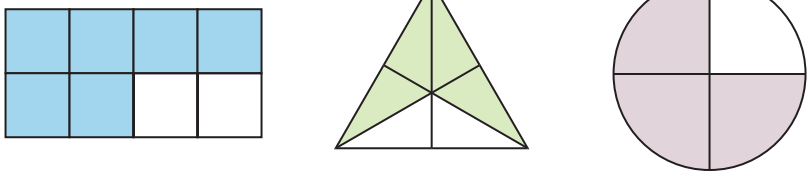
7-5 Proportions in Triangles

Vocabulary

Review

1. Circle the model that can form a *proportion* with $\frac{10}{15}$.



2. Circle the ratios that you can use to form a *proportion*.

$\frac{1}{2}$ $\frac{3}{4}$ $\frac{25}{100}$ $\frac{75}{100}$

3. Cross out the *proportion* that does NOT have the same solution as the others.

$\frac{12}{17} = \frac{n}{20}$ $\frac{12}{n} = \frac{17}{20}$ $\frac{n}{17} = \frac{20}{12}$ $\frac{20}{n} = \frac{17}{12}$

Vocabulary Builder

bisector (noun) BY **sek tur**

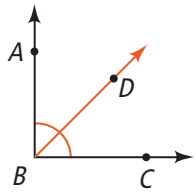
Other Word Form: bisect (verb)

Definition: A **bisector** divides a whole into two equal parts.

Math Usage: A **bisector** is a point, segment, ray, or line that divides an angle or a segment into two congruent angles or segments.

Use Your Vocabulary

Use the diagram at the right. Complete each statement with the correct word from the list below. Use each word only once.



bisects bisector bisected

4. $\overrightarrow{BD}$ is the ? of $\angle ABC$. _____

5. $\angle ABC$ is ? by $\overrightarrow{BD}$. _____

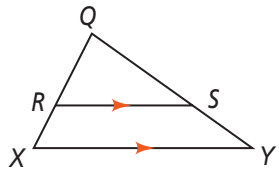
6. $\overrightarrow{BD}$? $\angle ABC$. _____

take note

Theorem 7-4 Side-Splitter Theorem and Its Corollary

Side-Splitter Theorem

If a line is parallel to one side of a triangle and intersects the other two sides, then it divides those sides proportionally.



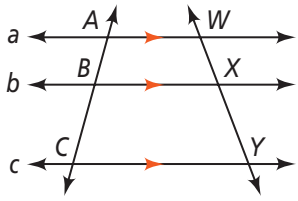
If $\overleftrightarrow{RS} \parallel \overleftrightarrow{XY}$, then $\frac{XR}{RQ} = \frac{\quad}{SQ}$.

7. If $XR = 4$, $RQ = 4$, and $YS = 5$, then $SQ =$ ____.

8. If $XR = 3$, $RQ = 6$, and $YS = 4$, then $SQ =$ ____.

Corollary to the Side-Splitter Theorem

If three parallel lines intersect two transversals, then the segments intercepted on the transversals are proportional.



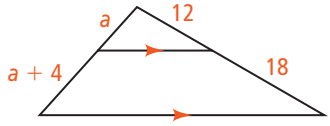
If $a \parallel b \parallel c$, then $\frac{AB}{BC} = \frac{WX}{XY}$.

Complete each proportion.

9. $\frac{BC}{AB} = \frac{XY}{\quad}$ **10.** $\frac{\quad}{BA} = \frac{YX}{XW}$ **11.** $\frac{AC}{AB} = \frac{\quad}{WX}$

Problem 1 Using the Side-Splitter Theorem

Got It? **What is the value of a in the diagram at the right?**



12. The value of a is found below. Use one of the reasons in the box to justify each step.

Cross Products Property	Divide each side by 6.
Side-Splitter Theorem	Simplify.
Subtract $12a$ from each side.	

