 1)(2x - 1)$ **12.** $(3x - 1)(x + 2)$

Factoring Trinomials of the Type $x^2 + bx + c$

REVIEW Factor $x^2 + 6x + 8$.

STEP 1 Write the factors of the first term at the beginning of each set of parentheses.

$x^2 + 6x + 8$ ← $x^2 = x \cdot x$

$(x \quad)(x \quad)$

STEP 2 List factor pairs of the constant term and their sums until you find a sum equal to the coefficient of the middle term of the trinomial.

Factors of 8	Sum of Factors
1 and 8	☐
–1 and –8	☐
2 and 4	☐

STEP 3 Use those factors to complete the binomial factors.

$x^2 + 6x + 8 = (x + \square)(x + \square)$

Factor $x^2 + 4x - 21$.

$(x \quad)(x \quad)$

$1 + -21 = -20$ $\quad -1 + 21 = 20$

$3 + -7 = -4$ $\quad -3 + 7 = 4$

← **List the factor pairs of –21 and their sums until you find a pair whose sum is 4.**

$x^2 + 4x - 21 = \square$ ← **Complete the binomial factors.**

PRACTICE Factor each expression.

1. $y^2 + 11y + 18$

2. $x^2 - 8x + 15$

3. $x^2 - 11x + 18$

4. $y^2 - 5y + 4$

5. $x^2 + 6x + 8$

6. $y^2 - 8y + 12$

7. $r^2 + 13r + 12$

8. $x^2 - 16x + 39$

9. $x^2 - 10x + 16$

10. $x^2 - x - 2$

11. $x^2 - 4x - 32$

12. $x^2 - 7x - 18$

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

14. $x^2 - 11x + 24$

15. $x^2 + 16x + 63$

Factoring Trinomials of the Type $ax^2 + bx + c$

REVIEW

Factor $2x^2 + 13x + 20$.

STEP 1 **Multiply the first coefficient by the constant.**

$2 \cdot 20 = 40$

STEP 2 **Find a factor pair of the product from Step 1 whose sum is equal to the middle coefficient.**

$10 \cdot 4 = 40$ $\quad \square + \square = \square$ ← **close, but too high**

$8 \cdot 5 = 40$ $\quad 8 + 5 = 13$

STEP 3 **Use the two factors to rewrite the middle term in the trinomial.**

$2x^2 + 13x + 20 = 2x^2 + 8x + 5x + 20$

STEP 4 **Group the first two terms and the last two terms. Factor out the GCF of each binomial.**

$2x^2 + 8x + 5x + 20 = (2x^2 + 8x) + (5x + 20)$

$= \square(x + 4) + 5(x + 4)$ ← **The GCF of $2x^2$ and $8x$ is $2x$; the GCF of $5x$ and 20 is 5.**

$= (x + 4)(2x + 5)$ ← **Use the Distributive Property.**

Factor $3x^2 - 2x - 8$.

$3(-8) = \square$

$-6 \cdot \square = -24$ and $-6 + \square = -2$

$3x^2 - 2x - 8 = 3x^2 - 6x + 4x - 8$

$= (3x^2 - 6x) + \square$

$= 3x(x - 2) + 4(x - \square)$

$= (x - 2)(3x + 4)$

PRACTICE Factor each expression.

1. $2x^2 + 11x + 14$

2. $4x^2 - 12x + 5$

3. $6x^2 - 13x + 2$

4. $6x^2 + 7x - 20$

5. $3x^2 + 4x - 4$

6. $8x^2 - 26x - 24$

7. $2x^2 - 5x + 3$

8. $5x^2 - 13x - 6$

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

Factoring Special Cases

REVIEW

- Difference of two squares: $a^2 - b^2 = (a - b)(a + b)$
- Perfect-square trinomials: $a^2 - 2ab + b^2 = (a - b)^2$
  $a^2 + 2ab + b^2 = (a + b)^2$

Factor $4x^2 - 25$.

