Name _____ Date _____ Class _____

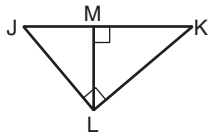
LESSON 8-1

Practice B

Similarity in Right Triangles

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

1.



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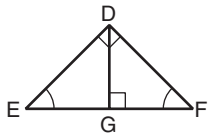

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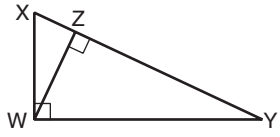


_____ _____ _____

_____ _____ _____

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 _____

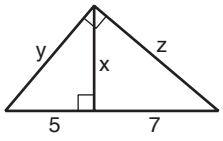
7. $\frac{1}{2}$ and 9 _____

8. 10 and 14 _____

9. 4 and 12.25 _____

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

10.



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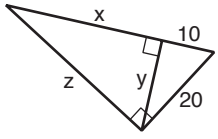

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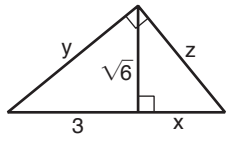
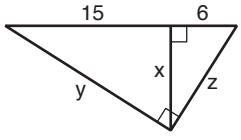


_____ _____ _____

13.



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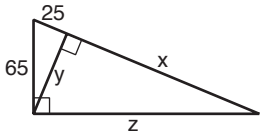

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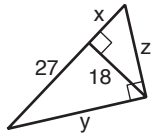
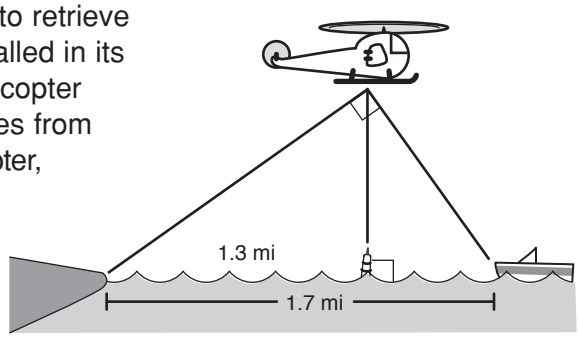


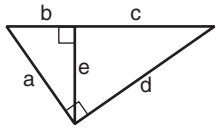
_____ _____ _____

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

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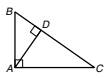
LESSON 8-1

Practice A

Similarity in Right Triangles

In Exercises 1 and 2, fill in the blanks to complete each theorem or definition.

1. The geometric mean of two positive numbers is the positive ___square root___ of their product.
2. The ___altitude___ to the hypotenuse of a right triangle forms two triangles that are similar to each other and to the original triangle.
3. Write a similarity statement comparing the three triangles. Be sure to write the vertices in the correct order.

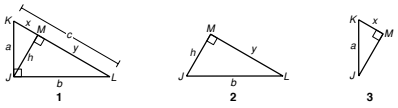


$\triangle ABC \sim \triangle DBA \sim \triangle DAC$

Find the geometric mean of each pair of numbers.

4. 3 and 12 ___6___
5. 9 and 16 ___12___
6. 4 and 25 ___10___

Use the figure for Exercises 7–11. The big right triangle is divided by an altitude into two smaller right triangles. The smaller triangles are also shown separated from the big triangle. All three triangles are similar. For Exercises 7–9 complete each similarity ratio comparing the indicated side lengths.



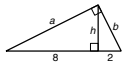
7. legs of triangles 2 and 3 : $\frac{h}{x} = \frac{y}{\boxed{h}}$
8. shorter legs and the hypotenuses of triangles 1 and 3 : $\frac{a}{x} = \frac{\boxed{c}}{\boxed{a}}$
9. longer legs and the hypotenuses of the triangles 1 and 2 : $\frac{\boxed{b}}{y} = \frac{c}{\boxed{b}}$
10. Find the cross product of your answer to Exercise 7 to prove Theorem 8-1-2.

$h^2 =$ ___xy___

11. Find the cross products of your answers to Exercises 8 and 9 to prove Theorem 8-1-3.

$a^2 =$ ___xc___ $b^2 =$ ___yc___

12. Find *h*, *a*, and *b*. Write your answer in simplest radical form, if necessary.



$h =$ ___4___ $a =$ ___$4\sqrt{5}$___ $b =$ ___$2\sqrt{5}$___

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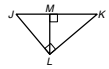
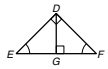
LESSON 8-1

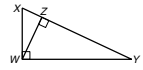
Practice B

Similarity in Right Triangles

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

1. 

2. 

3. 

Possible answers:

$\triangle JKL \sim \triangle JLM \sim \triangle LKM$

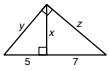
$\triangle DEF \sim \triangle GED \sim \triangle GDF$

$\triangle WXY \sim \triangle ZXW \sim \triangle ZWY$

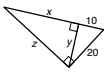
Find the geometric mean of each pair of numbers. If necessary, give the answer in simplest radical form.

