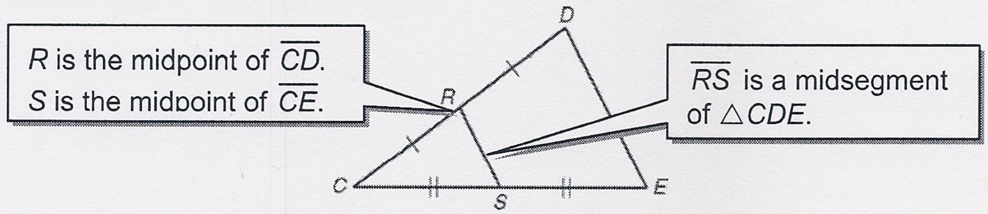
Name ______________________ Date ______________ Class______________

LESSON 5-4

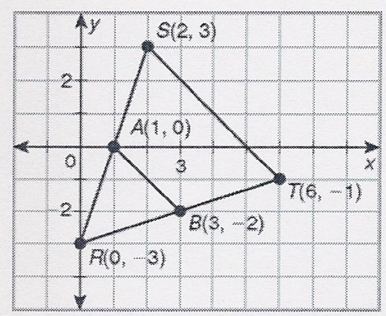
Reteach

The Triangle Midsegment Theorem

A **midsegment** of a triangle joins the midpoints of two sides of the triangle. Every triangle has three midsegments.



Use the figure for Exercises 1–4. $\overline{AB}$ is a midsegment of $\triangle RST$.



1. What is the slope of midsegment $\overline{AB}$ and the slope of side $\overline{ST}$?

   ____

2. What can you conclude about $\overline{AB}$ and $\overline{ST}$?

   ____

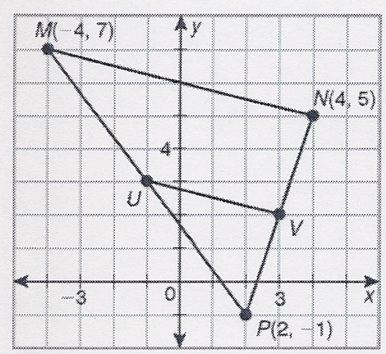
3. Find AB and ST.

   ____

4. Compare the lengths of $\overline{AB}$ and $\overline{ST}$.

   ____

Use $\triangle MNP$ for Exercises 5–7.



5. $\overline{UV}$ is a midsegment of $\triangle MNP$. Find the coordinates of U and V.

   ____

6. Show that $\overline{UV} \parallel \overline{MN}$.

   ____

   ____

   ____

7. Show that $UV = \frac{1}{2}MN$.

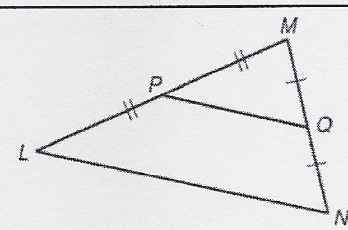
   ____

Name ________________________ Date ______________ Class______________

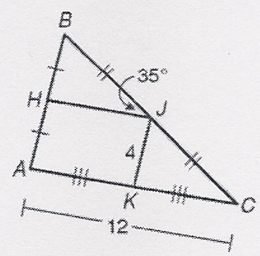
LESSON 5-4

Reteach

The Triangle Midsegment Theorem continued

Theorem	Example
Triangle Midsegment Theorem A midsegment of a triangle is parallel to a side of the triangle, and its length is half the length of that side.	 **Given:** $\overline{PQ}$ is a midsegment of $\triangle LMN$. **Conclusion:** $\overline{PQ} \parallel \overline{LN}$, $PQ = \frac{1}{2}LN$

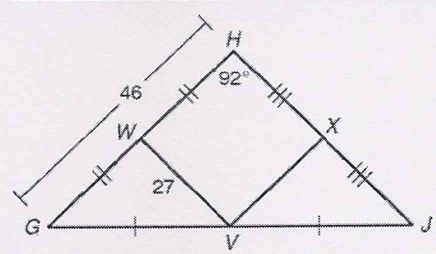
You can use the Triangle Midsegment Theorem to find various measures in $\triangle ABC$.



