GEOMETRY
Ms. Rigby’s Summer Assignment 2010

This summer assignment is meant to reintroduce you to the geometry you have already learned throughout your academic education, to help prepare you to be successful in this course. Take this assignment seriously, as this is not busy work. This is your FIRST assignment for my class, and as such, is going to be my first impression of you.

Instructions:
✓ Read each page.
✓ Complete any work requested on each page.
✓ If you are requested to solve problems that require you to show work, do the work on the back of the worksheet.
✓ For any unfinished work, highlight that/those problems with a highlighter pen.
  o You will be given a project grade for the packet that will impact your grade.
  o I will be available on Monday, August 9th in my classroom (PB-20) to answer questions if you need help on questions you had trouble with.
✓ Hole-punch your papers, and put them in a three binder paper folder for turning in.
  o In black marker, clearly put your first and last name on the front of the folder and on the front page of the packet.
    ▪ KEEP THE PAGES IN THE ORDER THEY ARE SENT TO YOU!
✓ You will be given a quiz on the first day of school on the material in the packet.
Two-Step Equations

When solving a two-step equation, follow the order of operations.

Solve the equation $5x + 33 = 63$.

**Step 1** Subtract 33 from each side.
\[ 5x + 33 - 33 = 63 - 33 \]
\[ 5x = 30 \]

**Step 2** Divide each side by 5.
\[ \frac{5x}{5} = \frac{30}{5} \]
\[ x = 6 \]

**Step 3** Simplify.

Check by substitution.

\[ 5x + 33 = 63 \]
\[ (5 \times 6) + 33 = 63 \]
\[ 30 + 33 = 63 \]
\[ 63 = 63 \]

Solve each equation. Check the solution.

1. $3x + 5 = 23$ \[ \] 2. $4a + 8 = 32$ \[ \]

3. $8c + 6 = 62$ \[ \] 4. $21 + 7x = 105$ \[ \]

5. $7.6 + 4x = 10.4$ \[ \] 6. $8x + 15 = 19$ \[ \]

7. $2.3y + 1.2 = 2.12$ \[ \] 8. $5n - 11 = 24$ \[ \]

9. $6y + 12 = 99$ \[ \] 10. $\frac{x}{3} - 4 = 2$ \[ \]

11. $9x - 8 = 55$ \[ \] 12. $\frac{x}{4} + 6 = 10$ \[ \]

13. $3 = 13 - 2a$ \[ \] 14. $7c - 14 = 49$ \[ \]

15. $6m - 4 = 3.2$ \[ \] 16. $2z + 0.4 = 1.2$ \[ \]
Two-Step Equations

Solve each equation. Check the solution.

1. $7m + 8 = 71$
2. $\frac{f}{3} + 6 = 11$
3. $12y + 2 = 146$
4. $\frac{y}{12} + 1 = 6$
5. $2a - 1 = 19$
6. $\frac{5}{6} - 8 = 17$
7. $4t + 16 = 24$
8. $4f - 11 = 29$
9. $\frac{6}{7} + 8 = 10$
10. $13a - 9 = 17$
11. $5c - 42 = 73$
12. $4w - 26 = 82$
13. $7a + 4 = 46$
14. $\frac{w}{6} + 8 = 12$
15. $9n - 7 = 56$
16. $3k + 6 = 30$
17. $\frac{x}{8} - 3 = 3$
18. $15y - 40 = 35$

Complete each table.

19. Rule: $y = 0.2x + 4$

<table>
<thead>
<tr>
<th>$x$</th>
<th>$y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
</tr>
</tbody>
</table>

20. Rule: $z = \frac{w}{4} - 2$

<table>
<thead>
<tr>
<th>$w$</th>
<th>$z$</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>23</td>
</tr>
</tbody>
</table>

Write an equation for each problem. Solve the equation. Then give the solution of the equation.

21. Five more than half a number equals fifteen. What is the number?

22. Two less than three times a number equals thirteen. What is the number?
Two-Step Equations
A Riddle about Everything

Solve the following equations. Cross out the letter each solution represents at the bottom of the page. The remaining letters will spell out the answer to this riddle:

What is at the end of everything?

1. $9x + 5 = 50$  
2. $\frac{x}{6} - 1 = 4$  
3. $60 = 8x - 4$

4. $7 = \frac{x}{8} + 1$  
5. $45 = 3x + 9$  
6. $7x - 11 = 38$

7. $\frac{x}{12} + 6 = 9$  
8. $4 = \frac{x}{11} - 1$  
9. $\frac{x}{25} + 8 = 11$

10. $97 = 4x + 25$  
11. $20 = \frac{x}{4} - 2$  
12. $15x + 15 = 60$

13. $16 = \frac{x}{12} + 8$  
14. $\frac{x}{6} + 15 = 24$  
15. $3x + 19 = 70$

16. $103 = 8x + 31$  
17. $9x + 30 = 120$  
18. $5 = \frac{x}{3} - 9$

19. $99 = 11x - 22$  
20. $\frac{x}{15} + 19 = 23$  
21. $\frac{1}{2}x + 15 = 37$

\[
\begin{array}{c|c}
A & 17 \\
B & 75 \\
C & 9 \\
D & 10 \\
E & 30 \\
F & 8 \\
G & 21 \\
H & 64 \\
I & 7 \\
J & 36 \\
K & 55 \\
M & 12 \\
N & 18 \\
O & 42 \\
P & 5 \\
Q & 48 \\
R & 96 \\
S & 11 \\
T & 3 \\
U & 54 \\
V & 44 \\
W & 88 \\
\end{array}
\]
Getting Familiar with Vocabulary

**Instructions:** Write out the definitions of the words listed below in the space provided.

Geometry-

Parallel-

Inductive Reasoning-

Deductive Reasoning-

Diagonal-

Polygon-
Adjacent-

Intersection-

Midpoint-

Circumference-

Perimeter-

Area-

Congruent-
Mathematical Symbols

The following list provides the signs and symbols used most often in mathematics.