$(2x)^2 - (5)^2$ ← **Recognize the difference of two squares.**

$(2x - 5)(2x + \square)$ ← **Factor according to the difference of squares pattern.**

Factor $4x^2 - 12x + 9$.

$(2x)^2 = 4x^2$ and $3^2 = \square$ ← **Recognize the first and last terms as perfect squares.**

$(2x)^2 - 2(2x)(3) + (3)^2$ ← **Recognize a perfect-square trinomial.**

$(2x - 3)^2$ ← **Factor according to the perfect-square trinomial pattern.**

Factor $18x^2 - 98$.

$2(9x^2 - 49)$ ← **Factor out the GCF.**

$2[(3x)^2 - (\square)^2]$ ← **Recognize the difference of two squares.**

$2(3x - 7)(3x + 7)$ ← **Factor according to the difference of squares pattern.**

PRACTICE Factor each expression.

1. $a^2 - 36$

2. $y^2 - 49$

3. $9y^2 - 16$

4. $x^2 + 10x + 25$

5. $b^2 - 12b + 36$

6. $4x^2 + 28x + 49$

7. $4a^2 - 1$

8. $x^2 + 22x + 121$

9. $9n^2 - 12n + 4$

10. $27a^2 - 75$

11. $7x^2 - 112$

12. $x^2 + 24x + 144$

13. $16h^2 - 49$

14. $16n^2 - 8n + 1$

15. $3x^2 - 300$

Mixture Problems

REVIEW A scientist needs 30 liters of a solution that is 12% acid, but she only has a solution that is 8% acid and a solution that is 24% acid. How many liters of each should she mix to get the solution she needs?

Solution	Amount, liters
8%	x
24%	$30 - x$
12%	☐

← **Identify the amount of each solution.**

$0.08x + 0.24(30 - x) = 0.12(\square)$ ← **Create an equation relating the parts of the total solution.**

$0.08x + \square - 0.24x = \square$ ← **Multiply, using the Distributive Property when needed.**

$\square x + 7.2 = 3.6$ ← **Combine like terms.**

$-0.16x + 7.2 - 7.2 = 3.6 - 7.2$ ← **Subtract 7.2 from both sides.**

$-0.16x = -3.6$

$\frac{-0.16x}{-0.16} = \frac{-3.6}{-0.16}$ ← **Divide both sides by −0.16.**

$x = 22.5$

The scientist will need ☐ liters of the 8% solution and 7.5 liters of the 24% solution.

PRACTICE Find the requested amounts.

1. A lab technician needs 50 liters of a solution that is 20% acid. He only has a solution that is 15% acid and a solution that is 35% acid. How many liters of each solution should he mix to get the solution he needs?

2. For an experiment, a chemistry teacher needs 12 liters of 40% base solution, but she has only 10% solution and 60% solution. How many liters of each solution should she mix to get the solution she needs?

3. A chemist needs 100 liters of a solution that is 75% acid, but she has only 40% solution and 90% solution. How many liters of each solution should she mix to get the solution she needs?

4. A scientist needs 72 liters of 50% base solution, but he has only 24% solution and 72% solution. How many liters of each solution should he mix to get the solution he needs?

Name ______________________________________ F01

Evaluating Functions in Function Notation

REVIEW Evaluate $f(x) = 4x - 2$ for $x = 0$, 1, and 2. Then state the domain and range of the function.

STEP 1 Substitute each value for *x*.

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

$f(0) = 4(0) - 2$ $f(1) =$ ☐ $f(2) =$ ☐

STEP 2 Simplify.

$f(0) = 0 - 2$ $f(1) = 4 - 2$ $f(2) = 8 - 2$

$f(0) =$ ☐ $f(1) =$ ☐ $f(2) =$ ☐

STEP 3 Find the domain and range of the function.

The x values are part of the domain of the function.
The $f(x)$ values are part of the range of the function.

domain = ☐

range = ☐

PRACTICE Find the domain and range of each relation.

1. {(–4, 3), (–2, –1), (0, 0), (1, 4), (2, 6)}

2. {(–6, –4), (–3, –1), (1, 2), (2, 4), (3, 7)}

Evaluate each function rule for $x = -2$.

