

# Geometry Summer Review Assignment - 2024-2025 School Year

**DUE DATE: September 9th, 2024**

**Course Description:** The Saint Dominic Academy geometry curriculum mixes content focused on the goal of understanding the measurements of the 3-Dimensional space we live in with lessons about mathematical theorems and how they are developed. This type of coursework encourages students' spatial visualization abilities to flourish, opens their mind to more real-world applications of math, and fosters deeper learning as students look for reasoning behind geometric rules and discover some on their own through virtual and physical mediums of experimentation.

Specific Topics: covered include points, lines, angles, planes, logic, triangle congruence, similar polygons, circles, and area and volume for 2-dimensional and 3-dimensional figures.

## **Purpose of this assignment:**

To ensure students are adequately prepared for the topics that will be explored in this class, this summer assignment is meant to encourage students to review and practice skills they previously learned in Algebra 1, and make sure they are up to par. These concepts will be reviewed and tested within the first 2 weeks of school, before jumping into the main curriculum. **This assignment should be done within the last few weeks of summer vacation so that the knowledge is more fresh come the beginning of the school year**

## **Topics covered on this assignment:**

- Units of Measurement
- Measurement Conversions
- Algebraic Expressions
- Linear Equations (solving one step and multi-step equations)
- Linear Inequalities
- Solving System of Equations (Using Graphing, Substitution, and Elimination)
- Rules of Exponents
- Basic Perimeter
- Basic Area
- Basic Volume
- Basic Surface Area

**Helpful Resources:** If at any point during the assignment you need a refresher on the topic, or to learn it for the first time, don't be afraid to look for video tutorials and articles on the internet. Here are some good sites that I recommend using as reference when needed. **It is intended that you practice searching for the guidance you need on the internet for this assignment.** Algebra is one of the most documented subjects on the internet, learning to find content that helps you learn now will come in handy during your educational career. **Remember to search for an explanation of the process, not just the answer to a specific question!**

-[Math is Fun \(mathsisfun.com\)](https://www.mathsisfun.com)

-[High School Geometry | Khan Academy](#)

-[Algebra 1 | Math | Khan Academy](#)

-[Free and clear online algebra help! | Purplemath](#)

## Units of Measurement

Since geometry is primarily related to understanding the size and shape of objects in the real world, it is important that students understand how things are measured in the real world. Below is a set of tables from your textbook with some common units you may come across, what they are used to measure, and the conversions between different types of units. Customary units are generally used in America and in Engineering workplaces, while the metric system sees more widespread use in other parts of the world, and in the sciences.

| Metric Units of Length             |
|------------------------------------|
| 1 kilometer (km) = 1000 meters (m) |
| 1 m = 100 centimeters (cm)         |
| 1 cm = 10 millimeters (mm)         |

| Customary Units of Length     |
|-------------------------------|
| 1 foot (ft) = 12 inches (in.) |
| 1 yard (yd) = 3 ft            |
| 1 mile (mi) = 5280 ft         |

| Metric Units of Capacity            |
|-------------------------------------|
| 1 liter (L) = 1000 milliliters (mL) |

| Customary Units of Capacity        |                       |
|------------------------------------|-----------------------|
| 1 cup (c) = 8 fluid ounces (fl oz) | 1 quart (qt) = 2 pt   |
| 1 pint (pt) = 2 c                  | 1 gallon (gal) = 4 qt |

The mass of an object is the amount of matter that it contains.

| Metric Units of Mass             |
|----------------------------------|
| 1 kilogram (kg) = 1000 grams (g) |
| 1 g = 1000 milligrams (mg)       |

| Customary Units of Weight     |
|-------------------------------|
| 1 pound (lb) = 16 ounces (oz) |
| 1 ton (T) = 2000 lb           |

For these first 6 exercises, choose the unit from the table above that makes the most sense to measure the length of each object. If it's something small, use a relatively small unit, and vice versa.

**State which metric unit you would probably use to measure each item.**

- radius of a tennis ball
- length of a notebook
- mass of a textbook
- mass of a beach ball
- liquid in a cup
- water in a bathtub

For these next problems, use the tables on this page to convert the units. For example, in #7, 120 inches is equal to how many feet?