+ addition, plus, positive
− subtraction, minus, negative, opposite of
× multiplication, multiply by, times
· multiplication, multiply by, times
÷ division, divided by
/ division
= is equal to, equals
≠ is not equal to
> is greater than
≥ is greater than or equal to
< is less than
≤ is less than or equal to
∴ therefore
∞ infinity
$ dollar sign
g cent(s)
© at
# number or pounds
% percent
: is to
△ triangle
□ square
▭ rectangle
° degree
∠ABC angle ABC
m∠ABC measure of angle ABC
⊥ right angle
⌒ AB arc AB
∥ is parallel to
⊥ is perpendicular to
Ray AB
Segment AB
AB measure of line segment AB
AB line AB
π pi which is about 3.14
≌ is congruent to
～ is similar to
( ) parentheses, grouping symbol
[ ] braces, grouping symbol
± plus or minus
|n| absolute value of n
(x,y) ordered pair of numbers
x^n x to the a power
√ positive square root
√ negative square root
f(x) f of x, the value of f at x
{ } indicates a set
Ø empty set
∈ is an element of
∩ intersection
∪ union
P(E) probability of event E
n! n factorial
nPr number of permutations of n items, taken r at a time
nCr number of combinations of n items, taken r at a time
SinA sine of angle A
CosA cosine of angle A
TanA tangent of angle A
CotA cotangent of angle A
SecA secant of angle A
CscA cosecant of angle A
Match the flowing symbols with their definition........

\[ \widehat{AB} \] percent

\[ \infty \] square

\[ \simeq \] therefore

\[ \Delta \] degree

\[ : \] is to

\[ \$ \] measure of angle ABC

\[ m\angle ABC \] is approximately equal to

\[ : \] is greater than

\[ @ \] cent(s)

\[ \perp \] right angle

\[ \% \] triangle

\[ \circ \] dollar sign

\[ \square \] at

\[ > \] is perpendicular to

\[ \perp \] arc AB

\[ \varnothing \] infinity
+ is less than or equal to

× rectangle

÷ angle ABC

\div is less than

\leq addition, plus, positive

\geq number or pounds

\equiv is greater than or equal to

\cancel multiplication, multiply by, times

\neq is not equal to

\equiv is equal to, equals

\neq multiplication, multiply by, times

\div division, divided by

\not subtraction, minus, negative, opposite of

\parallel is parallel to

\overline segment AB

\overrightarrow ray AB

\sqrt positive square root

\cap is similar to

\sqrt n factorial

\cap intersection
{ }  measure of line segment AB
f(x)  braces, grouping symbol
|n|  plus or minus
AB  x to the a power
[ ]  line AB
P(E)  sine of angle A
∈  absolute value of n
∪  ordered pair of numbers
SinA  π which is about 3.14
∅  is an element of
±  indicates a set
(parentheses, grouping symbol
nCr  f of x, the value of f at x
π  is congruent to
AB  union
( )  probability of event E
(x,y)  negative square root
=  empty set
x^a  number of combinations of n items, taken r at a time
nPr  tangent of angle A
tanA  number of permutations of n items, taken r at a time
secA  cosecant of angle A
CosA  cosine of angle A
secA  secant of angle A
TanA  cotangent of angle A
CotA  CscA
Polygons

- In the blank, fill in the number of sides of each polygon.

Octagon
A ____ sided polygon

Triangle
A ____ sided polygon

Nonagon
A ____ sided polygon

Pentagon
A ____ sided polygon

Decagon
A ____ sided polygon

Hexagon
A ____ sided polygon

Hendecagon
A ____ sided polygon

Heptagon
A ____ sided polygon

Dodecagon
A ____ sided polygon
Four Sided Figures

A) Rectangle
B) A 4 sided polygon
C) 2 parallel & congruent pairs
D) 4 right angles

A) Trapezoid
B) A 4 sided polygon
C) Less than or equal to one congruent pair
D) 1 parallel pair

A) Parallelograms
B) A 4 sided polygon
C) 2 parallel pairs

A) Kites
B) A 4 sided polygon
C) 2 congruent pairs

A) Square
B) A 4 sided polygon
C) All sides congruent
D) 4 right Angles
Across
5. How many players are on a soccer team.
7. As many sides as you have fingers.

Down
1. I live in Times ______.
2. Road Side Warning Signs.
3. How long is the human gestation period
4. As many sides as there are months
5. As many sides as a die
6. How many days are there in one week
Circles

Definitions:

1.) Circle:
   - The set of all points in a plane that are equidistant from a given point called the center of a circle. Which is also 360°.

2.) Diameter:
   - A chord that passes through the center of a circle. The distance across a circle through its center is 180°. Write diameter as “d”.

3.) Radius:
   - A segment whose endpoints are the center of the circle and a point on the circle. The distance from the center of a circle, to any point on the circle. Write radius as “r”.

4.) Circumference:
   - The distance around a circle.
Identify:

Identify the radius, circumference, and diameter (draw items if needed).
Review for Mastery

Circles

A chord is a line segment that connects 2 points on the circle. \(JK\) and \(GH\) are chords.

A diameter is a chord that passes through the center of the circle. \(PR\) is a diameter.

A radius is a line segment that connects a point on the circle with the center of the circle. \(AO\) and \(BO\) are radii.

A circle is named by its center. This is circle \(O\).

Use circle \(A\) for Exercises 1–4.

1. \(AB\) is a ________________.
2. \(CD\) is a ________________.
3. \(DE\) is a ________________.
4. \(CA\) is a ________________.

Use circle \(Z\) for Exercises 5–7.

5. Name 3 radii of circle \(Z\).

6. Name 2 chords of circle \(Z\).

7. Name the diameter of circle \(Z\).
Practice B

Circles

Name the parts of circle A.

1. radii ________________________
2. diameters ____________________
3. chords ________________________

Name the parts of circle H.

4. radii ________________________
5. diameters ____________________
6. chords ________________________

Name the parts of circle C.

7. radii ________________________
8. diameters ____________________
9. chords ________________________

Name the parts of circle Z.

10. radii ________________________
11. diameters ____________________
12. chords ________________________

Use the circle graph.

13. The circle graph shows the distribution of ethnic groups in New Zealand. Find the central angle measure of the sector that shows the percent of New Zealanders who are Maori.

New Zealand Population
- Maori 9.7%
- Asian/other 7.4%
- Other European 4.6%
- Pacific Islander 3.6%
- New Zealand European 74.5%
CHAPTER 9A Review for Mastery

Circumference and Area

A radius connects the center of a circle to any point on the circle.

A diameter passes through the center and connects two points on the circle.

diameter \( d = \text{twice radius } r \)
\( d = 2r \)

**Circumference** is the distance around a circle.

(The symbol \( \approx \) means *is approximately equal to*.)

Circumference \( C \approx 3(\text{diameter } d) \)
\[ C = \pi d \]

For a circle with diameter = 8 in.

\[ C = \pi d \]
\[ C = \pi(8) \]
\[ C = 8\pi \text{ in.} \]

\( \pi \approx 3.14 \)
\( C \approx 8(3.14) \approx 25.12 \text{ in.} \)

Circumference \( C \approx 6(\text{radius } r) \)
\[ C = 2\pi r \]

For a circle with radius = 8 in.

\( C = 2\pi r \)
\( C = 2\pi(8) \)
\( C = 16\pi \text{ in.} \)

\( \pi \approx 3.14 \)
\( C \approx 16(3.14) \approx 50.24 \text{ in.} \)

Find the circumference of each circle, exactly in terms of \( \pi \) and approximately when \( \pi = 3.14 \).

