Name $\qquad$ Date $\qquad$

## Reteaching with Practice

For use with pages 498-505

## GOAL Use proportionality theorems to calculate segment lengths

## Vocabulary

Theorem 8.4 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.
Theorem 8.5 Converse of the Triangle Proportionality Theorem If a line divides two sides of a triangle proportionally, then it is parallel to the third side.

## Theorem 8.6

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

## Theorem 8.7

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.

## EXAMPLE 1

## Finding the Length of a Segment

a. In the diagram, $\overline{A B} \| \overline{C D}, B D=15, A C=10$, and $C E=18$. What is the length of $\overline{D E}$ ?

b. In the diagram, $\overline{N R} \| \overline{P Q}, M Q=42, M N=13$, and $N P=8$. What is the length of $\overline{R Q}$ and $\overline{M R}$ ?

## Solution


a. $\frac{D E}{B D}=\frac{C E}{A C} \quad$ Triangle Proportionality Theorem

$$
\begin{array}{ll}
\frac{D E}{15}=\frac{18}{10} & \text { Substitute. } \\
D E=\frac{15(18)}{10}=27 & \text { Multiply each side by } 15 \text { and simplify }
\end{array}
$$

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b. Let $R Q=x$. Then $M R=42-x$.

$$
\begin{array}{rlrl}
\frac{M R}{R Q} & =\frac{M N}{N P} & & \text { Triangle Proportionality Theorem } \\
\frac{42-x}{x} & =\frac{13}{8} & & \text { Substitute. } \\
8(42-x) & =13 x & & \text { Cross product property } \\
336-8 x & =13 x & & \text { Distributive property } \\
16 & =x & & \text { Simplify. } \\
\text { So, } R Q=16 \text { and } M R= & 42-16=26 .
\end{array}
$$

## Exercises for Example 1

Find the value of each variable.
1.

2.

3.


## EXAMPLE 2 Using Proportionality Theorems

In the diagram, $\overline{M P}$ bisects $\angle M$. Find $N P$.
SOLUTION

$$
\begin{array}{ll}
\frac{N P}{P Q}=\frac{M N}{M Q} & \text { Apply Theorem 8.7. } \\
\frac{N P}{4}=\frac{16}{18} & \text { Substitute. } \\
N P=\frac{4(16)}{18} \approx 3.6 & \\
\text { Multiply each side by 4 and simplify. }
\end{array}
$$



## Exercises for Example 2

Find the value of each variable.
4.

5.

6.


