UPPER SCHOOL SUMMER MATH
Rising 8^{th} Grade

Algebra I Part 2 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 next 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

Name ______________________________

Ordered Pairs and Functions

REVIEW

- A relation is a set of ordered pairs.
- The domain is the complete set of input values for a relation or function.
- The range is the complete set of output values for a relation or function.
- A relation is a function if each input value corresponds to exactly one output value. For a function that relates x and y, where x is the input and y is the output, an x-value cannot correspond to two or more different y-values.

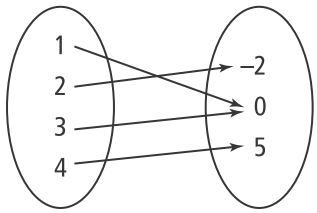
Find the domain and range of each relation. Determine whether the relation is a function. Explain.

{(6,1), (2, 1), (5, 4), (2, 2), (1, 4), (4, 2)}

The domain is { }.

The range is { }.

The x-value ☐ is repeated with two different y-values. Since each input value does not correspond to exactly one output value, the relation is not a function.



The domain is { }.

The range is { }.

The relation [is / is not] a function because

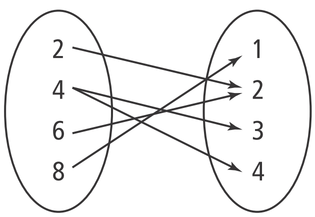
____

PRACTICE

Determine whether the relation is a function. Explain.

1. {(1, 1), (2, 2), (3, 3), (4, 4)}

2.

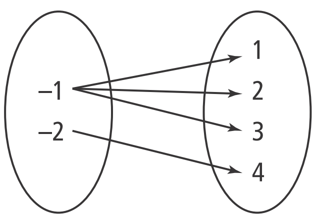


3.

x	*y*
0	1
3	1
4	2
9	2

4. {(10, 2), (9, 2), (10, 1), (9, 1)}

5.



6.

x	*y*
1	0
2	1
1	2
3	3

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.**

$m = \frac{-10}{-2}$ ← **Simplify.**

$m = \square$

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, $\square$)

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*.**

$y = \square x + \square$ ← **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 ______________________________

The Distributive Property

REVIEW

In the equation $a(b + c) = ab + ac$, the Distributive Property distributes the coefficient outside the parentheses to each term inside the parentheses by multiplying.

Simplify $-\frac{2}{3}(6x - 9)$ by using the Distributive Property.

$-\frac{2}{3}(6x - 9)$ ← **Distribute the coefficient to each term inside the parentheses.**

$-\frac{2}{3}(6x) - \left(-\frac{2}{3}\right)(\boxed{})$

$-\boxed{}x + 6$ ← **Simplify. Pay close attention to the signs of the numbers. Change the subtraction of a negative to addition.**

Simplify $\left(4 - \frac{5}{2}x\right)6$ by using the Distributive Property.

$\left(4 - \frac{5}{2}x\right)6$

$4(\boxed{}) - \frac{5}{2}x\,(\boxed{})$ ← **Distribute the coefficient to each term inside the parentheses.**

$24 - \boxed{}x$ ← **Simplify.**

PRACTICE Simplify each expression using the Distributive Property.

1. $2(5x - 4)$

2. $\frac{1}{4}(12x - 8)$

3. $-\frac{2}{5}(3 - x)$

4. $5\left(\frac{x}{5} - 2\right)$

5. $-\left(\frac{2}{3}x + 4\right)$

6. $\frac{1}{10}(30x - 50)$

7. $\left(\frac{2}{7}x + 2\right)14$

8. $(4x - 1)\frac{3}{4}$

9. $-\frac{1}{8}(x + y)$

10. $-6\left(\frac{2}{9}x - y\right)$

11. $(4 + x)\frac{1}{3}$

12. $-\frac{1}{2}(x + 4y)$

13. $\frac{4}{5}(10x - 15y)$

14. $\left(\frac{1}{6}y - \frac{1}{3}x\right)12$

15. $-\frac{1}{11}(33 - 44x)$

Name ______________________________

Zero and Negative Exponents

REVIEW Write each expression as an integer or simple fraction.

- When a nonzero number a has a zero exponent, then $a^0 = 1$.
  In other words, any nonzero number raised to the zero power equals one.
- For any nonzero number a and any integer n, $a^{-n} = \frac{1}{a^n}$.

a. 2.7^0

$= \square$ ← **Rewrite using the property of zero as an exponent.**

b. $\left(\frac{5}{2}\right)^{-2}$

$= \dfrac{1}{\left(\frac{5}{2}\right)^{\square}}$ ← **Rewrite as a fraction using the property of negative exponents.**

$= \dfrac{1}{\frac{25}{4}}$ ← **Square $\frac{5}{2}$.**

$= \dfrac{4}{25}$ ← **Simplify.**

c. $(2x)^{-3}$

$= \dfrac{1}{(2x)^{\square}}$ ← **Rewrite as a fraction using the property of negative exponents.**

$= \dfrac{1}{\square x^{\square}}$ ← **Simplify.**

PRACTICE Write each expression as an integer, a simple fraction, or an expression that contains only positive exponents. Simplify.

1. 10^{-3} **2.** 1.67^0 **3.** 5^{-4}

4. x^{-5} **5.** $\left(-\frac{3}{2}\right)^{-2}$ **6.** $(5y)^{-3}$

7. $(4x)^{-1}$ **8.** $(367.5d)^0$ **9.** $(-b)^{-2}$

Write each expression so that it only contains positive exponents.