1. diameter = 15 ft
   \[ C = \pi d \]
   \[ C = \pi(15) = 15\pi \text{ ft} \]
   \[ C \approx 3.14(15) \approx 47.1\pi \text{ ft} \]

2. radius = 4 m
   \[ C = 2\pi r \]
   \[ C = 2\pi(4) = 8\pi \text{ m} \]
   \[ C \approx 3.14(8) \approx 25.12\pi \text{ m} \]

Area \( A = \text{the square of radius } r \)

\[ A = \pi r^2 \]

For a circle with radius = 5 in.: \( A = \pi r^2 = \pi(5^2) = 25\pi \text{ in}^2 \)
\[ A \approx 78.5 \text{ in}^2 \]

Find the area of each circle, exactly in terms of \( \pi \) and approximately when \( \pi = 3.14 \).

3. radius = 9 ft
   \[ A = \pi r^2 \]
   \[ A = \pi(9^2) = 81\pi \text{ ft}^2 \]
   \[ A \approx 3.14(81) \approx 254.34\pi \text{ ft}^2 \]

4. diameter = 10 m, radius = \( \frac{10}{2} \) m
   \[ A = \pi r^2 \]
   \[ A = \pi(5^2) = 25\pi \text{ m}^2 \]
   \[ A \approx 3.14(25) \approx 78.5\pi \text{ m}^2 \]
Practice C

Circumference and Area

Find the circumference and area of each circle to the nearest tenth. Use 3.14 for \( \pi \).

1. \begin{align*} \text{C} &= 2 \pi r \\ r &= \frac{25}{2} \text{ in.} \quad &\text{A} &= \pi r^2 \quad &\text{A} &= \pi \left(\frac{25}{2}\right)^2 \end{align*}

2. \begin{align*} \text{C} &= 2 \pi r \\ r &= \frac{48}{2} \text{ m} \quad &\text{A} &= \pi r^2 \quad &\text{A} &= \pi \left(\frac{48}{2}\right)^2 \end{align*}

3. \begin{align*} \text{C} &= 2 \pi r \\ r &= \frac{17}{2} \text{ ft} \quad &\text{A} &= \pi r^2 \quad &\text{A} &= \pi \left(\frac{17}{2}\right)^2 \end{align*}

Find the radius of each circle with the given measurement.

4. \( C = 36\pi \text{ cm} \)

5. \( C = 42\pi \text{ ft} \)

6. \( C = 80.1\pi \text{ m} \)

7. \( C = 152.6\pi \text{ in.} \)

8. \( A = 121\pi \text{ cm}^2 \)

9. \( A = 734.41\pi \text{ ft}^2 \)

10. \( A = 1024\pi \text{ m}^2 \)

11. \( A = 5184\pi \text{ in}^2 \)

Find the shaded area to the nearest tenth. Use 3.14 for \( \pi \).

12. \begin{align*} \text{A} &= \text{Outer area} - \text{Inner area} \\ &= \pi \left(\frac{12}{2}\right)^2 - \pi \left(\frac{4}{2}\right)^2 \\ &= \pi (36) - \pi (4) \\ &= 32\pi \text{ in}^2 \end{align*}

13. \begin{align*} \text{A} &= \text{Outer area} - \text{Inner area} \\ &= \pi \left(\frac{16}{2}\right)^2 - \pi \left(\frac{12}{2}\right)^2 \\ &= \pi (64) - \pi (36) \\ &= 28\pi \text{ ft}^2 \end{align*}

14. \begin{align*} \text{A} &= \text{Outer area} - \text{Inner area} \\ &= \pi \left(\frac{10}{2}\right)^2 - \pi \left(\frac{4}{2}\right)^2 \\ &= \pi (25) - \pi (4) \\ &= 21\pi \text{ ft}^2 \end{align*}

15. Derek is riding his bicycle with a 36-in. diameter wheel in a 10-mi race. How many revolutions will each wheel make in the race? Round your answer to the nearest tenth. Use 3.14 for \( \pi \).

(Hint: 12 in. = 1 ft; 5280 ft = 1 mi)
Area Formulas

Area of a Circle

Area = \pi r^2

Note:
Use 3.14 for \pi
r = radius

Area of a Rectangle and a Circle

Length

The format for the area of a rectangle is the length (L) times the width (W)

Area = L \times W

It is essentially the same for a circle, but since all sides are equal length, it can be written as area = side^2

Area of a Triangle

To find the area of a triangle, the formula is \text{Area} = \frac{1}{2} bh

b = base
h = height
Area of Figures

Work through the problems to find the area of the given figure. Please show your work & box your answers. =)

1. Find the area of the triangle

![Triangle with sides 5, 7, and 7]

2. Find the area of the circle.

![Circle with diameter 4]

3. Find the area of the rectangle.

![Rectangle with sides 6 and 10]

4. Find the area of the square.

![Square with side 42]
Area of Figures

Work through the problems to find the area of the given figure. Please show your work & box your answers. =)

1. Find the area of the triangle

2. Find the area of the circle.

3. Find the area of the square.

4. Find the area of the rectangle.
Area of Figures

Work through the problems to find the area of the given figure. Please show your work and box your answers. =)

1. Find the area of the circle.

\[ \text{Diameter} = 17 \]

2. Find the area of the circle.

3. Find the Area of the rectangle

4. Find the area of the square.
Review for Mastery

**Perimeter and Area of Parallelograms**

**Perimeter** = distance around a figure.
To find the perimeter of a figure, add the lengths of all its sides.

![Diagram of a parallelogram](image)

**Perimeter of Rectangle**
\[ P = 2l + 2w \]

**Perimeter of Parallelogram**
\[ P = 2l + 2w \]

**Area** = number of square units contained inside a figure.
The rectangle contains 12 square units.
Area of rectangle = \[ 4 \times 3 = 12 \text{ units}^2 \]

![Diagram of a rectangle](image)

**Area of Rectangle** = \( b \times h \)  
**Area of Parallelogram** = \( b \times h \)

Complete to find the perimeter of each figure.

1. \[
\begin{align*}
\text{Perimeter of rectangle} & = 2w + 2\ell \\
& = 2(\text{in.}) + 2(\text{in.}) \\
& = \text{in.} + \text{in.} \\
& = \text{in.}
\end{align*}
\]
Area of rectangle = \( b \times h \)
\[ b = \text{in.} \times \text{in.} = \text{in}^2 \]

2. \[
\begin{align*}
\text{Perimeter of parallelogram} & = 2w + 2\ell \\
& = 2(\text{m}) + 2(\text{m}) \\
& = \text{m} + \text{m} \\
& = \text{m}
\end{align*}
\]
Area of parallelogram = \( b \times h \)
\[ b = \text{m} \times \text{m} = \text{m}^2 \]
You can find the area of a composite figure by dividing it into rectangles, triangles, or other simple shapes.