$HJ = \frac{1}{2}AC$	△ Midsegment Thm.
$HJ = \frac{1}{2}(12)$	Substitute 12 for *AC*.
$HJ = 6$	Simplify.

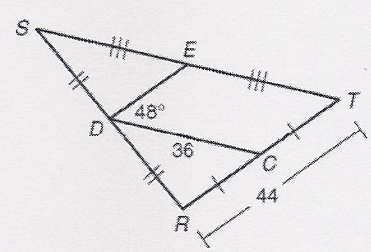
$JK = \frac{1}{2}AB$	△ Midsegment Thm.	$\overline{HJ} \parallel \overline{AC}$	Midsegment Thm.
$4 = \frac{1}{2}AB$	Substitute 4 for *JK*.	$m\angle BCA = m\angle BJH$	Corr. ∡ Thm.
$8 = AB$	Simplify.	$m\angle BCA = 35°$	Substitute 35° for $m\angle BJH$.

Find each measure.



8. $VX =$ ____________________
9. $HJ =$ ____________________
10. $m\angle VXJ =$ ____________________
11. $XJ =$ ____________________

Find each measure.



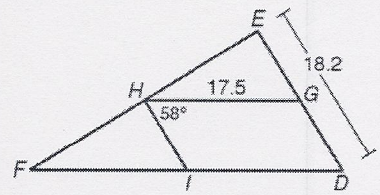
12. $ST =$ ____________________
13. $DE =$ ____________________
14. $m\angle DES =$ ____________________
15. $m\angle RCD =$ ____________________

Name ______________________ Date ______________ Class______________

LESSON 5-4

Practice B

The Triangle Midsegment Theorem

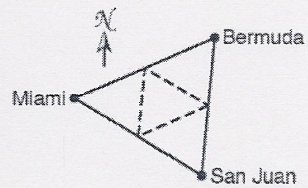


Use the figure for Exercises 1–6. Find each measure.

1. HI ________________
2. DF ________________
3. GE ________________
4. m$\angle HIF$ ________________
5. m$\angle HGD$ ________________
6. m$\angle D$ ________________

The Bermuda Triangle is a region in the Atlantic Ocean off the southeast coast of the United States. The triangle is bounded by Miami, Florida; San Juan, Puerto Rico; and Bermuda. In the figure, the dotted lines are midsegments.

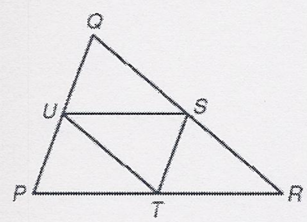
	Dist. (mi)
Miami to San Juan	1038
Miami to Bermuda	1042
Bermuda to San Juan	965



7. Use the distances in the chart to find the perimeter of the Bermuda Triangle. ________________
8. Find the perimeter of the midsegment triangle within the Bermuda Triangle. ________________
9. How does the perimeter of the midsegment triangle compare to the perimeter of the Bermuda Triangle?

____

Write a two-column proof that the perimeter of a midsegment triangle is half the perimeter of the triangle.



10. **Given:** $\overline{US}$, $\overline{ST}$, and $\overline{TU}$ are midsegments of $\triangle PQR$.

    Prove: The perimeter of $\triangle STU = \frac{1}{2}(PQ + QR + RP)$.

Name ______________________ Date ______________ Class______________

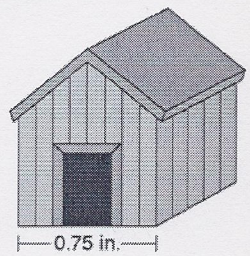
LESSON 7-5

Reteach

Using Proportional Relationships

A **scale drawing** is a drawing of an object that is smaller or larger than the object's actual size. The drawing's scale is the ratio of any length in the drawing to the actual length of the object.

The scale for the diagram of the doghouse is 1 in : 3 ft. Find the length of the actual doghouse.



First convert to equivalent units: 1 in : 36 in. (3 ft × 12 in./ft).

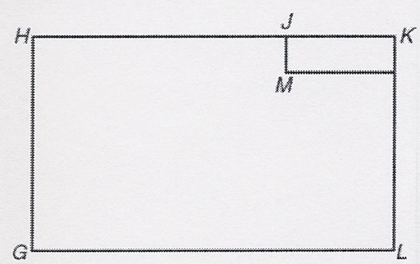
diagram length → / actual length → $\frac{1}{36} = \frac{0.75}{x}$ ← diagram length / ← actual length

$1x = 36(0.75)$ Cross Products Property

$x = 27$ in. Simplify.

