GOAL **Use ratios and proportions.**

> **VOCABULARY**
>
> A **ratio** is a comparison of a number a and a nonzero number b using division.
>
> An equation that states that two ratios are equal is called a **proportion**. In the proportion $\frac{a}{b} = \frac{c}{d}$, the numbers b and c are the **means** of the proportion. The numbers a and d are the **extremes** of the proportion.
>
> **Cross Product Property**
> In a proportion, the product of the extremes is equal to the product of the means.

EXAMPLE 1 *Simplify Ratios*

Simplify the ratio.

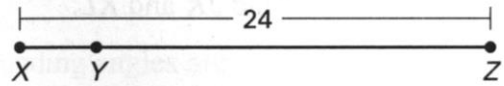**a.** 6 days:15 days   **b.** $\dfrac{2 \text{ ft}}{2 \text{ yd}}$

Exercises for Example 1

Simplify the ratio.

1. 6 in.:28 in.   **2.** $\dfrac{18 \text{ cm}}{6 \text{ cm}}$ **3.** $\dfrac{27 \text{ in.}}{3 \text{ ft}}$
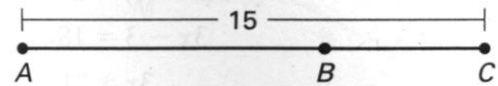
EXAMPLE 2 *Use Ratios*

In the diagram $XY:YZ$ is 1:5 and $XZ = 24$.
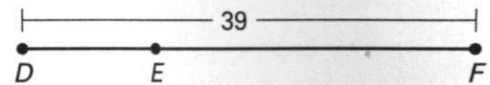Find XY and YZ.

Exercises for Example 2
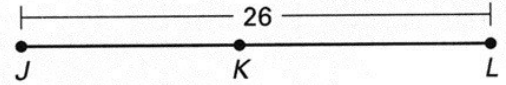
Find the segment lengths.

4. In the diagram, $AB:BC$ is 2:1 and $AC = 15$.
   Find AB and BC.

5. In the diagram, $DE:EF$ is 4:9 and $DF = 39$.
   Find DE and EF.

6. In the diagram, JK:KL is 6:7 and $JL = 26$.
   Find JK and KL.

$$\begin{array}{c} \vdash\!\!\!\!\underline{\hspace{6cm}}\, 26 \,\underline{\hspace{2cm}}\!\!\!\!\dashv \\ \bullet\!\!\underline{\hspace{4cm}}\!\bullet\!\!\underline{\hspace{3cm}}\!\bullet \\ J \qquad\qquad\qquad K \qquad\qquad\qquad L \end{array}$$

EXAMPLE 3 *Solve a Proportion*

Solve the proportion $\dfrac{3}{2} = \dfrac{9}{x - 1}$.

Exercises for Example 3

Solve the proportion.

7. $\dfrac{x}{2} = \dfrac{7}{14}$

8. $\dfrac{5}{7} = \dfrac{y + 1}{21}$

9. $\dfrac{27}{x - 5} = \dfrac{3}{2}$