**Complete each sentence.**

- 120 in. =   ?   ft
- 18 ft =   ?   yd
- 10 km =   ?   m
- 210 mm =   ?   cm
- 180 mm =   ?   m
- 3100 m =   ?   km
- 90 in. =   ?   yd
- 5280 yd =   ?   mi
- 8 yd =   ?   ft
- 0.62 km =   ?   m
- 370 mL =   ?   L
- 12 L =   ?   mL
- 32 fl oz =   ?   c
- 5 qt =   ?   c
- 10 pt =   ?   qt

## Algebraic Expressions

An expression is an algebraic expression if it contains sums and/or products of variables and numbers. To evaluate an algebraic expression, replace the variable or variables with known values, and then use the order of operations.

| Order of Operations |   |
|---------------------|---|
| <b>Step 1</b>       | Evaluate expressions inside grouping symbols.               |
| <b>Step 2</b>       | Evaluate all powers.  |
| <b>Step 3</b>       | Do all multiplications and/or divisions from left to right. |
| <b>Step 4</b>       | Do all additions and/or subtractions from left to right.    |

### Example 1 Addition/Subtraction Algebraic Expressions

Evaluate  $x - 5 + y$  if  $x = 15$  and  $y = -7$ .

$$\begin{aligned} x - 5 + y &= 15 - 5 + (-7) && \text{Substitute.} \\ &= 10 + (-7) \text{ or } 3 && \text{Subtract.} \end{aligned}$$

### Example 2 Multiplication/Division Algebraic Expressions

Evaluate each expression if  $k = -2$ ,  $n = -4$ , and  $p = 5$ .

|   |   |
|---|---|
| <p>a. <math>\frac{2k + n}{p - 3}</math></p> $\begin{aligned} \frac{2k + n}{p - 3} &= \frac{2(-2) + (-4)}{5 - 3} && \text{Substitute.} \\ &= \frac{-4 - 4}{5 - 3} && \text{Multiply.} \\ &= \frac{-8}{2} \text{ or } -4 && \text{Subtract.} \end{aligned}$ | <p>b. <math>-3(k^2 + 2n)</math></p> $\begin{aligned} -3(k^2 + 2n) &= -3[(-2)^2 + 2(-4)] \\ &= -3[4 + (-8)] \\ &= -3(-4) \text{ or } 12 \end{aligned}$ |
|---|---|

### Example 3 Absolute Value Algebraic Expressions

Evaluate  $3|a - b| + 2|c - 5|$  if  $a = -2$ ,  $b = -4$ , and  $c = 3$ .

$$\begin{aligned} 3|a - b| + 2|c - 5| &= 3|-2 - (-4)| + 2|3 - 5| && \text{Substitute for } a, b, \text{ and } c. \\ &= 3|2| + 2|-2| && \text{Simplify.} \\ &= 3(2) + 2(2) \text{ or } 10 && \text{Find absolute values.} \end{aligned}$$

## Exercises

Evaluate each expression if  $a = 2$ ,  $b = -3$ ,  $c = -1$ , and  $d = 4$ .

- |                        |                    |                       |                       |
|------------------------|--------------------|-----------------------|-----------------------|
| 1. $2a + c$            | 2. $\frac{bd}{2c}$ | 3. $\frac{2d - a}{b}$ | 4. $3d - c$           |
| 5. $\frac{3b}{5a + c}$ | 6. $5bc$           | 7. $2cd + 3ab$        | 8. $\frac{c - 2d}{a}$ |

Evaluate each expression if  $x = 2$ ,  $y = -3$ , and  $z = 1$ .

- |                   |                    |                    |                     |
|-------------------|--------------------|--------------------|---------------------|
| 9. $24 +  x - 4 $ | 10. $13 +  8 + y $ | 11. $ 5 - z  + 11$ | 12. $ 2y - 15  + 7$ |
|-------------------|--------------------|--------------------|---------------------|

## Linear Equations

(Try Searching “Solving one step equation” or solving “Multi Step equations” on google, and look for results from the sites I recommend, or youtube tutorials)