$\frac{a}{a+4} = \frac{12}{18}$ ____

$18a = 12a + 48$ ____

$18a - 12a = 12a - 12a + 48$ ____

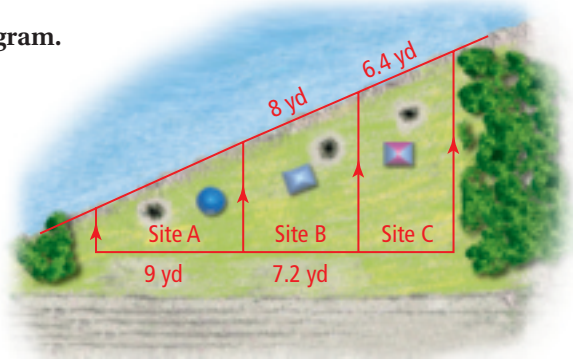
$6a = 48$ ____

$\frac{6a}{6} = \frac{48}{6}$ ____

$a = 8$ ____

Problem 2 Finding a Length

Got It? Camping **Three campsites are shown in the diagram. What is the length of Site C along the road?**



13. Let y be the length of Site C along the road. Use the justifications at the right to find the value of y.

$\frac{y}{7.2} = \frac{6.4}{\square}$ Corollary to Side-Splitter Theorem

$\square \cdot y = 46.08$ Cross Products Property

$\frac{\square \cdot y}{\square} = \frac{46.08}{\square}$ Divide each side by the coefficient of y.

$y = \square$ Simplify.

14. The length of Site C along the road is $\square$ yd.

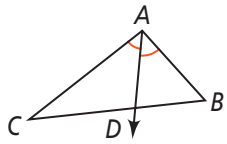
take note

Theorem 7-5 Triangle-Angle-Bisector Theorem

Triangle-Angle-Bisector Theorem

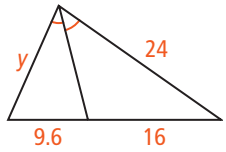
If a ray bisects an angle of a triangle, then it divides the opposite side into two segments that are proportional to the other two sides of the triangle.

If $\overrightarrow{AD}$ bisects $\angle CAB$, then $\frac{CD}{DB} = \frac{CA}{BA}$.



Problem 3 Using the Triangle-Angle-Bisector Theorem

Got It? **What is the value of y in the diagram at the right?**



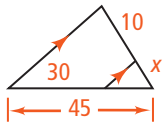
15. Complete the reasoning model below.

Think	Write
I can use the Triangle-Angle-Bisector Theorem to write a proportion.	$\frac{9.6}{16} = \frac{y}{\square}$
Then I can use the Cross-Products Property.	$\square = 16y$
Now I divide each side by $\square$ and simplify.	$\frac{\square}{16} = \frac{16}{16}y$ $y = \square$

16. The value of y is $\square$.

Lesson Check • Do you know HOW?

What is the value of x in the figure at the right?



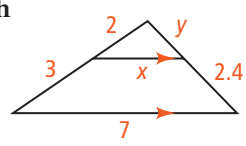
17. Circle the proportion you can use to solve the problem.

$\frac{10}{30} = \frac{x}{45}$ $\frac{x}{10} = \frac{30}{45}$ $\frac{x}{x + 10} = \frac{30}{45}$ $\frac{10}{x + 10} = \frac{30}{45}$

18. Solve the proportion.

Lesson Check • Do you UNDERSTAND?

Error Analysis **A classmate says you can use the Side-Splitter Theorem to find both x and y in the diagram. Explain what is wrong with your classmate's statement.**



19. Cross out the lengths that are NOT parts of the sides intersected by the parallel line.

2 2.4 3 7 x y

20. Can you use the Side-Splitter Theorem to find x? Yes / No

21. Can you use the Side-Splitter Theorem to find y? Yes / No

22. Explain what is wrong with your classmate's statement.

_____

_____

Math Success

Check off the vocabulary words that you understand.

☐ bisector ☐ proportion ☐ Side-Splitter Theorem

Rate how well you understand *side and angle bisectors*.