10. $\left(\frac{2}{7}\right)^{-4}$ **11.** $3ab^0$ **12.** -4^{-3}

13. $a^{-3}b^{-4}$ **14.** $\frac{3x^{-2}}{y}$ **15.** $12xy^{-3}$

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 ______________________________

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 ______________________________

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 ____________________ NS10

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.**

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

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

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

STEP 2 **Simplify the perfect squares.**

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

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

STEP 3 **Multiply the radicals.**

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

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

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

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

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 Two-Step Equations

REVIEW

Steps for Solving Two-Step Equations

- Isolate the term with the variable on one side.
- Isolate the variable on one side.

Solve $3x + 4 = 10$.

$$3x + 4 = 10$$

$$3x + 4 - \boxed{} = 10 - \boxed{} \quad \leftarrow \textbf{Subtract to isolate } 3x.$$

$$3x = \boxed{}$$

$$\frac{3x}{\boxed{}} = \frac{6}{\boxed{}} \quad \leftarrow \textbf{Divide to isolate } x.$$

$$x = 2$$

Solve $-8 = \frac{s}{6} - 5$.

$$-8 = \frac{s}{6} - 5$$

$$-8 + \boxed{} = \frac{s}{6} - 5 + \boxed{} \quad \leftarrow \textbf{Add to isolate } \frac{s}{6}.$$

$$\boxed{} = \frac{s}{6}$$

$$-3 \cdot \boxed{} = \frac{s}{6} \cdot \boxed{} \quad \leftarrow \textbf{Multiply to isolate } s.$$

$$\boxed{} = s$$

PRACTICE Solve each equation.

1. $3x - 4 = 8$

2. $\frac{z}{4} + 3 = 10$

3. $4y + 5 = -7$

4. $p \div 3 + 9 = 15$

5. $15 = -6 + 3g$

6. $18 = 6 + \frac{t}{3}$

7. $7 - 4d = 43$

8. $12 - \frac{f}{5} = -8$

9. $15z + 6 = 81$

10. $\frac{k}{6} + 4 = 46$

11. $8 + h \div 7 = -4$

12. $25 = m \times 3 - 11$

Name ______________________________

Combining Like Terms

REVIEW Simplify $3a - 6x + 4 - 2a + 5x$ by combining like terms.

STEP 1 Use symbols to show like terms.

$3a$ $\boxed{-6x}$ $+4$ $-2a$ $\boxed{+5x}$ ← **Circle each term with a variable *a*. Draw a rectangle around each term with a variable *x*, and a triangle around each constant term.**

STEP 2 Group the like terms by reordering the terms so that all matching shapes are together.

$3a$ $-2a$ $\boxed{-6x}$ $\boxed{+5x}$ $+4$

STEP 3 Combine like terms by adding coefficients.

$a - x + \boxed{}$

PRACTICE Draw circles, rectangles, and triangles to help you combine like terms and simplify each expression.

1. $3a + 5 - x + 7x - 2a$

2. $2x - 5 + 3a - 5x + 10a$

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

4. $-6m + 3t + 4 - 4m - 2t$

5. $2r + 3s - \frac{5}{2}r$

6. $4 - p - 2x + 3p - 7x$

7. $3k - 2x + 6k + 5$

8. $3 + 2a - 7x + 2.5 + 5x$

9. $4a + 3 - 2y - 5a - 7 + 4y$

10. $c - 3 + 2x - 6c + 4x$

Simplify each expression.

11. $2b + 2 - x + 4$

12. $-5 - c - 4 + 3c$

13. $\frac{1}{2}a - 5 - \frac{1}{2}a$

14. $1.5y - 1.5 + 0.5y + 0.5z + 1$

15. $6a + 3b - 2a + 4$

16. $\frac{2}{3}a + 5 - \frac{1}{3}a - 7$

17. $-8 + x - 2 + 3x$

18. $x + y - z + 4x - 5y + 2z$

19. $\frac{7}{8}x + 5 - \frac{3}{8}x - 4$

20. $10y - 3x + 5 - 8 - 2y$

Name ____________________

Equations with Variables on Both Sides

REVIEW Solve $5a - 12 = 3a + 7$.

- To solve, rewrite the equation until all terms with variables are combined on one side and all constant terms are combined on the other side.
- When you perform an operation on one side to move terms with variables, you must do the same on the other.

Solve $5a - 12 = 3a + 7$

$5a - 12 = 3a + 7$ ← **Circle all the terms with variables.**

$5a \boxed{-12} = 3a \boxed{+7}$ ← **Draw rectangles around the constants. Plan to collect variables on one side and constants on the other.**

$5a - 12 - 3a = 3a + 7 - 3a$ ← **To get variables on the same side, subtract $\boxed{}$ from each side.**

$2a - 12 = \boxed{}$ ← **Combine like terms.**

$2a - 12 + \boxed{} = 7 + 12$ ← **To get constants on the other side, add 12 to each side.**

$2a = 19$ ← **Combine like terms.**

$a = \boxed{}$ ← **To undo multiplication by 2, divide each side by 2.**

Check $5(9.5) - 12 \stackrel{?}{=} 3(9.5) + 7$

$47.5 - 12 \stackrel{?}{=} 28.5 + 7$

$35.5 \stackrel{?}{=} 35.5$ ✓

PRACTICE Fill in the blanks to show a plan to solve each equation.

1. $9x + 4 = 6x - 11$ ________ $6x$ ________ each side; subtract $\boxed{}$ from each side.

2. $4b - 13 = 7b - 28$ Subtract $\boxed{}$ from each side; ________ 28 ________ each side.

Use circles and rectangles to mark the variables and constants. Write a plan that tells the steps you would use and then solve each equation.

3. $7c - 4 = 9c - 11$

4. $3 - 4d = 6d - 17$

5. $5e + 13 = 7e - 21$

Solve and check each equation.