The actual length of the doghouse is 27 in., or 2 ft 3 in.

The scale of the cabin shown in the blueprint is 1 cm : 2 m. Find the actual lengths of the following walls.



1. $\overline{HG}$ ______________________
2. $\overline{GL}$ ______________________
3. $\overline{HJ}$ ______________________
4. $\overline{JM}$ ______________________

A rectangular fitness room in a recreation center is 45 feet long and 28 feet wide. Find the length and width for a scale drawing of the room, using the following scales.

5. 1 in : 1 ft ______________________
6. 1 in : 2 ft ______________________
7. 1 in : 3 ft ______________________
8. 1 in : 6 ft 8 in. ______________________

Name ______________________ Date ______________ Class______________

LESSON 7-5

Reteach

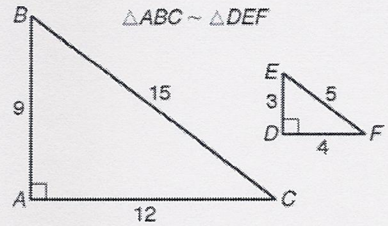
Using Proportional Relationships continued

Proportional Perimeters and Areas Theorem

If two figures are similar and their similarity ratio is $\frac{a}{b}$, then the ratio of their perimeters is $\frac{a}{b}$ and the ratio of their areas is $\left(\frac{a}{b}\right)^2$.

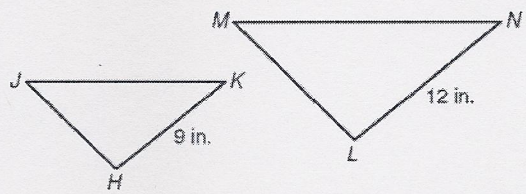
$$\frac{\text{perimeter of } \triangle ABC}{\text{perimeter of } \triangle DEF} = \frac{36}{12} = \frac{3}{1}$$

$$\frac{\text{area of } \triangle ABC}{\text{area of } \triangle DEF} = \frac{54}{6} = \frac{9}{1} = \left(\frac{3}{1}\right)^2$$



$$\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD} = \frac{3}{1}$$

△HJK ~ △LMN. The perimeter of △HJK is 30 inches, and the area of △HJK is 36 square inches. Find the perimeter and area of △LMN.

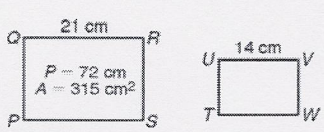


The similarity ratio of △HJK to △LMN = $\frac{9}{12} = \frac{3}{4}$.

$\frac{\text{perimeter of } \triangle HJK}{\text{perimeter of } \triangle LMN} = \frac{3}{4}$	The ratio of the perimeters equals the similarity ratio.
$\frac{30}{P} = \frac{3}{4}$	Substitute the known values.
$30(4) = P(3)$	Cross Products Property
$40 = P$	Simplify.
$\frac{\text{area of } \triangle HJK}{\text{area of } \triangle LMN} = \left(\frac{3}{4}\right)^2$	The ratio of the areas equals the square of the similarity ratio.
$\frac{36}{A} = \frac{9}{16}$	Substitute the known values.
$36(16) = A(9)$	Cross Products Property
$64 = A$	Simplify.

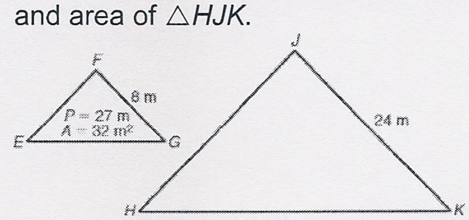
The perimeter of △LMN is 40 in., and the area is 64 in^2.

9. ▭PQRS ~ ▭TUVW. Find the perimeter and area of ▭TUVW.



____

10. △EFG ~ △HJK. Find the perimeter and area of △HJK.