**Solve each equation.**

1.  $r + 11 = 3$

2.  $n + 7 = 13$

3.  $d - 7 = 8$

4.  $\frac{8}{5}a = -6$

5.  $-\frac{p}{12} = 6$

6.  $\frac{x}{4} = 8$

7.  $\frac{12}{5}f = -18$

8.  $\frac{y}{7} = -11$

9.  $\frac{6}{7}y = 3$

10.  $c - 14 = -11$

11.  $t - 14 = -29$

12.  $p - 21 = 52$

13.  $b + 2 = -5$

14.  $q + 10 = 22$

15.  $-12q = 84$

16.  $5t = 30$

17.  $5c - 7 = 8c - 4$

18.  $2\ell + 6 = 6\ell - 10$

19.  $\frac{m}{10} + 15 = 21$

20.  $-\frac{m}{8} + 7 = 5$

21.  $8t + 1 = 3t - 19$

22.  $9n + 4 = 5n + 18$

23.  $5c - 24 = -4$

24.  $3n + 7 = 28$

25.  $-2y + 17 = -13$

26.  $-\frac{t}{13} - 2 = 3$

27.  $\frac{2}{9}x - 4 = \frac{2}{3}$

**28.**  $9 - 4g = -15$

**29.**  $-4 - p = -2$

**30.**  $21 - b = 11$

**31.**  $-2(n + 7) = 15$

**32.**  $5(m - 1) = -25$

**33.**  $-8a - 11 = 37$

**34.**  $\frac{7}{4}q - 2 = -5$

**35.**  $2(5 - n) = 8$

**36.**  $-3(d - 7) = 6$

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**Linear Inequalities (Try searching for “Solving Linear Inequalities” if you need a refresher)**  
**Solve the Following Inequalities**

**1.**  $x - 7 < 6$

**2.**  $a + 7 \geq -5$

**3.**  $4y < 20$

**4.**  $-\frac{a}{8} < 5$

**5.**  $\frac{t}{6} > -7$

**6.**  $\frac{a}{11} \leq 8$

**7.**  $d + 8 \leq 12$

**8.**  $m + 14 > 10$

**9.**  $12k \geq -36$

**10.**  $6t - 10 \geq 4t$

**11.**  $3z + 8 < 2$

**12.**  $4c + 23 \leq -13$

**13.**  $m - 21 < 8$

**14.**  $x - 6 \geq 3$

**15.**  $-3b \leq 48$

$$16. -\frac{p}{5} \geq 14$$

$$17. 2z - 9 < 7z + 1$$

$$18. -4h > 36$$

$$19. \frac{2}{5}b - 6 \leq -2$$

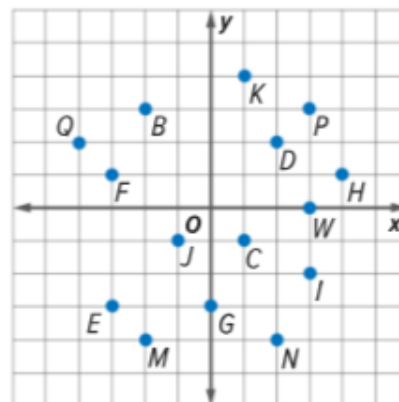
$$20. \frac{8}{3}t + 1 > -5$$

$$21. 7q + 3 \geq -4q + 25$$

### Ordered Pairs

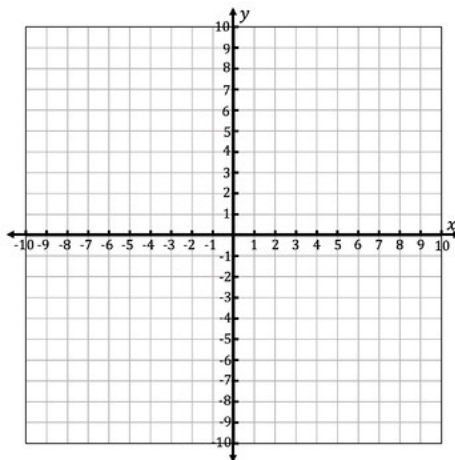
Write the ordered pair for each point shown at the right.

- |              |              |              |
|--------------|--------------|--------------|
| 1. <i>B</i>  | 2. <i>C</i>  | 3. <i>D</i>  |
| 4. <i>E</i>  | 5. <i>F</i>  | 6. <i>G</i>  |
| 7. <i>H</i>  | 8. <i>I</i>  | 9. <i>J</i>  |
| 10. <i>K</i> | 11. <i>W</i> | 12. <i>M</i> |
| 13. <i>N</i> | 14. <i>P</i> | 15. <i>Q</i> |



Graph and label each point on a coordinate plane. Name the quadrant in which each point is located.