6. $8f - 12 = 5f + 12$

7. $3k + 5 = 2(k + 1)$

8. $9 - x = 3x + 1$

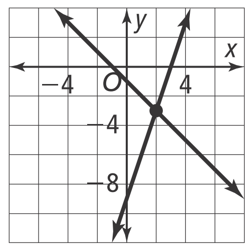
Name ______________________________

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 $b = -9$

$y = -x - 1$: $m = \boxed{}$ and $b = \boxed{}$

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.

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

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

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*.

$$x - y = 1$$
$$x = 1 + \boxed{}$$

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

$$-4x + y = -13$$
$$-4(1 + y) + y = -13$$
$$\boxed{} + (-4y + y) = -13$$
$$-3y = \boxed{}$$
$$y = \boxed{}$$

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

$$x - y = 1$$
$$x - \boxed{} = 1$$
$$x = \boxed{}$$

The solution of the system of equations is ($\boxed{}$, $\boxed{}$).

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

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

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

Name ________________________________ **A14**

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 $4x + \boxed{}\, y = -2$.

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

$$\begin{array}{rrr} 4x & -3y = & -7 \\ (-)4x & (-)+2y = & (-)-2 \\ \hline & -5y = & \boxed{} \\ & y = & 1 \end{array}$$

← **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*.**

$4x = \boxed{}$ ← **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. $y = 0.5x + 2.5$
$y = -1.5x + 0.5$

Name ______________________________

Linear Inequalities

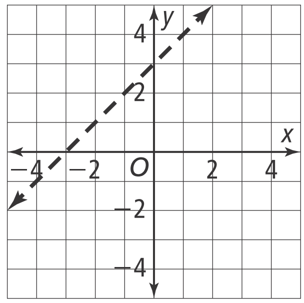
REVIEW Graph the inequality $y - 3 < x$.

STEP 1 Solve the inquality for y.

Solve $y - 3 < x$ for y.

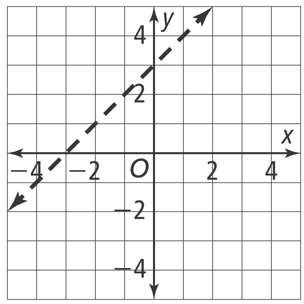
____

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.

$y - 3 < x$

$0 - 3 < 0$

$\boxed{} < \boxed{}$

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. $\frac{1}{3}y + 1 > 2$

Name ____

Systems of Linear Inequalities

REVIEW Solve this system of inequalities by graphing.

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

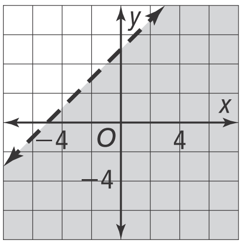
STEP 1 **Rewrite the inequalities in slope-intercept form.**

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

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).



$0 < 0 + 5 \quad \rightarrow \quad \square < \square$

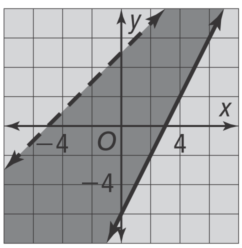
The inequality is true, so shade the region

______________________ the dashed line.

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

The inequality uses the ≥ symbol, so the boundary line should be solid.

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



$\square \geq 2 \cdot \square - 6 \quad \rightarrow \quad \square \geq \square$

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. $y > -4$
$x + 2y \leq 8$

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.

$f(x) = 4x - 2$	$f(x) = 4x - 2$	$f(x) = 4x - 2$
$f(0) = 4(0) - 2$	$f(1) = \boxed{}$	$f(2) = \boxed{}$

STEP 2 Simplify.

$f(0) = 0 - 2$	$f(1) = 4 - 2$	$f(2) = 8 - 2$
$f(0) = \boxed{}$	$f(1) = \boxed{}$	$f(2) = \boxed{}$

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 = $\boxed{}$

range = $\boxed{}$

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 ____________________ F02

Function Rules, Tables, and Graphs

REVIEW Graph the function $f(x) = 4 - x^2$.

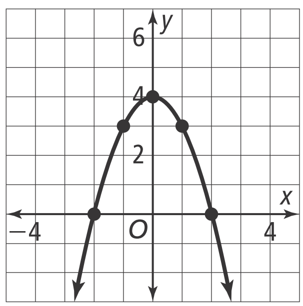
You can use a function rule to create a table of values and a graph.

STEP 1 Choose several x-values for the function.

Be sure to include both negative and positive values.

STEP 2 Evaluate the function to find y for each value of x.

STEP 3 Plot the ordered pairs. Draw a smooth curve connecting the points.



x	$f(x) = 4 - x^2$	(x, y)
−2	$f(x) = 4 - (-2)^2 = 0$	(−2, 0)
−1	$f(x) = 4 - (-1)^2 =$ ☐	(−1, ☐)
0	$f(x) = 4 - (0)^2 =$ ☐	(0, ☐)
1	$f(x) = 4 - (1)^2 =$ ☐	(1, ☐)
2	$f(x) = 4 - (2)^2 =$ ☐	(2, ☐)

PRACTICE Use a table of values to graph each function. Choose an appropriate number of values for x, including some negative values.

1. $f(x) = 4x + 1$

2. $g(x) = |x| - 3$

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

4. $h(x) = 3 - |x|$

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

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

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

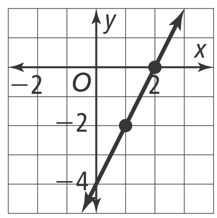
STEP 1 **Identify the slope and y-intercept.**

$y = 2x - 4$

$m = \square$ $b = \square$

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

Plot a point at the y-intercept ($\square$, $\square$).