To find the shaded area at right, divide the figure into a triangle and a semicircle as shown.

area of triangle:
\[ A = \frac{1}{2}bh = \frac{1}{2}(11)(7) = 38.5 \text{ m}^2 \]

area of semicircle:
\[ A = \frac{1}{2}\pi r^2 = \frac{1}{2}(3.14)(3.5)^2 \approx 19.2 \text{ m}^2 \]

Add the area of the triangle and the area of the semicircle.

total area: \[ A = 38.5 + 19.2 = 57.7 \text{ m}^2 \]

Find the shaded area. Round to the nearest tenth, if necessary.

1. 

\[
\begin{array}{c}
\text{8 ft} \\
5 \text{ ft} \\
13 \text{ ft} \\
8 \text{ ft}
\end{array}
\]

2. 

\[
\begin{array}{c}
15 \text{ in.} \\
6 \text{ in.}
\end{array}
\]

3. 

\[
\begin{array}{c}
16 \text{ cm} \\
10 \text{ cm} \\
6 \text{ cm} \\
2 \text{ cm}
\end{array}
\]

4. 

\[
\begin{array}{c}
5 \text{ m} \\
1.5 \text{ m} \\
3 \text{ m} \\
1 \text{ m} \\
2 \text{ m}
\end{array}
\]

5. 

\[
\begin{array}{c}
5 \text{ yd} \\
3 \text{ yd} \\
8 \text{ yd}
\end{array}
\]

6. 

\[
\begin{array}{c}
5 \text{ ft} \\
8 \text{ ft} \\
5 \text{ ft} \\
18 \text{ ft}
\end{array}
\]
Perimeter Crossword

Find the perimeter of the different shapes drawn below. To check the accuracy of your responses, place your answers in the crossword grid.

figure A
21 in
46 in

figure B
39 m

30 m
20 m
13 m
11 m
25 m

39 m

figure C
11 cm
8 cm
6 cm
1 cm

Regular Pentagon
figure D
31 ft

5"
5"

3"

5"

5"

14 km
9 km
7 km
11 km
8 km
7 km

figure E

Across
1. \( P_{\text{figure A}} = \) 
2. \( P_{\text{figure C}} = \) 
5. \( P_{\text{figure F}} = \) 

Down
1. \( P_{\text{figure B}} = \) 
3. \( P_{\text{figure D}} = \) 
4. \( P_{\text{figure E}} = \)
Pythagorean Theorem

The longest side of the triangle is called the "hypotenuse"

Definition: In a right angled triangle the square of the hypotenuse is equal to the sum of the squares of the other two sides

\[ a^2 + b^2 = c^2 \]

So if the square of a \((a^2)\) plus the square of \(b\) \((b^2)\) is equal to the square of \((c^2)\)

\[ a^2 + b^2 = c^2 \]

Examples

Example-1

\[ a^2 + b^2 = c^2 \]

\[ 5^2 + 12^2 = c^2 \]

\[ 25 + 144 = c^2 \]

\[ 169 = c^2 \]

\[ c = \sqrt{169} \]

\[ c = 13 \]
Example 2- Does this angle have a right angle?

\[ \sqrt{3} \quad \sqrt{5} \quad \sqrt{8} \]

\[ a^2 + b^2 = c^2 \]

\[ (\sqrt{3})^2 + (\sqrt{5})^2 = (\sqrt{8})^2 \]

3 + 5 = 8

Yes it does! This is a right angled triangle!
**Review for Mastery**

**4-9 The Pythagorean Theorem**

You can find the length of a side by using the Pythagorean Theorem.

\[ a^2 + b^2 = c^2 \]
\[ 3^2 + 4^2 = c^2 \]
\[ 9 + 16 = c^2 \]
\[ 25 = c^2 \]
\[ c = 5 \text{ in.} \]

Complete to find the length of each hypotenuse.

1. \[ \begin{array}{c}
5 \text{ ft} \\
12 \text{ ft}
\end{array} \]
   \[ c \]

   \[ a^2 + b^2 = c^2 \]
   \[ \quad + \quad = c^2 \]
   \[ \quad + \quad = c^2 \]
   \[ \quad = c^2 \]
   \[ c = \quad \text{ ft} \]

2. \[ \begin{array}{c}
8 \text{ in.} \\
15 \text{ in.}
\end{array} \]
   \[ c \]

   \[ a^2 + b^2 = c^2 \]
   \[ \quad + \quad = c^2 \]
   \[ \quad + \quad = c^2 \]
   \[ \quad = c^2 \]
   \[ c = \quad \text{ in.} \]

Complete to find the length of each leg.

3. \[ a^2 + b^2 = c^2 \]
   \[ \quad + b^2 = \quad \]
   \[ \quad + b^2 = \quad \]
   \[ - \quad - \quad \]
   \[ b^2 = \quad \]
   \[ b = \quad \text{ in.} \]

4. \[ a^2 + \quad = \quad \]
   \[ a^2 + \quad = \quad \]
   \[ - \quad - \quad \]
   \[ a^2 = \quad \]
   \[ a = \quad \text{ cm} \]
**Practice B**

**The Pythagorean Theorem**

Use the Pythagorean Theorem to find each missing measure to the nearest tenth.

1. \[ \triangle ABC \]
   - \( AC = 10 \)
   - \( BC = 10 \)

2. \[ \triangle ABC \]
   - \( AB = 18 \)
   - \( BC = 12 \)

3. \[ \triangle ABC \]
   - \( AB = b \)
   - \( BC = 21 \)

4. \[ \triangle ABC \]
   - \( AB = 23 \)
   - \( BC = 14 \)

5. \[ \triangle ABC \]
   - \( AB = 23 \)
   - \( AC = a \)

6. \[ \triangle ABC \]
   - \( AB = 78 \)
   - \( BC = 30 \)

**Tell whether the given side lengths form a right triangle.**

7. \( 12, 35, 37 \)

8. \( 9, 11, 14 \)

9. \( 20, 21, 29 \)

10. A glider flies 8 miles south from the airport and then 15 miles east. Then it flies in a straight line back to the airport. What was the distance of the glider's last leg back to the airport?
Triangles – Pythagorean Theorem – Crossword

Find the missing sides. Round your answer to the nearest whole number. To check the accuracy of your responses, place your answers in the crossword grid.