3. $f(x) = 4x$ **4.** $f(x) = 3x$ **5.** $f(x) = x - 2$

6. $f(x) = -2x + 1$ **7.** $f(x) = \frac{1}{2}x + 2$ **8.** $f(x) = -\frac{3}{2}x + 2$

Find the range of each function, given the domain.

9. $g(m) = m^2$; {–2, 0, 2} **10.** $h(x) = -\frac{1}{3}x - 1$; {–3, 0, 6}

11. $h(n) = 3n^2 - 2n + 2$; {–1, 0, 1} **12.** $g(n) = n^2 + n - 2$; {–2, 0, 2}

13. $g(x) = |x| + 2$; {–4, –2, 4} **14.** $f(x) = -2|x| - 1$; {–3, –2, 3}

Name ______________________________

Writing a Function Rule

REVIEW Write a rule for a function given a table or a real-world situation.

STEP 1 **For each row, ask yourself, "What can I do to *x* to get *f*(*x*)?**

x	$f(x)$	
1	3	← I can add 2 or multiply by 3.
2	4	← I can add 2 or multiply by 2.
3	5	← I can add 2 or multiply by $\frac{5}{3}$.

STEP 2 **Find the pattern that works for every row of the table.**

For every row, you can ________ to x to get $f(x)$.

STEP 3 **Write the function rule.**

The function rule is $f(x) = x +$ ☐.

A gym membership costs $10 to start, then $15 per month. Write a function rule for the total cost $c(m)$ that a gym member has paid for m months.

fixed cost = ☐

cost for m months = ☐

total cost = sum of the fixed cost and the monthly fee $c(m) =$ ☐

PRACTICE Write a function rule for each table or situation.

1.

x	$f(x)$
0	0
1	3
2	6
3	9

2.

x	$f(x)$
0	–1
1	0
2	1
3	2

3.

x	$f(x)$
0	0
–1	1
3	9
5	25

4. the length $l(w)$ of a box that is two more than four times the width w

5. the value $v(q)$ of a pile of q quarters

6. the cost $c(a)$ of a pounds of apples at $0.99 per pound

7. the distance $d(t)$ traveled at 65 miles per hour in t hours

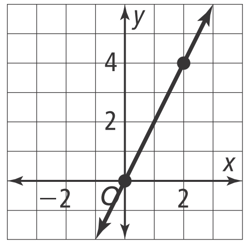
8. a worker's earnings $e(n)$ for n hours when the worker's hourly wage is $8.25

9. the distance $f(d)$ traveled in feet when you know the distance d in yards

Name ______________________________ **F05**

Slope

REVIEW Calculate the slope of the line shown in the graph.



STEP 1 Pick any two points on the line and write their coordinates.

Underline the *x*-coordinates and circle the *y*-coordinates.

(0 , 0) and (2 , 4)

STEP 2 Find the vertical change or *rise* of the line by subtracting the *y*-coordinates.

rise: $4 - 0 = 4$

STEP 3 Find the horizontal change or *run* of the line by subtracting the *x*-coordinates.

Be sure to subtract the *x*-coordinates in the same order as the *y*-coordinates.

run: ☐ – ☐ = ☐

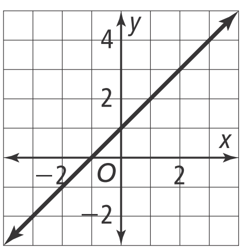
STEP 4 Find the slope of the line through the two points.

Find the slope by forming the ratio of rise to run.

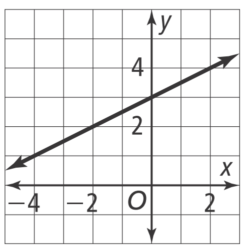
$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{\square}{\square} = \square$

PRACTICE Find the slope of each line.

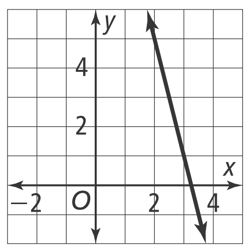
1.



2.