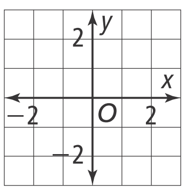
STEP 3 **Plot at least one other point using the y-intercept and the slope.**

Plot points so that the y-value increases by $\square$ each time the x-value increases by 1.

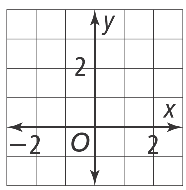
STEP 3 **Draw a line through the points.**

PRACTICE Graph each line.

1. $y = 3x + 1$

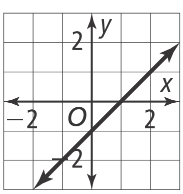


2. $y = -2x + 3$



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

3.



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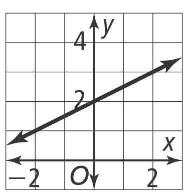


Standard Form

REVIEW Graph the equation $4x + 5y = 20$ using x- and y-intercepts.

- The *x-intercept* of a line is the point where the line crosses the x-axis. This point has a y-coordinate of 0.
- The *y-intercept* of a line is the point where the line crosses the y-axis. This point has a x-coordinate of 0.

STEP 1 **Substitute 0 for *y* in the equation, then solve for *x* to find the *x*-intercept.**

$$4x + 5y = 20$$
$$4x + 5(0) = 20$$
$$4x + 0 = 20$$
$$4x = 20$$
$$x = 5$$

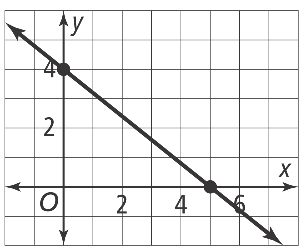
The x-intercept is (☐ , ☐).

STEP 2 **Substitute 0 for *x* in the equation, then solve for *y* to find the *y*-intercept.**

$$4x + 5y = 20$$
$$4(0) + 5y = 20$$
$$0 + 5y = 20$$
$$5y = 20$$
$$y = 4$$

The y-intercept is (☐ , ☐).

STEP 3 **Plot the two points and draw a line that connects them.**



PRACTICE Graph each equation using x- and y-intercepts.

1. $3x + 4y = 36$

2. $7x - 4y = 28$

3. $10x + 30y = 90$

4. $5x + 3y = 15$

5. $4x - 3y = 9$

6. $6x + 3y = 12$

7. $2x - y = 6$

8. $x - 4y = 4$

9. $\frac{1}{3}x + \frac{1}{2}y = 12$

10. $0.5x + 0.2y = 10$

11. $-3x = 21$

12. $9y = 3$

Name ______________________ F08

Point-Slope Form and Writing Linear Equations

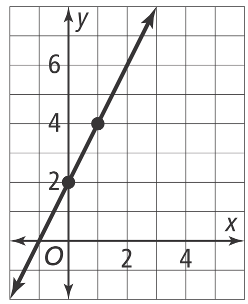
REVIEW

A line with a slope of $-\frac{2}{3}$ passes through the point (6, 1). Write an equation in point-slope form for the line.

Substitute known values into the point-slope form, $y - y_1 = m(x - x_1)$.

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

Write an equation in point-slope form for the line shown in the graph.



STEP 1 **Find the slope of the line using two points on the line.**

Use the slope formula, $m = \frac{y_2 - y_1}{x_2 - x_1}$.

Let $(x_1, y_1) = (0, 2)$ and $(x_2, y_2) = (1, 4)$.

$m = \frac{4 - 2}{1 - 0}$

$= \square$

STEP 2 **Substitute known values into the point-slope form, $y - y_1 = m(x - x_1)$, and simplify. Use either point's coordinates.**

Using the point (0, 2):

$y - \square = 2(x - \square)$

$y - 2 = 2x$

Using the point (1, 4):

$y - \square = 2(x - \square)$

$y - 2 = 2x$

The equation $y - 2 = 2x$ is in point-slope form.

PRACTICE Write an equation in point-slope form for each line with the given slope and point.

1. $m = \frac{7}{8}$; (8, 7)

2. $m = -\frac{1}{2}$; (0, −2)

3. $m = \frac{3}{2}$; (−6, −5)

Write an equation in point-slope form for the line that passes through each set of points.

4. (6, 4), (4, 3)

5. (−2, −2), (−4, 2)

6. (2, −5), (0, −7)

7. (2, −1), (−1, 8)

8. (−3, 4), (3, 8)

9. (−2, −6), (8, 4)

Name ______________________________

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 $\boxed{}$, so the slope of the parallel line passing through the given point is $\boxed{}$.

STEP 2 Use point-slope form. Then simplify.

Substitute the point (1, –2) for (x_1, y_1) and $\boxed{}$ for the slope, m.

$$y - y_1 = m(x - x_1)$$
$$y - (\boxed{}) = \boxed{}(x - \boxed{})$$
$$y + 2 = 3x - 3$$
$$y = 3x - \boxed{}$$

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

The slope of the given line is $\boxed{}$, so the slope of the perpendicular line passing through the given point is $\boxed{}$.

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

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

$y = \boxed{}x + \boxed{}$

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)

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 $\left(-\frac{3}{2}, \square\right)$.

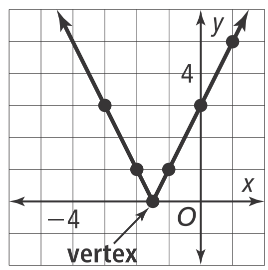
STEP 2 Create a table of values.