____

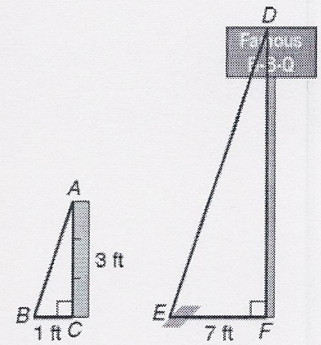
Name ______________________ Date ______________ Class______________

LESSON 7-5

Practice A

Using Proportional Relationships

A city engineer wants to check that the height of a roadside sign is within the limits set by city regulations. She decides to use indirect measurement to find the height. She places a yardstick so that it is perpendicular to the ground and measures its shadow. Then she measures the shadow of the sign. Refer to the figure for Exercises 1 and 2. (The figure is not drawn to scale.)

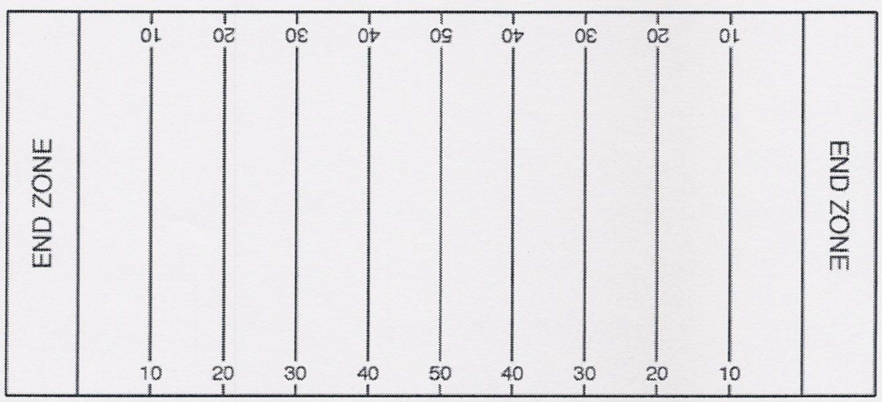


1. $\triangle ABC \sim \triangle DEF$. Write and solve a proportion to find DF, the height of the sign.

   ____

2. According to city regulations, the maximum height of a roadside sign is 30 feet. Find the length of the shadow of a 30-foot-tall sign at this time of day. ______________

Use the figure for Exercises 3–5. The figure shows a scale drawing of a professional football field. The scale of the drawing is 1 cm : 10 yds. Use a centimeter ruler and the figure to find each actual measure in yards.



3. Find the distance from the front to the back of an end zone. ______________
4. Find the length of the field from the back of one end zone to the back of the other. ______________
5. Estimate the width of the field to the nearest yard. ______________

An Olympic standard swimming pool is a rectangle that measures 50 meters in length and 25 meters in width. Complete Exercises 6 and 7 to make a scale drawing of an Olympic standard swimming pool, using a scale of 1 in : 10 m.

6. Set up and solve proportions to find the length and width of the pool in the scale drawing.

   length = ______________ width = ______________

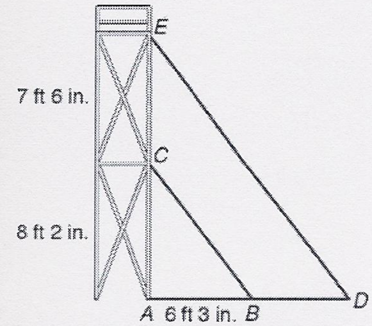
Name ______________________________ Date ______________ Class______________

LESSON 7-5

Practice B

Using Proportional Relationships

Refer to the figure for Exercises 1–3. A city is planning an outdoor concert for an Independence Day celebration. To hold speakers and lights, a crew of technicians sets up a scaffold with two platforms by the stage. The first platform is 8 feet 2 inches off the ground. The second platform is 7 feet 6 inches above the first platform. The shadow of the first platform stretches 6 feet 3 inches across the ground.