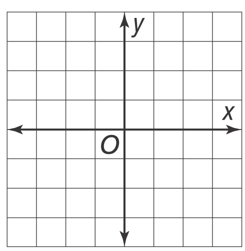


3.



4. Draw a horizontal line on the coordinate grid at the right. Find the slope of the line.

5. Draw a vertical line on the same grid. Find the slope of the line.



Name ______________________________

Slope-Intercept Form

REVIEW Graph $y = 2x - 4$.

- The slope-intercept form of a linear equation is $y = mx + b$, where m is the slope of the line and b is the y-coordinate of the y-intercept of the line.

slope	**y-intercept**
$m = \dfrac{\text{vertical change}}{\text{horizontal change}}$	$(0, b)$

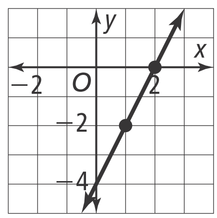
STEP 1 **Identify the slope and y-intercept.**

$y = 2x - 4$

$m =$ ☐ $b =$ ☐

STEP 2 **Plot a point at the y-intercept.**

Plot a point at the y-intercept (☐, ☐).



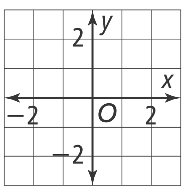
STEP 3 **Plot at least one other point using the y-intercept and the slope.**

Plot points so that the y-value increases by ☐ each time the x-value increases by 1.

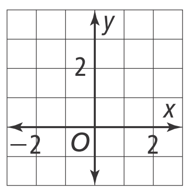
STEP 3 **Draw a line through the points.**

PRACTICE Graph each line.

1. $y = 3x + 1$

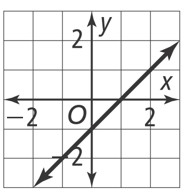


2. $y = -2x + 3$

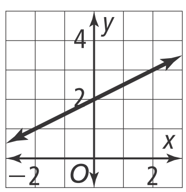


Write an equation for each line using the slope and y-intercept.

3.



4.



Name ______________________________ F09

Parallel and Perpendicular Lines

REVIEW

- Two lines are parallel if their slopes are the same.
- Two lines are perpendicular if their slopes are opposite reciprocals.

Write an equation of the line passing through (1, –2) that is parallel to $y = 3x$.

STEP 1 Identify the slope of the line.

The slope of the given line is ☐, so the slope of the parallel line passing through the given point is ☐.

STEP 2 Use point-slope form. Then simplify.

Substitute the point (1, –2) for (x_1, y_1) and ☐ for the slope, m.

$$y - y_1 = m(x - x_1)$$

$$y - (\square) = \square(x - \square)$$

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

$$y = 3x - \square$$

Write an equation of the line passing through (–4, 3) that is perpendicular to $y = 4x + 6$.

The slope of the given line is ☐, so the slope of the perpendicular line passing through the given point is ☐.

$y - y_1 = m(x - x_1)$ ← **Point–slope form**

$y - (\square) = -\frac{1}{4}(x - (\square))$ ← **Substitute the point and slope. Then simplify.**

$y = \square x + \square$

PRACTICE

Write an equation of the line parallel to the given line passing through the given point.

1. $y = 5x$; (2, –1)

2. $y = -\frac{1}{4}x - 2$; (8, 0)

Write an equation of the line perpendicular to the given line passing through the given point.

3. $y = 5x$; (10, –5)

4. $y = -\frac{1}{4}x - 2$; (8, 0)

5. $y = \frac{1}{2}x + 6$; (–4, –2)

6. $y = -\frac{2}{3}x + 1$; (6, –6)

Graphing a Quadratic Function in Standard Form

REVIEW Find the axis of symmetry and vertex, then graph $f(x) = -3 - 2x + x^2$.

STEP 1 Write the quadratic function in standard form.

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

STEP 2 Find the axis of symmetry, the *x*-coordinate of the vertex.

$x = -\frac{b}{2a}$

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

$x = \square$

STEP 3 Find the *y*-coordinate of the vertex.