4. $\frac{1}{4}$ and 4 ___1___
5. 3 and 75 ___15___
6. 4 and 18 ___$6\sqrt{2}$___
7. $\frac{1}{2}$ and 9 ___$3\sqrt{2}$___
8. 10 and 14 ___$2\sqrt{35}$___
9. 4 and 12.25 ___2___

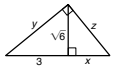
Find *x*, *y*, and *z*.

10. 

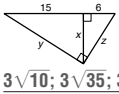
$\sqrt{35}; 2\sqrt{15}; 2\sqrt{21}$

11. 

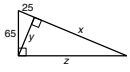
$30; 10\sqrt{3}; 20\sqrt{3}$

12. 

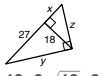
$2; \sqrt{15}; \sqrt{10}$

13. 

$3\sqrt{10}; 3\sqrt{35}; 3\sqrt{14}$

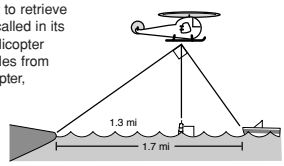
14. 

$144; 60; 156$

15. 

$12; 9\sqrt{13}; 6\sqrt{13}$

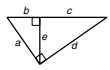
16. The Coast Guard has sent a rescue helicopter to retrieve passengers off a disabled ship. The ship has called in its position as 1.7 miles from shore. When the helicopter passes over a buoy that is known to be 1.3 miles from shore, the angle formed by the shore, the helicopter, and the disabled ship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



___3,807 feet___

Use the diagram to complete each equation.

17. $\frac{e}{b} = \frac{\boxed{c}}{e}$
18. $\frac{d}{b+c} = \frac{\boxed{e}}{a}$
19. $\frac{\boxed{d}}{\boxed{c}} = \frac{a}{e}$



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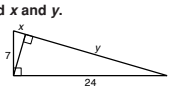
LESSON 8-1

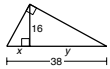
Practice C

Similarity in Right Triangles

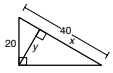
Find *x* and *y*.

1. 

$\frac{49}{25}, \frac{576}{25}$

2. 

$19 - \sqrt{105}; 19 + \sqrt{105}$

3. 

$30; 10\sqrt{3}$

4. The *arithmetic mean* is also known as the average. Name the conditions under which two nonzero, positive numbers, *a* and *b*, have equal geometric and arithmetic means.

___***a* and *b* have the same geometric and arithmetic means if *a* = *b*.___

5. Sketch a right triangle in which the segments of the hypotenuse formed by the altitude to the hypotenuse have the same geometric and arithmetic means.

6. Give all three angle measures of the triangle you drew in Exercise 5. ___45°, 45°, 90°___
7. Name the conditions under which two nonzero, positive numbers, *a* and *b*, have an arithmetic mean that is less than their geometric mean.

___There are no conditions under which the arithmetic mean will be less than the geometric mean.___

Greg is interested in buying a plot of land. He is looking at a plot in the shape of a right triangle. A dirt road makes an altitude to the longest side of the plot and cuts the longest side into two parts that measure 65 feet and 83 feet.

8. Find the area of the land to the nearest square foot. ___5435 ft²___
9. Find the perimeter of the land to the nearest foot. ___357 ft___

Use the figure for Exercises 11–12.
The figure shows $\triangle ABC$.
***AB* = 3 in. and *AC* = 4 in.**

10. Point *D* is placed so that $\angle CBD$ is a right angle and *D* is on $\overleftrightarrow{AC}$. Find *BD*. ___$\frac{15}{4} = 3\frac{3}{4}$ in.___
11. Point *E* is placed so that $\angle BCE$ is a right angle and *E* is on $\overleftrightarrow{AB}$. Find *CE*. ___$\frac{20}{3} = 6\frac{2}{3}$ in.___
12. Find *DE*. ___$\frac{5}{12}\sqrt{193}$ in. $\approx 5\frac{3}{4}$ in.___

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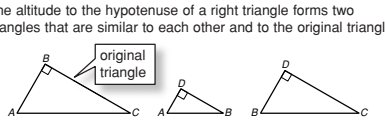
LESSON 8-1

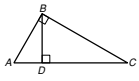
Review for Mastery

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.

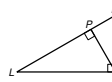
Let *x* be the geometric mean.

$x^2 = (5)(20)$	Definition of geometric mean	$\frac{a}{x} = \frac{x}{b}$
$x^2 = 100$	Simplify.	$x^2 = ab$
$x = 10$	Find the positive square root.	$x = \sqrt{ab}$

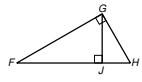
x is the geometric mean of *a* and *b*.

So 10 is the geometric mean of 5 and 20.

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

1. 

$\triangle MNL \sim \triangle NPL \sim \triangle MPN$

2. 

$\triangle FGH \sim \triangle FJG \sim \triangle GJH$

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

3. 3 and 27 ___9___
4. 9 and 16 ___12___
5. 4 and 5 ___$2\sqrt{5}$___
6. 8 and 12 ___$4\sqrt{6}$___

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