1. Explain why $\triangle ABC$ is similar to $\triangle ADE$.
   (*Hint:* The sun's rays are parallel.)

   ____

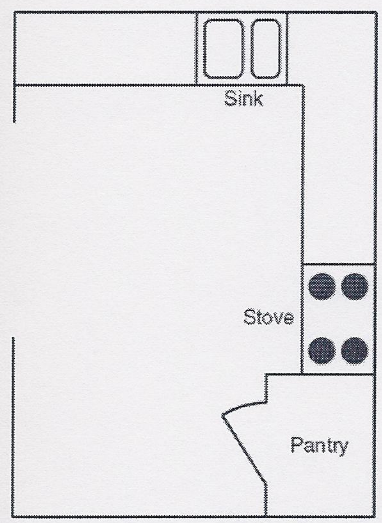
   ____

   ____

2. Find the length of the shadow of the second platform in feet and inches to the nearest inch. ________________

3. A 5-foot-8-inch-tall technician is standing on top of the second platform. Find the length of the shadow the scaffold and the technician cast in feet and inches to the nearest inch. ________________

Refer to the figure for Exercises 4–6. Ramona wants to renovate the kitchen in her house. The figure shows a blueprint of the new kitchen drawn to a scale of 1 cm : 2 ft. Use a centimeter ruler and the figure to find each actual measure in feet.



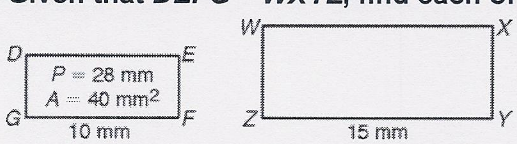
4. width of the kitchen ________________

5. length of the kitchen ________________

6. width of the sink ________________

7. area of the pantry ________________

Given that *DEFG* ~ *WXYZ*, find each of the following.



8. perimeter of *WXYZ* ________________

9. area of *WXYZ* ________________

Name ______________________ Date ______________ Class ______________

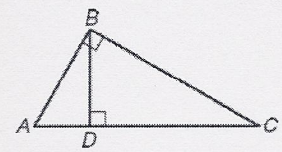
LESSON 8-1

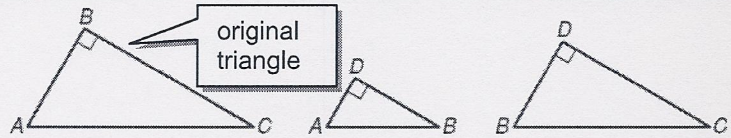
Reteach

Similarity in Right Triangles

Altitudes and Similar Triangles

The altitude to the hypotenuse of a right triangle forms two triangles that are similar to each other and to the original triangle.





Similarity statement: $\triangle ABC \sim \triangle ADB \sim \triangle BDC$

The **geometric mean** of two positive numbers is the positive square root of their product.

Find the geometric mean of 5 and 20.

Let x be the geometric mean.

$x^2 = (5)(20)$ Definition of geometric mean

$x^2 = 100$ Simplify.

$x = 10$ Find the positive square root.

So 10 is the geometric mean of 5 and 20.

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

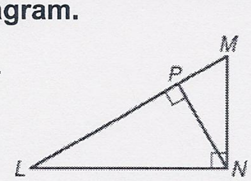
$$x^2 = ab$$

$$x = \sqrt{ab}$$

x is the geometric mean of *a* and *b*.

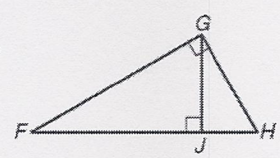
Write a similarity statement comparing the three triangles in each diagram.

1.



____

2.



____

Find the geometric mean of each pair of numbers. If necessary, give the answer in simplest radical form.

3. 3 and 27

____

4. 9 and 16

____

5. 4 and 5

____

6. 8 and 12

____

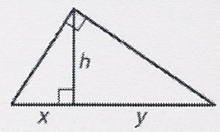
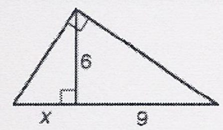
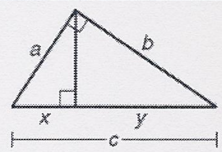
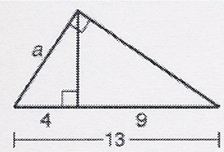
Name ______________________ Date ______________ Class ______________

LESSON 8-1

Reteach

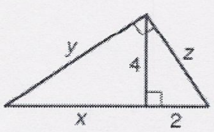
Similarity in Right Triangles continued

You can use geometric means to find side lengths in right triangles.