- |                |               |                 |                 |
|----------------|---------------|-----------------|-----------------|
| 16. $M(-1, 3)$ | 17. $S(2, 0)$ | 18. $R(-3, -2)$ | 19. $P(1, -4)$  |
| 20. $B(5, -1)$ | 21. $D(3, 4)$ | 22. $T(2, 5)$   | 23. $L(-4, -3)$ |

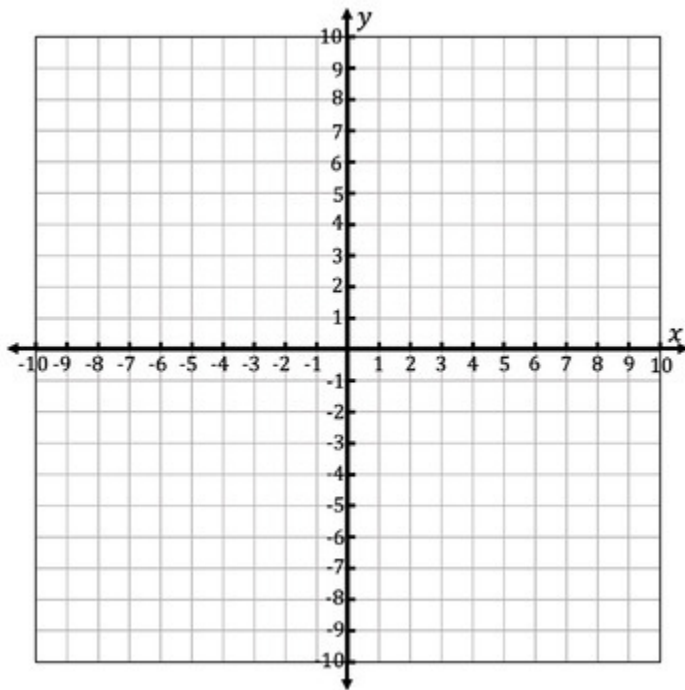


Graph the following geometric figures.

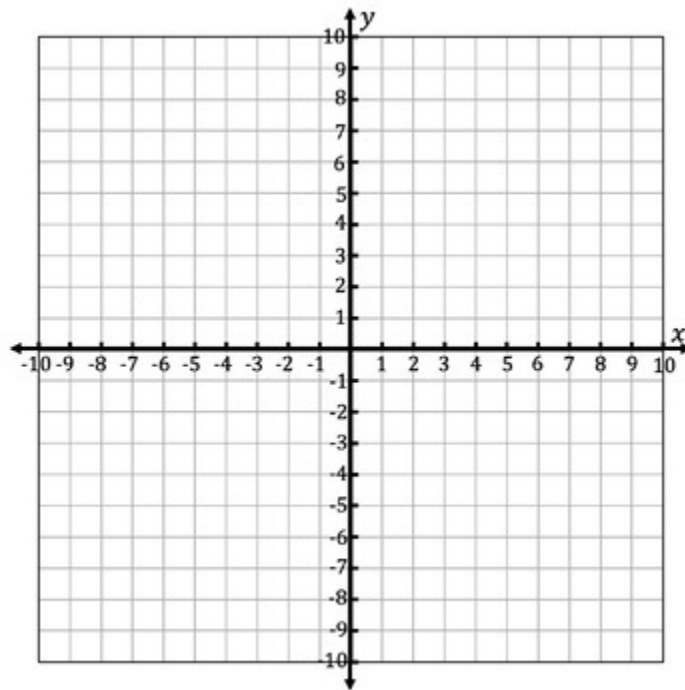
24. a square with vertices  $W(-3, 3)$ ,  $X(-3, -1)$ ,  $Z(1, 3)$ , and  $Y(1, -1)$

26. a triangle with vertices  $F(2, 4)$ ,  $G(-3, 2)$ , and  $H(-1, -3)$

24.



26.

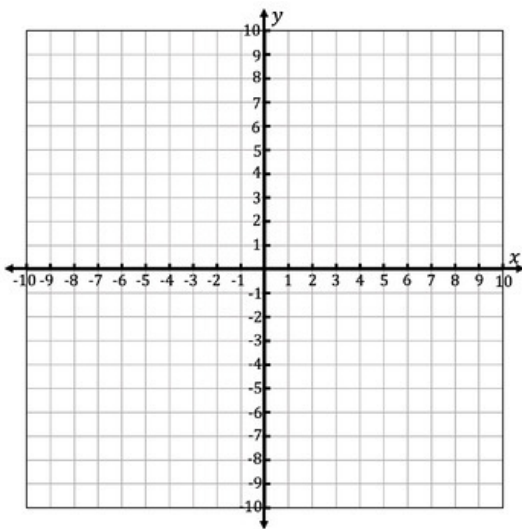


Graph four points that satisfy each equation.