Use x-values on both sides of the vertex.

x	−3	−2	−1	0	1
y	3	$\square$	1	$\square$	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.** $f(x) = \left|\frac{1}{2}x + 1\right|$

Translations of Absolute Value Functions

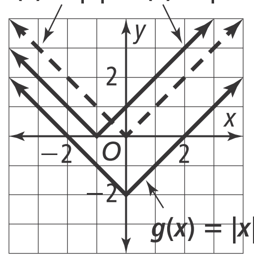
REVIEW Graph each translation of $f(x) = |x|$.

If h and k are positive numbers, then

- $g(x) = |x| + k$ shifts the graph of $f(x) = |x|$ up k units;
- $g(x) = |x| - k$ shifts the graph of $f(x) = |x|$ down k units;
- $g(x) = |x + h|$ shifts the graph of $f(x) = |x|$ left h units;
- $g(x) = |x - h|$ shifts the graph of $f(x) = |x|$ right h units;

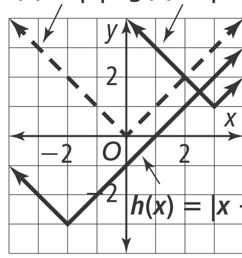
$g(x) = |x| - 2$ ← **Shift the graph of $f(x) = |x|$ down $\boxed{}$ units.**

$h(x) = |x + 1|$ ← **Shift the graph of $f(x) = |x|$ __________ 1 unit.**



$g(x) = |x - 3| + 1$ ← **Shift the graph of $f|x|$ right $\boxed{}$ units and __________ 1 unit.**

$h(x) = |x + 2| - 3$ ← **Shift the graph of $f(x) + |x|$ __________ $\boxed{}$ units and __________ $\boxed{}$ units.**



PRACTICE Complete each sentence. Then graph the translation of $f(x) = |x|$.

1. $g(x) = |x - 2|$ ← **Shift the graph of $f(x) = |x|$ __________ 2 units.**
2. $g(x) = |x| + 1$ ← **Shift the graph of $f(x) = |x|$ __________ 1 unit.**
3. $g(x) = |x| - 3$ ← **Shift the graph of $f(x) = |x|$ __________ 3 units.**
4. $g(x) = |x + 3|$ ← **Shift the graph of $f(x) = |x|$ __________ 3 units.**
5. $g(x) = |x - 1| - 5$ ← **Shift the graph of $f(x) = |x|$ __________ 1 unit and __________ 5 units.**
6. $g(x) = |x + 4| + 2$ ← **Shift the graph of $f(x) = |x|$ __________ 4 units and __________ 2 units.**
7. $g(x) = |x + 3| - 6$ ← **Shift the graph of $f(x) = |x|$ __________ 3 units and __________ 6 units.**

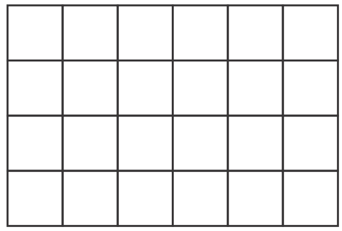
Area of Rectangles and Squares

Name ______________________________

Intervention Lesson **N41**

Maria's flower garden is in the shape of rectangle that measures 6 feet long and 4 feet wide. What is the area of the garden?

Find a formula for area of a rectangle by answering Exercises 1–6.



1. The rectangle at the right is a model of the garden. How many squares are in the model? ______

2. What is the area of the garden? ______ square feet

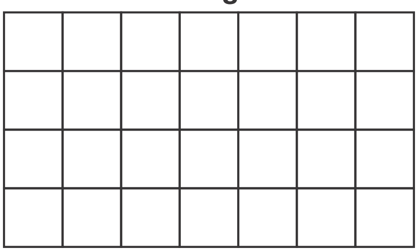
3. What is the length of the garden? ______ feet

4. What is the width of the garden? ______ feet

5. What could you multiply to find the area of the garden? ____________

6. Find the area of each rectangle by counting squares. Write the area in the table below. Complete the table.

Rectangle A



4 cm

7 cm

Rectangle B

3 in.

6 in.

Rectangle	Area	Length	Width	Product
Maria's garden	24	6	4	6×4
A		7		$7 \times$ ______
B				______ $\times$ ______
Any	Any	ℓ	w	$\ell \times$ ______

Name ______________________________

Area of Rectangles and Squares (continued)

The formula for the area of a rectangle is $A = \ell \times w$ *or* $A = \ell w$.

7. **Reasoning** Use the formula to find the area of a rectangle that is 8 meters long and 5 meters wide.

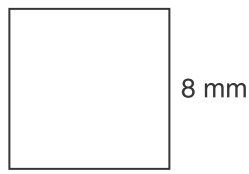
$$A = \underset{\downarrow}{\ell} \times \underset{\downarrow}{w}$$

$A = (\_\_\_\_) \times (\_\_\_\_) = \_\_\_\_$ square meters

A square is a type of rectangle where all of the side lengths are equal.

Find a formula for the area of the square shown by answering Exercises 8 and 9.

8. Use the formula $A = \ell w$ to find the area of the square.

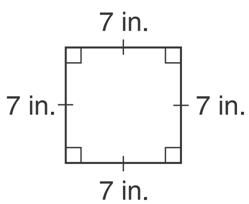


$\_\_\_\_ \times \_\_\_\_ = \_\_\_\_ \text{ mm}^2$

9. If s equals the length of a side of a square, how could you find the area of any square? $A =$ ________

Find the area of each figure.

10.



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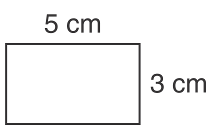
11.



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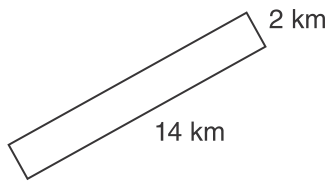
12.



____

Find the area of the rectangle with the given dimensions.