Across
1. b = _____
2. a = _____
3. d = _____
4. g = _____

Down
1. c = _____
4. e = _____
5. f = _____
6. h = _____
MIDPOINT FORMULA

Congruent: everything is equal

-symbol: \( \equiv \)

Midpoint of segment: point that divides a segment into 2 congruent pieces

-example:

Midpoint of \( \overline{AB} \) is point C

\[
\begin{array}{c}
\text{A} \\
\hline
\text{C} \\
\hline
\text{B}
\end{array}
\]

\( AC \equiv CB \)

Midpoint formula definition: finds midpoint of a segment given its two end point

Midpoint formula: \( \left[ \frac{x_1+x_2}{2}, \frac{y_1+y_2}{2} \right] \)

Solve: find the midpoint for \( \overline{AB} \) with the midpoint C given \( A(1,-3) \) and \( B(4,2) \)

Step 1: Label \( x \) & \( y \)

\[ 1 = x_1 \quad -3 = y_1 \quad 4 = x_2 \quad 2 = y_2 \]

Step 2: substitute \( X \) & \( Y \) in formula

\[
M = \left[ \frac{x_1+x_2}{2}, \frac{y_1+y_2}{2} \right]
\]

\[
M = \left[ \frac{1+4}{2}, \frac{-3+2}{2} \right]
\]

\[
M = \left[ \frac{5}{2}, \frac{-1}{2} \right]
\]
Step 3: Solve

\[
M = \begin{pmatrix}
\frac{1}{1+4}; & \frac{-3+2}{2} \\
2 & 2
\end{pmatrix}
\]

\[
M = 2.5; -0.5
\]

C(2.5, -0.5)

You can use the midpoint formula to find an endpoint:

Find endpoint B in AB with A(1,-4) and given midpoint C(3,2)

Step 1: Label x & y

\[
x_1 = 1 \quad m_1 = 3 \quad y_1 = -4 \quad m_2 = 2
\]

Step 2: Substitute X&Y in formula

\[
M = \begin{pmatrix}
x_1+x_2, & y_1+y_2 \\
2 & 2
\end{pmatrix}
\]

\[
\begin{pmatrix}
3 = \frac{1+x}{2}, & 2 = \frac{-4+y}{2} \\
2 & 2
\end{pmatrix}
\]

Step 3: Solve

\[
\begin{align*}
2\times3 &= 1+x \times 2 \\
2\times2 &= -4+y \times 2
\end{align*}
\]

\[
\begin{align*}
2 & \quad 2 \\
-1+6 &= 1+x-1 \\
5 &= x
\end{align*}
\]

\[
4+4 &= -4+y+4 \\
8 &= y
\]

B(5,4) ← Answer
On a separate piece of paper (showing your work), solve for midpoint $C$ in $\overline{AB}$:

1. $A(1,5)$ $B(3,6)$
2. $A(4,2)$ $B(11,9)$
3. $A(0,1)$ $B(3,4)$
4. $A(2,0)$ $B(8,17)$

On a separate paper (show your work), solve for $A$ in $\overline{AB}$ with midpoint $C$:

5. $B(3,4)$ $C(2,3)$
6. $B(10,17)$ $C(12,16)$
7. $B(12,4)$ $C(3,19)$
8. $B(10,6)$ $C(8,9)$

On a separate paper (show your work), solve for $B$ in $\overline{AB}$ with midpoint $C$:

9. $A(9,5)$ $C(8,12)$
10. $A(10,20)$ $C(2,3)$
11. $A(8,3)$ $C(9,5)$
12. $A(2,3)$ $C(4,5)$
LESSON 4-5

Review for Mastery

Squares and Square Roots

A perfect square has two identical factors.

\[ 25 = 5 \times 5 = 5^2 \text{ or } 25 = (-5) \times (-5) = (-5)^2 \quad 25 \text{ is a perfect square.} \]

Tell if the number is a perfect square.
If yes, write its identical factors.

1. 121
2. 200
3. 400

Since \( 5^2 = 25 \) and also \( (-5)^2 = 25 \),
\[ \sqrt{25} = 5 \text{ and } -\sqrt{25} = -5 \]
both 5 and -5 are square roots of 25.
The principal square root of 25 is 5: \( \sqrt{25} = 5 \)

Write the two square roots of each number.

4. \[ \sqrt{81} = \underline{9} \quad 5. \sqrt{625} = \underline{25} \quad 6. \sqrt{169} = \underline{13} \]
\[ -\sqrt{81} = \underline{-9} \quad -\sqrt{625} = \underline{-25} \quad -\sqrt{169} = \underline{-13} \]

Write the principal square root of each number.

7. \[ \sqrt{144} = \underline{12} \quad 8. \sqrt{6400} = \underline{80} \quad 9. \sqrt{10,000} = \underline{100} \]

Use the principal square root when evaluating an expression. For the order of operations, do square root first, as you would an exponent.

5\sqrt{100} - 3
5(10) - 3
50 - 3

Simplify each expression.

10. \[ \sqrt{196a^{12}} \]
11. \[ \sqrt{100b^{10}} \]
12. \[ \sqrt{36s^{16}} \]
**Square Roots**

Square roots are the opposite of exponents. You are basically undoing the “power.” If you square $x$ then you will get $x^2$. If you put $x^2$ in the radical then you will get $x$. The radical looks like this $\sqrt{}$. The number goes under the radical.

Example: $2^2 = 4$, $\sqrt{4} = 2$

**Simplifying**

All number can put under the radical, but unless they can be squared they will not turn out as a whole number. For example if you put 3 under the radical you would get a decimal. When you have larger numbers you can simplify the number by finding the multiples that the number is made of. The only way you can take numbers out is if it has a pair. Once you find a pair, you drop one and put the other outside of the radical while the remaining number is kept inside the radical.

Example: $\sqrt{52}$

```
  2 x 26
  \  \    2 times 26 make 52
  2 x 13    2 times 13 makes 52 which means you can take the twos.
    \     This is the answer because when you take the twos you have to drop one.
```

$\sqrt{52} = 2\sqrt{13}$

**Adding Square Roots**

You can add square roots if and only if the number inside the radical is the same. You add the number outside the radical together and the number inside the radical will remain the same. If there is no number in front of the radical then the number you add is 1.