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

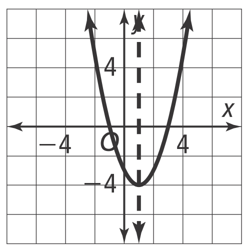
$y = \square$

vertex: __________

STEP 4 Make a table of values.

Table of Values		
x	$x^2 - 2x - 3$	y
−2	4 + 4 − 3	
0		
2		

STEP 5 Graph.



PRACTICE

Find each of the following related to $y + x^2 = 16 + 4x$.

1. Standard form
2. Axis of symmetry
3. Vertex
4. Table of values
5. Graph

Find the axis of symmetry and vertex, then graph each function.

6. $y + x^2 = -1 + 2x$
7. $f(x) = -4x + 3 + x^2$

Name ______________________

Graphing a Quadratic Function in Vertex Form

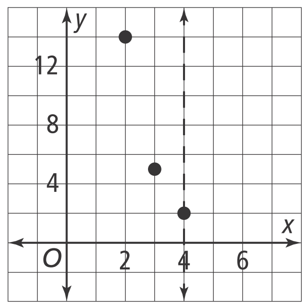
REVIEW Find the vertex and axis of symmetry, then graph $f(x) = 3(x - 4)^2 + 2$.

- Vertex form of a quadratic function is $f(x) = a(x - h)^2 + k$.
- The graph of $f(x) = a(x - h)^2 + k$ is a translation of the function $f(x) = ax^2$ that is translated h units horizontally and k units vertically.

STEP 1 **Identify *h* and *k*, the vertex, and the axis of symmetry.**

$h =$ ☐ and $k = 2$, so the vertex is (4, 2), and the axis of symmetry is $x =$ ☐.

STEP 2 **Evaluate the function at two *x* values that lie on one side of the axis of symmetry to find the corresponding *y* values. Then plot the vertex and axis of symmetry from STEP 1 and the two points.**

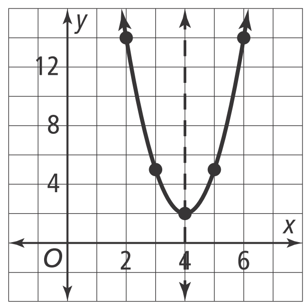


Evaluate the function at $x = 2$ and $x = 3$.

$f(x) = 3(2 - 4)^2 + 2 = 14$ $f(x) = 3(3 - 4)^2 + 2 = 5$

The ordered pairs for the two points are (2, 14) and (3, 5). Plot these along with the vertex and axis of symmetry from STEP 1.

STEP 3 **Reflect the two points across the axis of symmetry to find two more points and draw the parabola.**



The reflection of (2, 14) Is (6, 14).

The reflection of (3, 5) Is (5, 5).

PRACTICE Find the vertex and axis of symmetry, then graph each function.

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

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

3. $f(x) = 0.5(x - 1)^2 - 3$

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

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

6. $f(x) = -3(x - 1)^2 + 4$

Graphing Square Root Functions

REVIEW Graph the function $f(x) = \sqrt{6 + x}$.

STEP 1 Select a domain that makes the radical expression positive so that function values are real numbers.

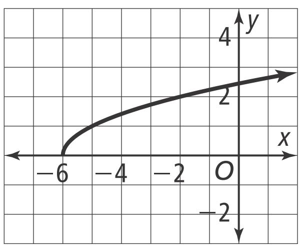
$6 + x \geq 0$

$x \geq \square$

STEP 2 Make a table with input and output values for the function.

x	*f(x)*
−6	$\sqrt{6 + (-6)} = \sqrt{\square} = \square$
−5	$\sqrt{6 + (-5)} = \sqrt{\square} = \square$
−2	$\sqrt{6 + (-2)} = \sqrt{\square} = \square$
3	$\sqrt{6 + 3} = \sqrt{\square} = \square$

STEP 3 Use the values for *x* and *f*(*x*) to graph the function.



PRACTICE Graph each function.

