Name _____ Date _____

8.4 Proportionality Theorems

For use with Exploration 8.4

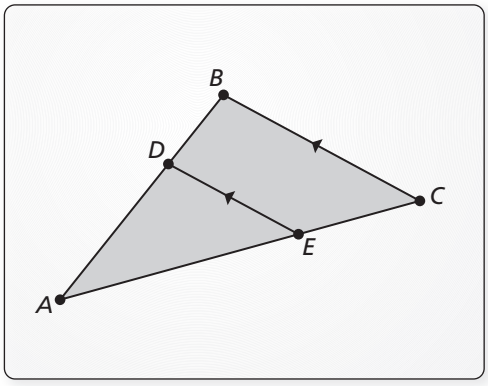
Essential Question What proportionality relationships exist in a triangle intersected by an angle bisector or by a line parallel to one of the sides?

1 EXPLORATION: Discovering a Proportionality Relationship

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner. Use dynamic geometry software to draw any $\triangle ABC$.

a. Construct $\overline{DE}$ parallel to $\overline{BC}$ with endpoints on $\overline{AB}$ and $\overline{AC}$, respectively.



b. Compare the ratios of AD to BD and AE to CE.

c. Move $\overline{DE}$ to other locations parallel to $\overline{BC}$ with endpoints on $\overline{AB}$ and $\overline{AC}$, and repeat part (b).

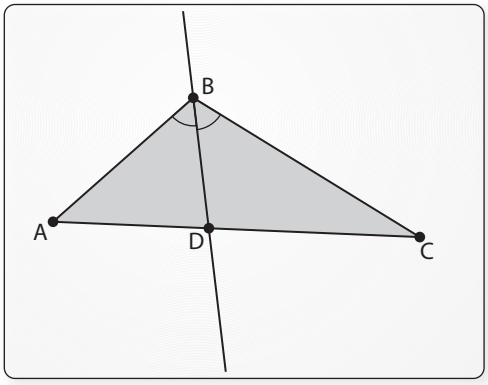
d. Change $\triangle ABC$ and repeat parts (a)–(c) several times. Write a conjecture that summarizes your results.

2 EXPLORATION: Discovering a Proportionality Relationship

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner. Use dynamic geometry software to draw any $\triangle ABC$.

a. Bisect $\angle B$ and plot point D at the intersection of the angle bisector and $\overline{AC}$.



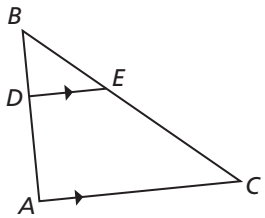
b. Compare the ratios of AD to DC and BA to BC.

c. Change $\triangle ABC$ and repeat parts (a) and (b) several times. Write a conjecture that summarizes your results.

Communicate Your Answer

3. What proportionality relationships exist in a triangle intersected by an angle bisector or by a line parallel to one of the sides?

4. Use the figure at the right to write a proportion.



Name _____ Date _____

8.4 Notetaking with Vocabulary

For use after Lesson 8.4

In your own words, write the meaning of each vocabulary term.

corresponding angles

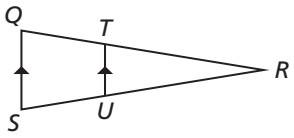
ratio

proportion

Theorems

Theorem 8.6 Triangle Proportionality Theorem

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

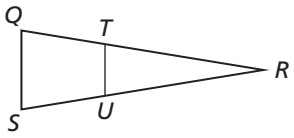


If $\overline{TU} \parallel \overline{QS}$, then $\frac{RT}{TQ} = \frac{RU}{US}$.

Notes:

Theorem 8.7 Converse of the Triangle Proportionality Theorem

If a line divides two sides of a triangle proportionally, then it is parallel to the third side.



If $\frac{RT}{TQ} = \frac{RU}{US}$, then $\overline{TU} \parallel \overline{QS}$.

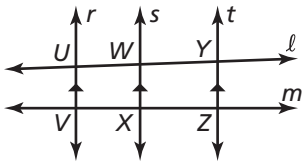
Notes:

Name_____ Date _____

8.4 Notetaking with Vocabulary (continued)

Theorem 8.8 Three Parallel Lines Theorem

If three parallel lines intersect two transversals, then they divide the transversals proportionally.

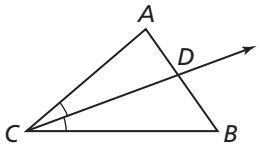


$$\frac{UW}{WY} = \frac{VX}{XZ}$$

Notes:

Theorem 8.9 Triangle Angle Bisector Theorem

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



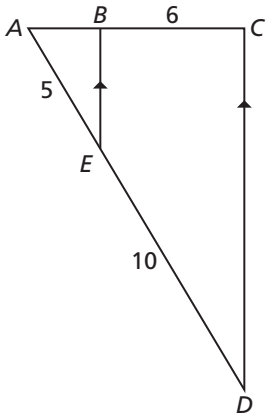
$$\frac{AD}{DB} = \frac{CA}{CB}$$

Notes:

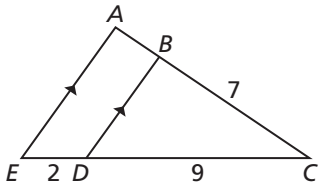
Extra Practice

In Exercises 1 and 2, find the length of $\overline{AB}$.

1.



2.

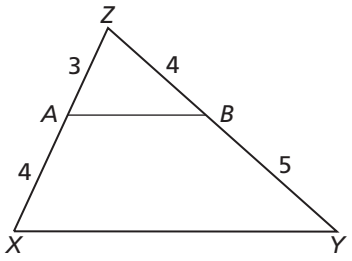


Name _____ Date _____

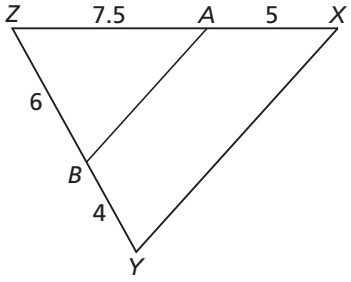
8.4 Notetaking with Vocabulary (continued)

In Exercises 3 and 4, determine whether $\overline{AB} \parallel \overline{XY}$.

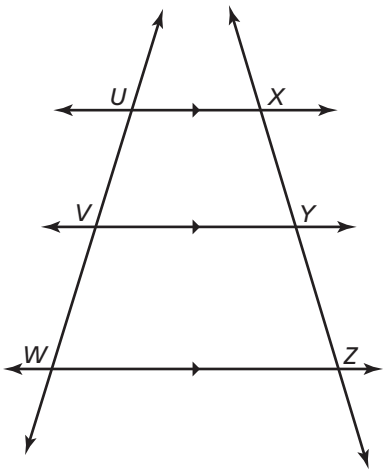
3.



4.



In Exercises 5–7, use the diagram to complete the proportion.



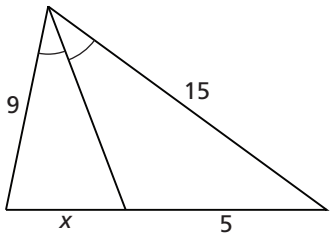
5. $\frac{UV}{UW} = \frac{XY}{\square}$

6. $\frac{XY}{YZ} = \frac{\square}{VW}$

7. $\frac{\square}{ZY} = \frac{WU}{WV}$

In Exercises 8 and 9, find the value of the variable.

8.



9.