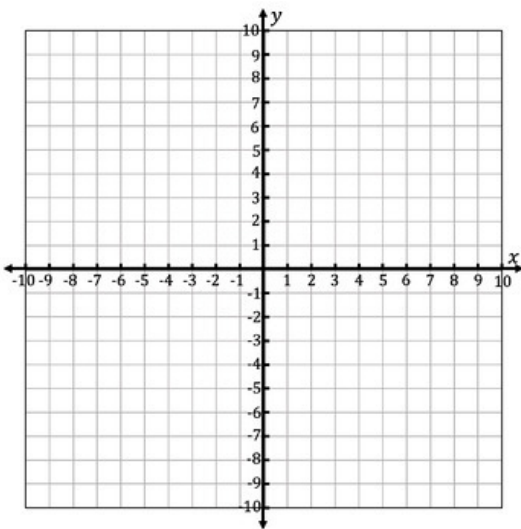
27.  $y = 2x$

28.  $y = 1 + x$

27.



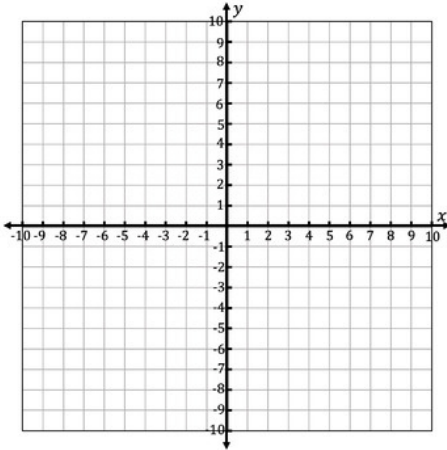
28.



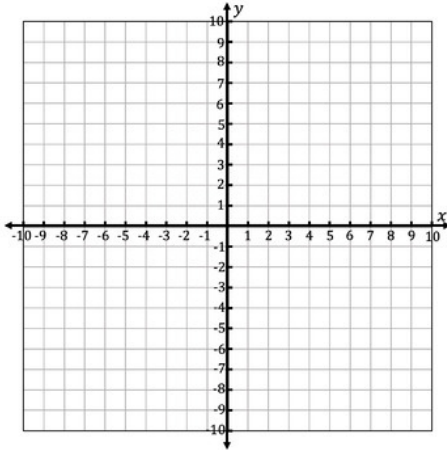
## Solving Systems of Equations

**Solve by graphing.**

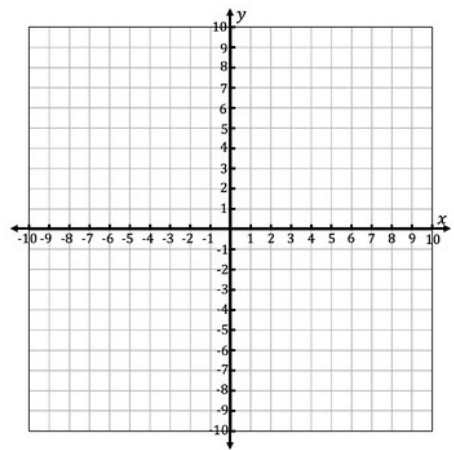
1.  $y = -x + 2$   
 $y = -\frac{1}{2}x + 1$