13. $\ell = 15$ mm, $w = 4$ mm

____

14. $\ell = 3$ cm, $w = 10$ cm

____

15. **Reasoning** The area of a square is 81 square feet. What is the length of each side? ________

16. **Reasoning** Using only whole numbers, what are all the possible dimensions of a rectangle with an area of 12 square centimeters?

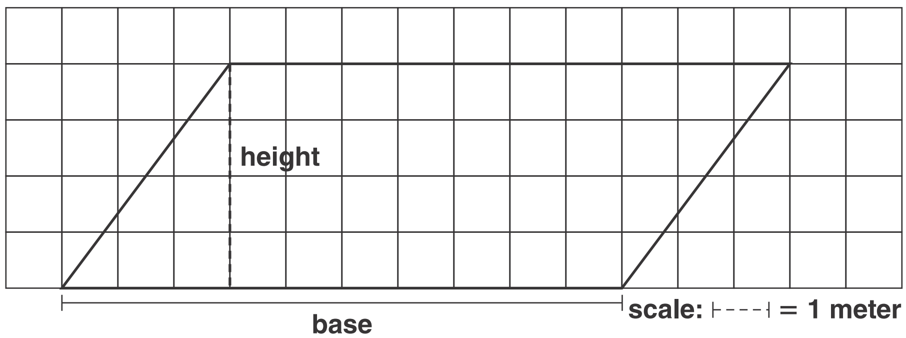
Name ____

Area of Parallelograms

Materials grid paper, colored pencils or markers, scissors

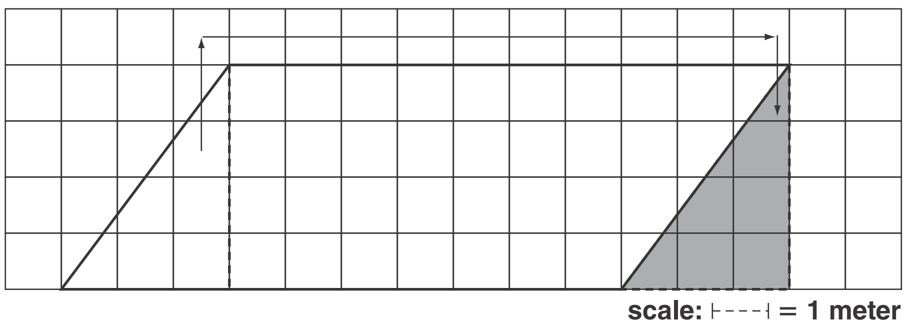
Find the area of the parallelogram on the grid by answering 1 to 10.

1. Trace the parallelogram below on a piece of grid paper. Then cut out the parallelogram.



2. Cut out the right triangle created by the dashed line.

3. Take the right triangle and move it to the right of the parallelogram.



4. What shape did you create? ________________

5. Is the area of the parallelogram the same as the area of the rectangle? _______

6. What is the area of the rectangle? $A = \ell \times w =$ _______ $\times\ 4 =$ _______ sq meters

7. What is the base b of the parallelogram? _______ meters

8. What is the height h of the parallelogram? _______ meters

9. What is the base times the height of the parallelogram? _______

10. Is this the same as the area of the rectangle? _______

Name ______________________________

Area of Parallelograms (continued)

The formula for the area of a parallelogram is $A = bh$.

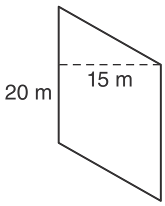
11. Use the formula to find the area of a parallelogram with a base of 9 ft and a height of 6 feet.

$$A = \quad b \quad \times \quad h$$

$$A = (\_\_\_\_\_\_) \times (\_\_\_\_\_\_) = \_\_\_\_\_\_ \text{ square feet}$$

Find the area of each figure.

12.



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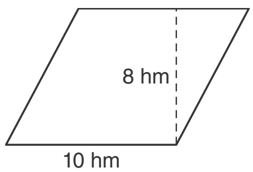

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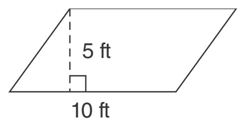

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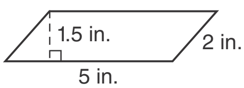

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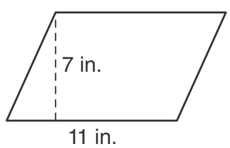

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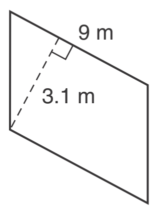

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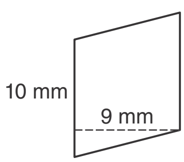

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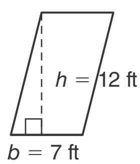

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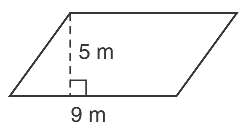

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21. **Reasoning** The area of a parallelogram is 100 square millimeters. The base is 4 millimeters. Find the height.

____

Name ______________________________

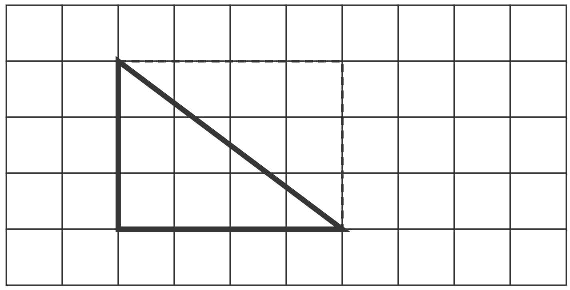
Intervention
Lesson **N45**

Area of Triangles

Materials markers, crayons or colored pencils

Jerah is making a model of a sailboat. The sail of the boat is a triangle. The sail has a base of 4 inches and a height of 3 inches. What is the area of the sail? The triangle below. is a model of the sail.