Example: $3\sqrt{4} + \sqrt{4} = 4\sqrt{4}$
SIMPLIFY OR ADD THE FOLLOWING:

1. \(\sqrt{72}\)  
2. \(\sqrt{342}\)  
3. \(\sqrt{81}\)  
4. \(\sqrt{23}\)  
5. \(\sqrt{63}\)  
6. \(\sqrt{45} + 3\sqrt{45}\)  
7. \(2\sqrt{3} + 4\sqrt{7}\)  
8. \(\sqrt{32}\)  
9. \(\sqrt{64} + \sqrt{9}\)  
10. \(\sqrt{64}\)  
11. \(\sqrt{8}\)  
12. \(\sqrt{45}\)  
13. \(6\sqrt{8} + 7\sqrt{8}\)  
14. \(\sqrt{4} + \sqrt{4}\)  
15. \(3\sqrt{81}\)  
16. \(\sqrt{34}\)  
17. \(\sqrt{68}\)  
18. \(\sqrt{7} + 4\sqrt{7}\)  
19. \(\sqrt{21}\)  
20. \(\sqrt{56}\)
PARALLEL LINES, PLANES, & TRANSVERSALS

Parallel Lines: two lines are parallel lines if they do not intersect and are coplanar

Skew Lines: two lines are skew lines if they do not intersect and are not coplanar

Parallel Planes: two planes are parallel if they do not intersect and they are parallel to each other

- Lines M and N are parallel lines
- Lines M and K are skew lines
- Planes T and U are intersecting lines

Define Complementary Angles:


Define Supplementary Angles:


Define Vertical Angles:


Define Adjacent Angles:


Transversal: a line that intersects two or more coplanar lines at different points (see picture below).

Rewrite the definition of a transversal in your own words:


Line $l$ and Line $m$ are parallel. Identify all of the following pairs of angles:

(e.g. \( \angle 3 \& \angle 5 \))

- Complementary Angles:

- Supplementary Angles:

- Vertical Angles:

- Adjacent Angles:
What is the difference between vertical and adjacent angles?

What is the difference between parallel lines and skew lines?
Parallel & Perpendicular Lines

**Parallel lines** never intersect and are always coplanar.

![Graph showing parallel lines](image)

You can prove that these lines are parallel by finding each line’s slope. Parallel lines **always have the same slope**. Find the slope through slope formula.

\[
m = \frac{y_2 - y_1}{x_2 - x_1} \quad (y_1 \neq y_2) \quad (x_1 \neq x_2)
\]

\(m\) is the variable for slope. The number attached to \(x\) or \(y\) signifies whether it was the first \((x, y)\) or the second one. This will make more sense once you read the example below.

We will pick two points from each of the lines.
From the parallel line on the left: \((-4,0)\) \((0,4)\)
From the parallel line on the right: \((-2,0)\) \((-2,0)\)

<table>
<thead>
<tr>
<th>Upper Left Line</th>
<th>((x_1, y_1))</th>
<th>((x_2, y_2))</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.4</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bottom Right Line</th>
<th>((x_1, y_1))</th>
<th>((x_2, y_2))</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

This concludes that the slope of both lines is -1. Thus, the lines are parallel to each other.
**Perpendicular lines** intersect and form a 90 degree angle.

You can prove that these lines are perpendicular by finding their slopes as we did before. The slopes of perpendicular lines are **opposite reciprocals**. This means that one the fractions is flipped and has the opposite sign (positive or negative) from the other one.

\[
\frac{2}{1} \rightarrow -\frac{1}{2}
\]

Now we will find the slope of each line, just as we did before. We will pick two points from each line.
From the vertical line: \((2, 1) (4, 0)\)
From the horizontal line: \((1, 4) (2, 6)\)

**Vertical line:** \((2, 1) (4, 0)\)

**Horizontal line:** \((1, 4) (2, 6)\)

\[
\frac{0-1}{4-2} = -\frac{1}{2}
\]

\[
\frac{6-4}{2-1} = \frac{2}{1}
\]

The lines' slopes are opposite reciprocals of each other, which proves they are perpendicular.

Know that negatives will often come up with parallel and perpendicular lines. You may get two points like \((2, 4)\) and \((-2, -4)\). Remember, two negatives become a positive. For instance, \(2 \cdot -2 = 4\). It is the same thing as saying “Summer homework is not not awesome.” This means, of course, that “Summer homework is awesome.”
You do not necessarily need to see a graph in order to determine whether two lines are perpendicular or parallel. Questions are often asked in this format:

Determine whether line EZ (4, 2) (2, 4) is parallel to line QT (2, 2) (4, 4).

\[
\text{line EZ } (4, 2) (2, 4) \quad \text{line QT } (2, 2) (4, 4)
\]

\[
\frac{y-2}{x-4} = \frac{2}{-2}
\]

\[
\frac{y-2}{x-2} = \frac{2}{2}
\]

\[
\text{noooooo, EZ is not } \parallel \text{ to QT.}
\]

\[
\parallel \text{ is simply a shortcut for the word parallel.}
\]

\[
\perp \text{ is the shortcut for the word "perpendicular".}
\]

Questions can also be asked in the standard equation of a line format, \(y=mx+b\). In order to do these kinds of problems, you must know how to solve for a variable. Refer to the “solve for x” section of your homework packet if you do not know how to do this. We already know that “m” stands for slope, so you can easily determine the status of the lines.

If you are already given the slope, you do not need to do any math. Simply remember that parallel lines have the same slope and that perpendicular lines have the opposite reciprocal for slopes.

\[
\begin{align*}
\text{parallel} & \quad \quad \text{perpendicular} \\
y = \frac{1}{2} x + 6 & \quad & y = 2x + 2 \\
y = 2x + 4 & \quad & y = 2x + 3,000
\end{align*}
\]

If you do not know the slope but you are given \(x, y\), and \(b\), you can easily solve for \(m\).

\[
\begin{align*}
\text{If you do not know the slope but you are given } x, y, \text{ and } b, \text{ you can easily solve for } m.
\end{align*}
\]

\[
\begin{align*}
y &= mx + b \\
y &= 5 \\
-1 &= m\cdot 4 + b
\end{align*}
\]

\[
\begin{align*}
4 &= \frac{4}{4} m \\
m &= 1 \quad \text{the lines are parallel}
\end{align*}
\]

\[
\text{Don't forget to simplify your fractions.}
\]
Now that you’ve learned the basics of parallel and perpendicular lines, it’s time to get down to business with some math problems. Do your work on a separate sheet of paper, but write and circle the answer wherever space provides you to for each problem.

1. Identify whether the lines on each graph are parallel, perpendicular, or neither.

A.

![Graph A with points (-1,1), (-1,5) & (3,1), (3,5)]

B.

![Graph B with points (3,3), (6,2) & (1,-3), (-1,3)]
2. Identify whether the lines and their given points are parallel, perpendicular, or neither.

A. Line DR is (5, -6) (-10, 2). Line BA is (-2, 4) (10, 2)

B. Line SR is (2, 2) (4, 4). Line MS is (-4, -4) (-8, -8)

C. Line NO is (3, 12) (1, 4). Line HM is (4, 1) (2, 8)

3. Determine whether the lines with their given slopes are parallel, perpendicular, or neither.

A. $20y=100,000x + 49b$ & $2y=100,000x +4b$

B. $888y=8x + 88b$ & $88y=-1/8x + 88b$

C. $y=x+b$ & $y=x+b$

4. Draw a pair of parallel lines and prove that they are, indeed, parallel.

5. Solve for M.

$10= m10 + 200$
6. Write an equation of a line that would be parallel to the line given in problem 5.