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



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



**Solve by substitution.**

4.  $-5x + 3y = 12$   
 $x + 2y = 8$

5.  $x - 4y = 22$   
 $2x + 5y = -21$

6.  $y + 5x = -3$   
 $3y - 2x = 8$

**Solve by elimination.**

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

8.  $3x + 4y = -1$   
 $-9x - 4y = 13$

9.  $-4x + 5y = -11$   
 $2x + 3y = 11$



## Properties of Exponents

**Simplify. Your answer should contain only positive exponents.**

1)  $2m^2 \cdot 2m^3$

2)  $m^4 \cdot 2m^{-3}$

3)  $4r^{-3} \cdot 2r^2$

4)  $4n^4 \cdot 2n^{-3}$

5)  $2k^4 \cdot 4k$

6)  $2x^3y^{-3} \cdot 2x^{-1}y^3$

7)  $2y^2 \cdot 3x$

8)  $4v^3 \cdot vu^2$

9)  $4a^3b^2 \cdot 3a^{-4}b^{-3}$

10)  $x^2y^{-4} \cdot x^3y^2$

11)  $(x^2)^0$

12)  $(2x^2)^{-4}$

13)  $(4r^0)^4$

14)  $(4a^3)^2$

15)  $(3k^4)^4$

16)  $(4xy)^{-1}$

17)  $(2b^4)^{-1}$

18)  $(x^2y^{-1})^2$

19)  $(2x^4y^{-3})^{-1}$

20)  $(3m)^{-2}$

21)  $\frac{r^2}{2r^3}$

22)  $\frac{x^{-1}}{4x^4}$

23)  $\frac{3n^4}{3n^3}$

24)  $\frac{m^4}{2m^4}$

25)  $\frac{3m^{-4}}{m^3}$

26)  $\frac{2x^4y^{-4}z^{-3}}{3x^2y^{-3}z^4}$

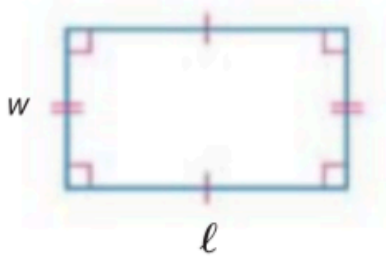
27)  $\frac{4x^0y^{-2}z^3}{4x}$

28)  $\frac{2h^3j^{-3}k^4}{3jk}$

## Finding Perimeter and Area of Basic Shapes

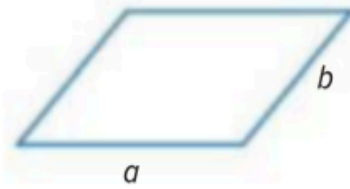
**Perimeter** is the distance around a figure. Perimeter is measured in linear units.

### Rectangle



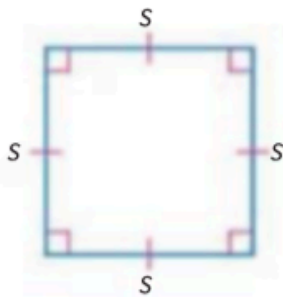
$$P = 2(\ell + w) \text{ or}$$
$$P = 2\ell + 2w$$

### Parallelogram



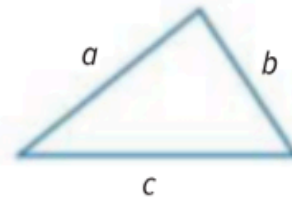
$$P = 2(a + b) \text{ or}$$
$$P = 2a + 2b$$

### Square



$$P = 4s$$

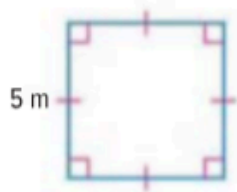
### Triangle



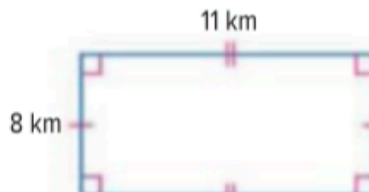
$$P = a + b + c$$

Find the perimeter of each figure.

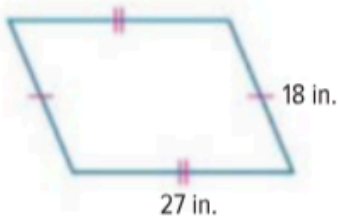
1.



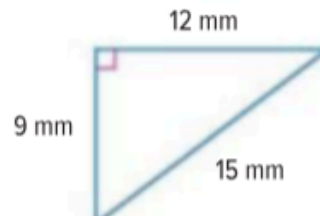
2.



3.



4.