Find the area of the sail by answering Exercises 1–5.

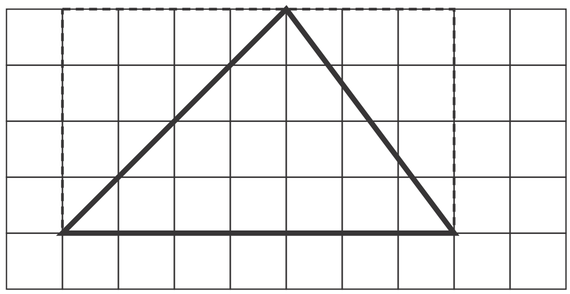


= 1 square inch

1. Color the triangle at the right.
2. How does the area of the triangle compare to the area of the rectangle?

   Area of the triangle = _______ × the area of the rectangle
3. What is the area of the rectangle? _______ square inches
4. What is the area of the triangle? _______ square inches
5. What is the area of Jerah's sail? _______ square inches

Nina is making a model of a sailboat with a sail in the shape of a triangle like the one shown below. The base of her sail is 7 inches and the height is 4 inches. Find the area of the triangle by answering Exercises 6–10.



= 1 square inch

6. Color the triangle at the right.
7. How does the area of the triangle compare to the area of the rectangle?

   Area of the triangle = _______ × the area of the rectangle
8. What is the area of the rectangle? _______ square inches
9. What is the area of the triangle? _______ square inches
10. What is the area of Nina's sail? _______ square inches

Name ____

Area of Triangles (continued)

11. Complete the table.

Triangle	Base	Height	Area
Jerah's sail		3	
Nina's sail			
Any	b	h	$\frac{1}{2} \times b \times$ ______

The formula for the area of a triangle is $A = \frac{1}{2} \times b \times h$ or $A = \frac{1}{2}bh$.

12. Reasoning Use the formula to find the area of Jerah's sail.

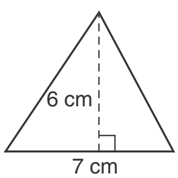
$$A = \frac{1}{2} \times \quad b \quad \times \quad h$$

$$A = \frac{1}{2} \times \text{\_\_\_\_\_\_} \times \text{\_\_\_\_\_\_} = \text{\_\_\_\_\_\_} \text{ square inches}$$

13. Is the area the same as you found on the previous page? ______

Find the area of each figure.

14.



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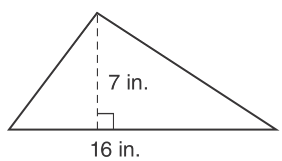

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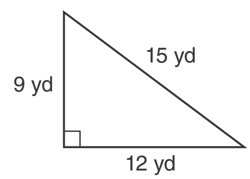


____

Find the area of the triangle with the measurements shown below.
Give the correct units.

17. $b = 22$ yd
$h = 20$ yd

____

18. $b = 8$ mm
$h = 4$ mm

____

19. $b = 12$ cm
$h = 4$ cm

____

20. The front of a tent is in the shape of a triangle with a height of 6 feet and a base of 10 feet. What is the area of the front of the tent?

____

Name ______________________________

Circumference

Materials Round objects, at least 3 for each group; tape measure or ruler and string for each student

Circumference (C) is the distance around a circle.

1. Complete the table for 3 different round objects.

Object	**Circumference (C)**	**Diameter (d)**	**$c \div d$**

The last column should be close to π, ≈ 3.14, every time.

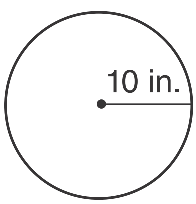
If $C \div d = \pi$, then $C = \pi d$.

2. What is the relationship between the diameter (d) and radius (r) of any circle? $d =$ ______

3. If $C = \pi d$ and $d = 2r$, what is a formula for the circumference using the radius (r)? $C = 2\pi$______

Use a formula to find the circumference of each circle to the nearest whole number.

4.

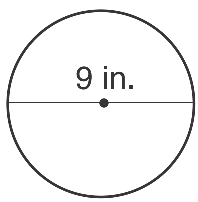


$C = 2 \quad \pi \quad r$

$C \approx 2 \times 3.14 \times$ ______

$C \approx$ ______ inches

5.



$C = \quad \pi \quad d$

$C \approx$ ______ $\times$ ______

$C \approx$ ______ inches

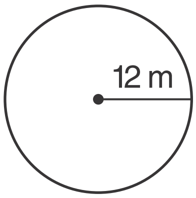
Name ________________________________

Circumference (continued)

Intervention Lesson **N46**

Find the circumference of each circle to the nearest whole number.
Use 3.14 or $\frac{22}{7}$ for π.

6.



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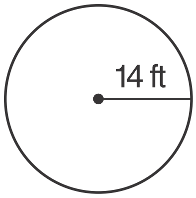

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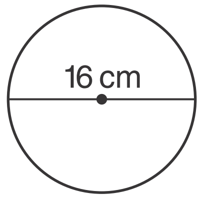

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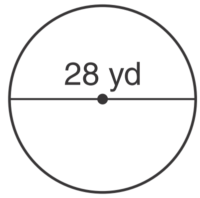

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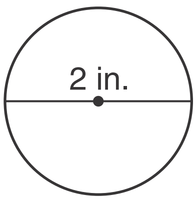

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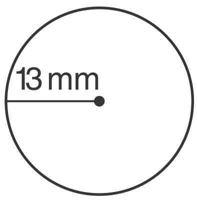

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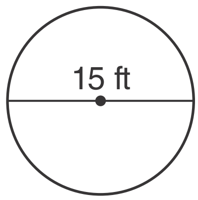