Geometric Means		
Words	**Symbols**	**Examples**
The length of the altitude to the hypotenuse of a right triangle is the geometric mean of the lengths of the two segments of the hypotenuse.	 $h^2 = xy$	 $h^2 = xy$ $6^2 = x(9)$ $36 = 9x$ $4 = x$
The length of a leg of a right triangle is the geometric mean of the length of the hypotenuse and the segment of the hypotenuse adjacent to that leg.	 $a^2 = xc \quad b^2 = yc$	 $a^2 = xc$ $a^2 = 4(13)$ $a^2 = 52$ $a = \sqrt{52} = 2\sqrt{13}$

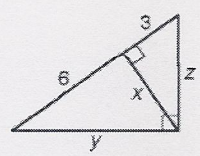
Find *x*, *y*, and *z*.

7.



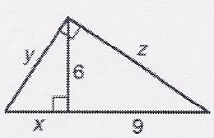
____

8.



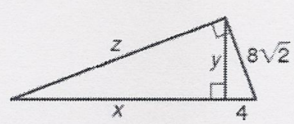
____

9.



____

10.



____

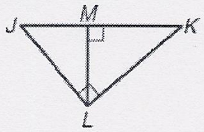
Name ______________________ Date ______________ Class______________

LESSON 8-1

Practice B

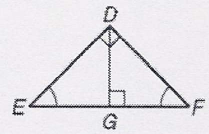
Similarity in Right Triangles

Write a similarity statement comparing the three triangles in each diagram.

1. 

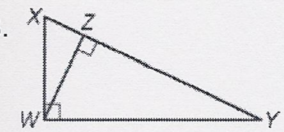
____

____

2. 

____

____

3. 

____

____

Find the geometric mean of each pair of numbers. If necessary, give the answer in simplest radical form.

4. $\frac{1}{4}$ and 4 ________

5. 3 and 75 ________

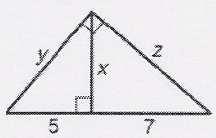
6. 4 and 18 ________

7. $\frac{1}{2}$ and 9 ________

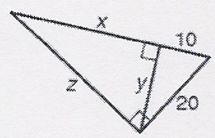
8. 10 and 14 ________

9. 4 and 12.25 ________

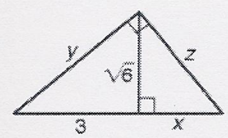
Find *x*, *y*, and *z*.

10. 

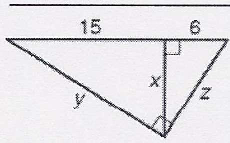
____

11. 

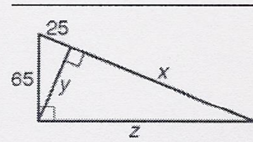
____

12. 

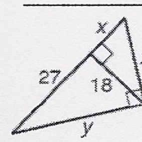
____

13. 

____

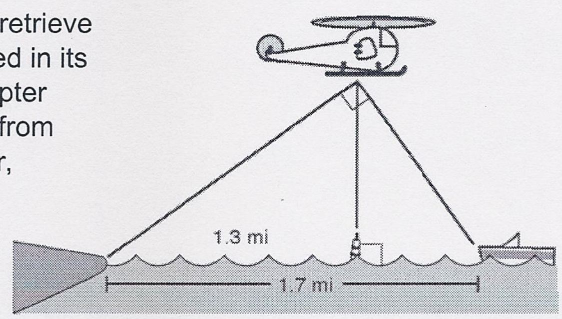
14. 

____

15. 

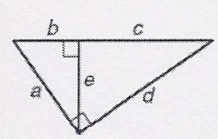
____

16. The Coast Guard has sent a rescue helicopter to retrieve passengers off a disabled ship. The ship has called in its position as 1.7 miles from shore. When the helicopter passes over a buoy that is known to be 1.3 miles from shore, the angle formed by the shore, the helicopter, and the disabled ship is 90°. Determine what the altimeter would read to the nearest foot when the helicopter is directly above the buoy.



____

Use the diagram to complete each equation.



17. $\frac{e}{b} = \frac{\square}{e}$

18. $\frac{d}{b+c} = \frac{\square}{a}$

19. $\frac{d}{\square} = \frac{a}{e}$