7. Write an equation of a line that would be perpendicular to the line given in problem 5.

Bonus Problem: If you do not want to do this problem, you don’t have to. However, you will get major brownie points if you at least try.

8. The statistics in this problem are taken from the last US Census. In this problem, the slope will actually refer to a percentage.

10% of the citizens in Gilroy, California live below the poverty line.
7% of the citizens in Hollister, California live below the poverty line.
Construct a visual to prove that the two towns are not parallel, or similar, in their level of poverty.

Write out two separate equations of a line: \( y = 10x + b \) & \( y = 7x + b \)
Decide on the same value for both x’s (both must equal the same number) and do the same for both of the y’s.
Now graph your two lines to illustrate how, despite all the other factors being the same, the different slope or, in this case, difference in % of poverty causes the two lines to be quite different.

You get extra brownie points if you think about how the graph relates to the problem of poverty. What does it mean to live “below the line of poverty”? How is a town affected when a large amount of its citizens struggle to buy food and pay for housing?
**Review for Mastery**

**Coordinate Geometry**

To find the slope of a line, use a direction ratio such as \( \frac{\text{up}}{\text{right}} \).

direction ratio from \( A \) to \( B \) = \( \frac{\text{up 5}}{\text{right 3}} \)

slope of \( \overline{AB} = \frac{5}{3} \)

Complete to find the slope of each line.

1. From \( A \) to \( B \), do you go up or down? How many units? ______
Do you go right or left? How many units? ______

slope of \( \overline{AB} = _______ \)

The slopes of parallel lines are equal.

The product of the slopes of perpendicular lines is \(-1\).

Complete each statement. If the slope of \( \overline{CD} = \frac{-2}{3} \)

2. and \( \overline{CD} \) is parallel to \( \overline{XY} \), then the slope of \( \overline{XY} \) is: ________

3. and \( \overline{CD} \) is perpendicular to \( \overline{PQ} \), then the slope of \( \overline{PQ} \) is: ________
LESSON 8-5 Coordinate Geometry

Determine if the slope of each line is positive, negative, 0, or undefined. Then find the slope of each line.

1. \( \overline{AB} \)

2. \( \overline{CD} \)

3. \( \overline{RS} \)

4. \( \overline{TC} \)

5. \( \overline{DR} \)

6. \( \overline{TX} \)

7. Which lines are parallel?

8. Which lines are perpendicular?

Graph the quadrilateral with the given vertices. Write all the names that apply to the quadrilateral.

9. \((-1, 1), (4, 1), (1, -3), (-4, -3)\)

Find the coordinates of the missing vertex.

10. rhombus \(ABCD\) with \(A(0, 4), B(4, 1),\) and \(C(0, -2)\)
Review for Mastery

Finding Slope of a Line

The slope of a line is a measure of its tilt, or slant.

The slope of a straight line is a constant ratio, the "rise over run," or the vertical change over the horizontal change.

You can find the slope of a line by comparing any two of its points. The vertical change is the difference between the two y-values. And the horizontal change is the difference between the two x-values.

\[
slope = \frac{y_2 - y_1}{x_2 - x_1}
\]

point A: (3, 2)  point B: (4, 4)

Make point A \((x_1, y_1)\).
Make point B \((x_2, y_2)\).

\[
slope = \frac{4 - 2}{4 - 3} = \frac{2}{1}, \text{ or } 2
\]

So, the slope of the line is 2.

You can make point A \((x_2, y_2)\) and point B \((x_1, y_1)\).

\[
slope = \frac{2 - 4}{3 - 4} = \frac{-2}{-1}, \text{ or } 2
\]

So, the slope remains 2.

Find the slope of the line that passes through each pair of points.

1. (1, 5) and (2, 6)
2. (0, 3) and (2, 7)
3. (2, 5) and (3, 4)
4. (6, 9) and (2, 7)
5. (6, 5) and (8, -1)
6. (7, -4) and (4, -2)
Review for Mastery

Points, Lines, Planes, and Angles

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Diagram</th>
<th>Notation</th>
<th>Write</th>
<th>Read</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line</td>
<td>an infinite collection of points with no beginning and no end</td>
<td><img src="line.png" alt="Diagram" /></td>
<td>$\overline{AB}$</td>
<td>line $AB$, or $\overline{BA}$</td>
<td>line $AB$, or line $\ell$</td>
</tr>
<tr>
<td>Line Segment</td>
<td>part of a line, with two endpoints</td>
<td><img src="segment.png" alt="Diagram" /></td>
<td>$\overline{AB}$</td>
<td>line segment $AB$, or $\overline{BA}$</td>
<td>line segment $BA$</td>
</tr>
<tr>
<td>Ray</td>
<td>part of a line, with one endpoint</td>
<td><img src="ray.png" alt="Diagram" /></td>
<td>$\overline{AB}$</td>
<td>ray $AB$</td>
<td></td>
</tr>
</tbody>
</table>

Use the diagram, to name each type of figure.

1. $\overline{MP}$
2. $k$
3. $\overline{MN}$
4. $\overline{LJ}$
5. $\overline{JL}$

<table>
<thead>
<tr>
<th>Acute Angle</th>
<th>Right Angle</th>
<th>Obtuse Angle</th>
<th>Straight Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="acute.png" alt="Acute Angle" /></td>
<td><img src="right.png" alt="Right Angle" /></td>
<td><img src="obtuse.png" alt="Obtuse Angle" /></td>
<td><img src="straight.png" alt="Straight Angle" /></td>
</tr>
</tbody>
</table>

Use the diagram to name each type of angle.

6. $\angle BCD$
7. $\angle BAD$
8. $\angle BDA$
9. $\angle CDA$
10. $\angle BDC$
11. $\angle ABC$
Review for Mastery

8-3 Angle Relationships

Vertical Angles

\[ \angle a \text{ and } \angle b, \ \angle c \text{ and } \angle d \]

are pairs of vertical angles.

Intersecting lines form two pairs of vertical angles. When parallel lines are cut by a transversal, 8 angles are formed, 4 acute and 4 obtuse.

The acute angles are all congruent.
The obtuse angles are all congruent.

Any acute angle is supplementary to any obtuse angle.

In each diagram, parallel lines are cut by a transversal. Name the angles that are congruent to the indicated angle.

