## Lesson 4-8

## Example 1 Real-World Example <br> RECREATION Use the map to find the actual distance between the lions' cages and the restroom.



Use a centimeter ruler to measure the map distance. The map distance is about 2.5 centimeters.

## Method 1 Write and solve a proportion.

Let $x$ represent the actual distance to the restroom.

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## Method 2 Write and solve an equation.

Write the scale as $\frac{10 \mathrm{~m}}{1 \mathrm{~cm}}$ which means 10 meters per centimeter.
Words The actual distance is 10 meters per centimeter of map distance.

| Variables | Let $a$ represent the actual distance in meters. |
| :---: | :---: |
|  | et $m$ represent the map distance in centimeters |

## Equation

$$
a=10 \cdot m
$$

$a=10 \mathrm{~m} \quad$ Write the equation.
$a=10(2.5)$ or $25 \quad$ Replace m with 2.5 and multiply.
The actual distance between the lions' cages and the restroom is 25 meters.

## Example 2 Find the scale <br> MODEL CARS A model car is $\mathbf{8}$ inches long. If the actual car is 20 feet long, what is the scale of the model?

Let $x$ represent the actual length of the car. Write and solve a proportion to find the scale of the model.

| Length of Car model $\rightarrow$ | 8 in .1 in. | Scale $\leftarrow$ model |
| :---: | :---: | :---: |
| actual $\rightarrow$ | $20 \mathrm{ft} \quad x \mathrm{ft}$ | $\leftarrow$ actual |
|  | $8 \cdot x=20 \cdot 1$ | Find the cross products. |
|  | $\frac{8 x}{8}=\frac{20}{8}$ | Multiply. Then divide each side by 8 . |
|  | $x=2 \frac{1}{2}$ | Simplify. |

So, the scale is 1 inch $=2 \frac{1}{2}$ feet.

## Example 3 Find the Scale Factor

Find the scale factor for the model car in Example 2.
$\frac{1 \text { in. }}{2 \frac{1}{2} \mathrm{ft}}=\frac{1 \text { in. }}{30 \text { in. }} \quad$ Convert 2.5 feet to inches.
The scale factor is $\frac{1}{30}$ or $1: 30$. This means that the model car is $\frac{1}{30}$ the size of the actual car.

## Example 4 Real-World Example

HOBBIES Thayer is making a model of a Victorian Mansion she recently visited. The height of the house is $\mathbf{5 0}$ feet tall. She wants her model to be no taller than 12 inches. Choose an appropriate scale and use it to determine how tall she should make the model of the entry door that is $\mathbf{1 0}$ feet tall.

Try a scale of 1 inch $=5$ feet.

| $\frac{1 \mathrm{in} .}{5 \mathrm{ft}}$ | $=\frac{x \text { in. }}{50 \mathrm{ft}}$ |  | $\leftarrow$ model |
| ---: | :--- | ---: | :--- |
| $1 \cdot 50$ | $=5 \cdot x$ |  | $\leftarrow$ actual |
| 50 | $=5 x$ |  | Find the cross products. |
| 10 | $=x$ |  | Miliply. |
|  |  |  | Divide each side by 5. |

Using this scale, the model of the house would be 10 inches tall.
Use this scale to find the height of the entry door.

| $\frac{1 \mathrm{in} .}{5 \mathrm{ft}}$ | $=\frac{y \mathrm{in} .}{10 \mathrm{ft}}$ |  |  |
| ---: | :--- | ---: | :--- |
| $1 \cdot 10$ | $=5 \cdot y$ |  |  |
| 10 | $=5 y$ |  | Find the cross products. |
| 2 | $=y$ |  | Multiply. |
|  |  |  | Divide each side by 5. |

The entry door is 2 inches tall.