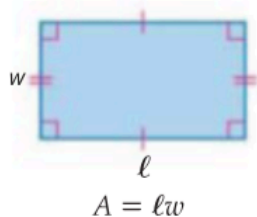


5. a square with side length 8 inches
6. a rectangle with length 9 centimeters and width 3 centimeters
7. a triangle with sides 4 feet, 13 feet, and 12 feet
8. a parallelogram with side lengths  $6\frac{1}{4}$  inches and 5 inches

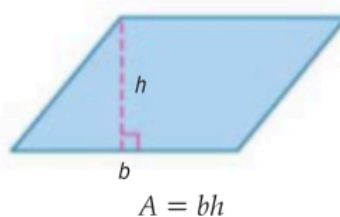
## AREA

**Area** is the number of square units needed to cover a surface. Area is measured in square units.

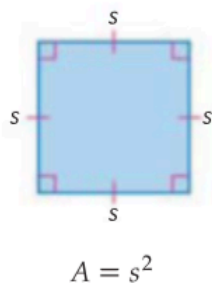
### Rectangle



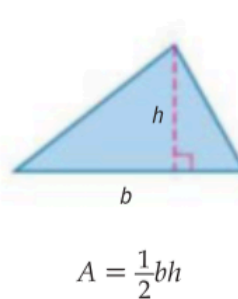
### Parallelogram



### Square

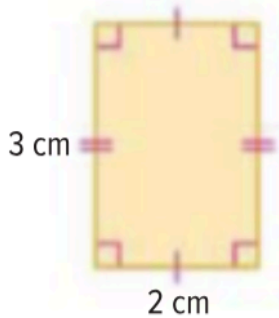


### Triangle

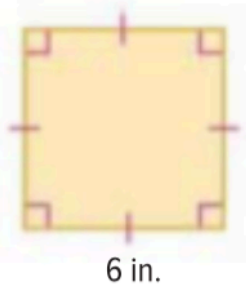


Find the area of each figure.

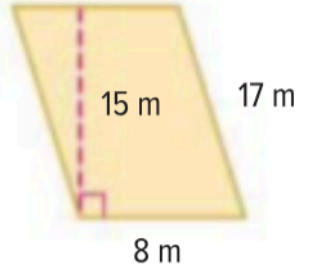
1.



2.



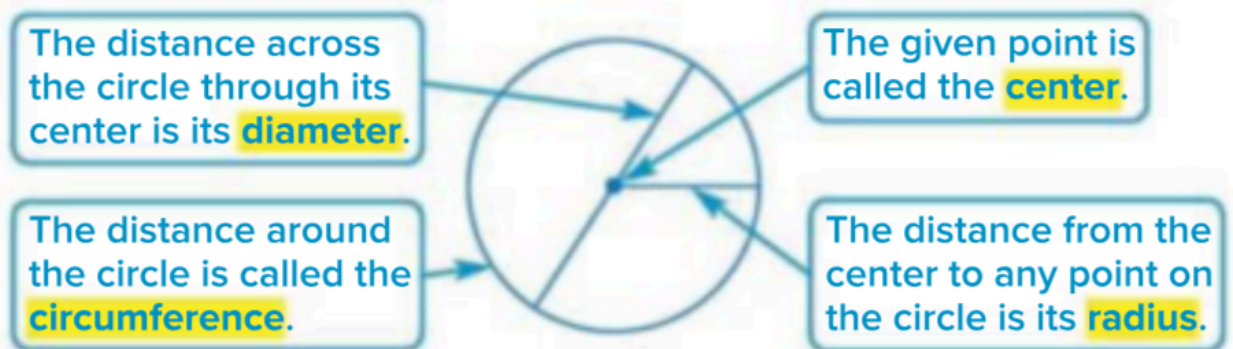
3.



Find the area of each figure. Round to the nearest tenth if necessary.

4. a triangle with a base 12 millimeters and height 11 millimeters
5. a square with side length 9 feet
6. a rectangle with length 8 centimeters and width 2 centimeters
7. a triangle with a base 6 feet and height 3 feet

A **circle** is the set of all points in a plane that are the same distance from a given point.

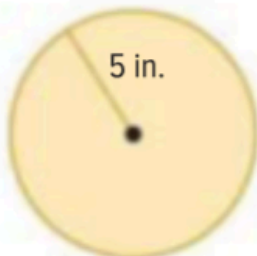


For a circle, the formula for area is shown below.  $A$  represents Area, and  $r$  represents the radius.

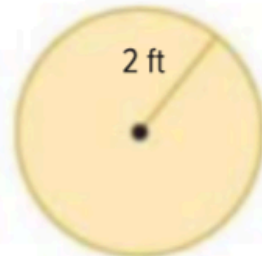
$$A = \pi r^2$$

Find the area of each circle. Round to the nearest tenth.

10.



11.



12.