1. $f(x) = \sqrt{4 + x}$

2. $f(x) = \sqrt{x - 2}$

3. $f(x) = \sqrt{x - 3}$

4. $f(x) = \sqrt{x - 1} + 2$

5. $f(x) = \sqrt{2x} - 4$

6. $f(x) = \sqrt{5 - x} + 1$

7. $f(x) = \sqrt{4x - 1} - 2$

8. $f(x) = \sqrt{x} + 3$

9. $f(x) = \sqrt{1 - x} + 3$

10. $f(x) = \sqrt{x + 5} - 1$

11. $f(x) = \sqrt{3x + 1} + 2$

12. $f(x) = \sqrt{3 - 2x} + 2$

Name ______________________________

Graphing Absolute Value Functions

REVIEW Graph $f(x) = |2x + 3|$.

- A function of the form $f(x) = |mx + b|$ is an absolute value function.
- The vertex of the function can be found by solving $mx + b = 0$ for x.

STEP 1 Find the vertex.

$$2x + 3 = 0$$
$$2x = -3$$
$$x = -\frac{3}{2}$$

The vertex is at $\left(-\frac{3}{2}, \square\right)$.

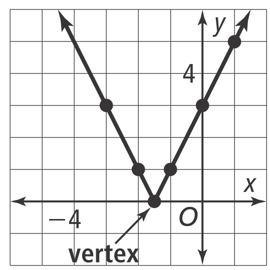
STEP 2 Create a table of values.

Use x-values on both sides of the vertex.

x	−3	−2	−1	0	1
y	3	☐	1	☐	4

STEP 3 Plot the vertex and points from the table of values.

Connect the points with two rays, each starting at the __________.



PRACTICE

Find the vertex of each absolute value function.

1. $f(x) = |5x|$ **2.** $f(x) = |x + 3|$ **3.** $f(x) = |x - 4|$

4. $f(x) = |3x + 1|$ **5.** $f(x) = \left|\frac{1}{2}x - 3\right|$ **6.** $f(x) = \left|\frac{1}{4}x + 2\right|$

Find the vertex of each absolute value function. Then graph the function by plotting several other points.

7. $f(x) = |2x - 1|$ **8.** $f(x) = |3x - 1|$ **9.** $f(x) = |2x + 4|$

10. $f(x) = |x + 1|$ **11.** $f(x) = \left|2x - \frac{3}{2}\right|$ **12.** $f(x) = \left|\frac{1}{2}x + 1\right|$

Name ____________________

Compound Interest

REVIEW

Compounded interest can be modeled by $A = P \cdot \left(1 + \frac{r}{n}\right)^{nt}$.

- A is the amount of the investment after t years.
- P is the initial investment.
- r is the interest rate, written as a decimal.
- n is the number of compounding periods per year.

A family invests $1600 in an account that earns 5.4% interest compounded monthly. Write an exponential function to model the value of the investment after x years. How much will the investment be worth after 10 years?

STEP 1 Write an exponential function.

$$A = P \cdot \left(1 + \frac{r}{n}\right)^{nt}$$

$$A = \square \cdot \left(1 + \frac{0.054}{\square}\right)^{\square t}$$ ← **Substitute given values.**

$$A = 1600 \cdot \left(\square\right)^{12t}$$ ← **Simplify.**

STEP 2 Evaluate the function.

To find the value after 10 years, let $t = \square$.

$$A = 1600 \cdot (1.0045)^{12 \cdot \square} \approx 2742.29$$

To the nearest dollar, the investment will be worth about $ $\square$ after 10 years.

PRACTICE Write and evaluate an exponential function for each situation. Round answers to the nearest whole number.

1. A $5000 investment earns 6.8% interest compounded quarterly. How much will the investment be worth after 15 years?
2. Jake invests $700 in an account that pays 4.5% interest compounded monthly. How much will his investment be worth after 5 years?
3. An investor has $10,000 in an account that earns 5.4% interest compounded semiannually. How much will be in the account after 30 years?
4. Lila puts $8200 in an account that pays 2.5% interest compounded annually. How much will Lila have in her account after 20 years?