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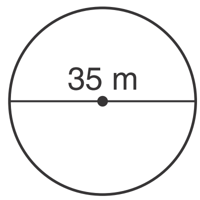

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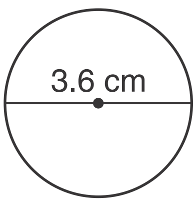

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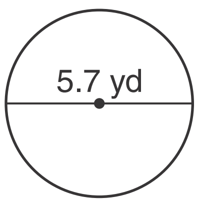

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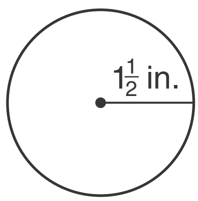

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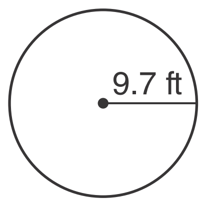
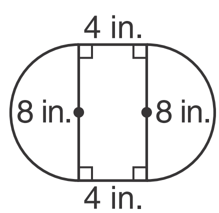


______

18. Miranda wants to sew lace around the outside of a pillow. The pillow has a diameter of 35 centimeters. How much lace does Miranda need?

______

19. **Reasoning** Find the distance around the figure at the right. Round your answer to the nearest whole number



______

20. **Reasoning** Write a formula for the circumference (C) of a semicircle.

______

Name ________________________________

Area of a Circle

Materials crayons, markers, or colored pencils, grid paper, compass

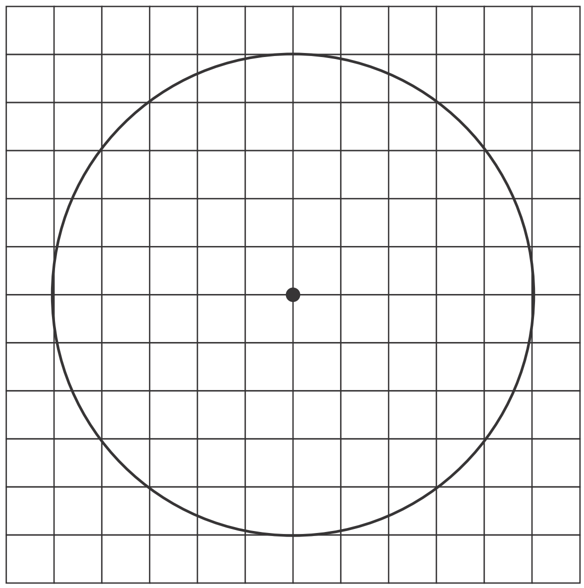
Sue places a water sprinkler in her yard. It sprays water 5 feet in every direction. What is the area of the lawn the sprinkler waters?

Find a formula for the area of a circle and find the area of the lawn by answering Exercises 1–8.

1. The sprinkler sprays in a circle.
What is the radius of the circle? ______

2. The grid at the right is a diagram of the sprinkler. Color all the whole squares within the circle one color. How many whole squares did you color?

______ whole squares



3. Combine partial squares to estimate whole squares. Color the partial squares, using a different color. The partial squares make up about how many whole squares?

______ whole squares

4. Add. What is a good estimate of the area of the circle? ______ units

5. Draw circles on grid paper with each radius listed in the table. Estimate the area and complete the table. Use 3.14 for π. Round πr^2 to the nearest whole number.

Estimated Area	Radius (r)	r^2	πr^2
80	5	25	
	3		28
	6		

6. Is the estimated area close to πr^2 each time? ______

Name ____________________

Area of a Circle (continued)

The formula for the area of a circle is $A = \pi r^2$.

7. Use the formula to find the area of a circle with radius 5 feet by filling in the blanks at the right. Round to the nearest whole number.

$A = \pi \quad r^2$

$A \approx 3.14 \times$ ______

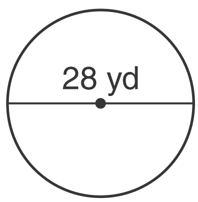
$A \approx$ ______

8. What is the approximate area of lawn watered by the sprinkler? Include the correct units.

about ______

Find the area of each circle to the nearest whole number.
Use either 3.14 or $\frac{22}{7}$ for π.

9.



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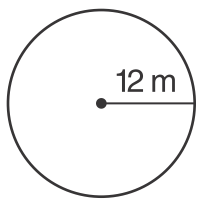

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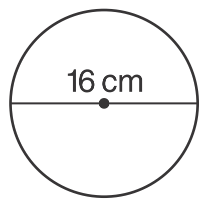

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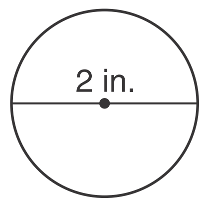

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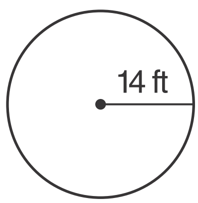

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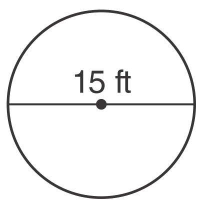

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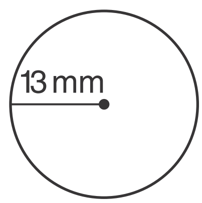

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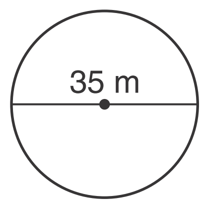

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17. A cement ring the shape of a circle surrounds a flag pole. The ring is 6 meters across. How much sod, to the nearest whole square meter, does it take to cover the area inside the ring? ______

18. **Reasoning** Chase used 3.14 for π and found the circumference of a circle to be 47.1 feet. Find the area of the circle to the nearest whole number. ______