1. \begin{align*}
\angle 1 & : \angle 3, \angle 4, \angle 5, \angle 7 \\
\angle 2 & : \angle 3, \angle 4, \angle 5, \angle 7
\end{align*}

The angles congruent to \( \angle 1 \) are:

2. \begin{align*}
\angle a & : \angle d, \angle e, \angle f, \angle g \\
\angle b & : \angle d, \angle e, \angle f, \angle g
\end{align*}

The angles congruent to \( \angle a \) are:

3. \begin{align*}
\angle z & : \angle v, \angle s, \angle w, \angle x \\
\angle y & : \angle v, \angle s, \angle w, \angle x
\end{align*}

The angles congruent to \( \angle z \) are:

In each diagram, parallel lines are cut by a transversal and the measure of one angle is given. Write the measures of the remaining angles on the diagram.

4. \begin{align*}
\angle 150^\circ & : \angle 30^\circ, \angle 150^\circ, \angle 30^\circ, \angle 30^\circ \\
\angle 150^\circ & : \angle 30^\circ, \angle 150^\circ, \angle 30^\circ, \angle 30^\circ
\end{align*}

5. \begin{align*}
\angle 135^\circ & : \angle 45^\circ, \angle 135^\circ, \angle 45^\circ, \angle 45^\circ \\
\angle 135^\circ & : \angle 45^\circ, \angle 135^\circ, \angle 45^\circ, \angle 45^\circ
\end{align*}

6. \begin{align*}
\angle 90^\circ & : \angle 90^\circ, \angle 90^\circ, \angle 90^\circ, \angle 90^\circ \\
\angle 90^\circ & : \angle 90^\circ, \angle 90^\circ, \angle 90^\circ, \angle 90^\circ
\end{align*}
**Practice B**

**8.3 Angle Relationships**

In the figure, \(\angle 1\) and \(\angle 3\) are vertical angles, and \(\angle 2\) and \(\angle 4\) are vertical angles.

1. If \(m\angle 2 = 110^\circ\), find \(m\angle 4\).
2. If \(m\angle 1 = n^\circ\), find \(m\angle 3\).

In the figure, line \(m \parallel \) line \(n\). Find the measure of each angle.

3. \(\angle 1\)  
4. \(\angle 2\)  
5. \(\angle 5\)

6. \(\angle 6\)  
7. \(\angle 8\)  
8. \(\angle 7\)

In the figure, line \(a \parallel \) line \(b\). Find the measure of each angle.

9. \(\angle 2\)  
10. \(\angle 5\)  
11. \(\angle 6\)

12. \(\angle 7\)  
13. \(\angle 4\)  
14. \(\angle 3\)
**Review for Mastery**

**Lesson 5-5**

**Similar Figures**

Similar Polygons

- same shape
- corresponding angles are congruent
  \[ \angle A \cong \angle A', \angle B \cong \angle B', \angle C \cong \angle C' \]
- usually different size
- corresponding sides are in proportion
  \[ \frac{AB}{A'B'} = \frac{BC}{B'C'} = \frac{AC}{A'C'} \]

Complete to tell if the polygons are similar.

1. a. corresponding angles: \( \angle A \) and _____, \( \angle B \) and _____, \( \angle C \) and _____, \( \angle D \) and _____
   
   b. all corresponding angles congruent? _____
   
   c. The ratio of each pair of corresponding sides is:
      \[ \frac{AB}{\_\_\_\_\_\_} = \frac{BC}{\_\_\_\_\_\_}, \frac{CD}{\_\_\_\_\_\_}, \frac{AD}{\_\_\_\_\_\_} = 7.5 \text{ cm} \]
   
   d. Are the corresponding sides proportional? Explain.

   e. Are the parallelograms similar? Explain.

Use a proportion to find a missing dimension. Corresponding sides are in proportion.

\[ \frac{AB}{DE} = \frac{BC}{EF} \]
\[ \frac{6}{9} = \frac{BC}{15} \]

\[ 9(BC) = 90 \]
\[ BC = 10 \text{ m} \]

Complete to find the missing dimension.

2. \[ \frac{MH}{RE} = \_\_\_\_\_\_\_ \]
   
   \[ \frac{MH}{6} = \_\_\_\_\_\_\_ \]
   
   \[ \_\_\_\_\_\_\_ \cdot (MH) = \_\_\_\_\_\_\_ \]
   
   \[ MH = \_\_\_\_\_\_\_ \text{ in.} \]
Review for Mastery

**Indirect Measurement**

If two triangles are similar, you can set up and solve a proportion to find a missing side length.

\[ \triangle ABC \sim \triangle DBE \]

\[ \frac{AB}{BC} = \frac{DB}{BE} \]

\[ \frac{9}{6} = \frac{27}{x} \quad \text{Find cross products.} \]

\[ 9x = 6(27) \quad \text{Simplify.} \]

\[ \frac{9x}{9} = \frac{162}{9} \quad \text{Divide both sides by 9.} \]

\[ x = 18 \]

The length of \( EB \) is 18 feet.

Each pair of triangles is similar. Find each missing length.

1. \[
\frac{HK}{HJ} = \frac{HI}{HG} \]
   \[
\frac{12}{20} = \frac{x}{45} \]
   \[ x = \quad \text{HI = } \]

2. \[
\frac{TP}{PR} = \frac{SQ}{QR} \]
   \[
\frac{x}{52} = \frac{24}{16} \]
   \[ x = \quad \text{TP = } \]
LESSON 5-6

Practice B

Indirect Measurement

1. Tamara wants to know the width of the pond at the park. She drew the diagram and labeled it with the measurements she made. How wide is the pond?

Use the diagram for 2 and 3.

2. How tall is the flagpole?

3. How tall is the child?

Use the diagram for 4 and 5.

4. How tall is the house?

5. The tree is 56 feet tall. How long is its shadow?

6. Drew wants to know the distance across the river. He drew the diagram and labeled it with the measurements he made. What is the distance across the river?

7. A warehouse is 120 feet tall and casts a shadow 288 feet long. At the same time, Julie casts a shadow 12 feet long. How tall is Julie?
Practice A
Three-Dimensional Figures

Describe the base of each prism or pyramid. Then choose the name of the prism or pyramid from the box.

<table>
<thead>
<tr>
<th>rectangular prism</th>
<th>square pyramid</th>
<th>triangular prism</th>
<th>pentagonal prism</th>
</tr>
</thead>
<tbody>
<tr>
<td>square prism</td>
<td>triangular pyramid</td>
<td>hexagonal prism</td>
<td>rectangular pyramid</td>
</tr>
<tr>
<td>hexagonal pyramid</td>
<td>pentagonal pyramid</td>
<td></td>
<td>octagonal prism</td>
</tr>
</tbody>
</table>

1. [Diagram]
2. [Diagram]
3. [Diagram]
4. [Diagram]
5. [Diagram]
6. [Diagram]

Classify each figure as a polyhedron or not a polyhedron. Then name the figure.

7. [Diagram]
8. [Diagram]
9. [Diagram]