

LESSON
6

Proportional Relationships

Review for Mastery: Scale Drawings and Scale Models

The dimensions of a scale model or scale drawing are related to the actual dimensions by a *scale factor*. The **scale factor** is a ratio.

The length of a model car is 9 in. $\longrightarrow \frac{9 \text{ in.}}{162 \text{ in.}} = \frac{9 \div 9}{162 \div 9} = \frac{1}{18}$
 The length of the actual car is 162 in. \longrightarrow

$\frac{9}{162}$ can be simplified to $\frac{1}{18}$. The scale factor is $\frac{1}{18}$.

If you know the scale factor, you can use a proportion to find the dimensions of an actual object or of a scale model or drawing.

- The scale factor of a model train set is $\frac{1}{87}$. A piece of track in the model train set is 8 in. long. What is the actual length of the track?

$$\frac{\text{model length}}{\text{actual length}} = \frac{8}{x} \quad \frac{8}{x} = \frac{1}{87} \quad x = 696$$

The actual length of track is 696 inches.

- The distance between 2 cities on a map is 4.5 centimeters. The map scale is 1 cm: 40 mi.

$$\frac{\text{distance on map}}{\text{actual distance}} = \frac{4.5 \text{ cm}}{x \text{ mi}} = \frac{1 \text{ cm}}{40 \text{ mi}} \quad \frac{4.5}{x} = \frac{1}{40} \quad x = 180$$

The actual distance is 180 miles.

Identify the scale factor.

- Photograph: height 3 in.
Painting: height 24 in.

$$\frac{\text{photo height}}{\text{painting height}} = \frac{\text{in.}}{\text{in.}} = \frac{\quad}{\quad}$$

- Butterfly: wingspan 20 cm
Silk butterfly: wingspan 4 cm

$$\frac{\text{silk butterfly}}{\text{butterfly}} = \frac{\text{cm}}{\text{cm}} = \frac{\quad}{\quad}$$

- On a scale drawing, the scale factor is $\frac{1}{12}$. A plum tree is 7 inches tall on the scale drawing. What is the actual height of the tree?

- On a road map, the distance between 2 cities is 2.5 inches. The map scale is 1 inch:30 miles. What is the actual distance between the cities?

Practice C

1. $x = 21.6$ yd
2. $x = 56^\circ$
3. $x = 26^\circ$
4. $x = 22.1$ m
5. 9.5 meters
6. 28 feet
7. 225 inches
8. 112 feet

Review for Mastery

1. MO ; MN ; x ; 6;
 $x = 10$ cm
2. AD ; AB ; 5; $\frac{y}{15}$;
 $y = 27$ m
3. $k = 29^\circ$
4. $s = 122^\circ$

Challenge

1. 10:15; 2:3
2. 8.5:11; 17:22
3. No, you need to leave room to print information about the dinner.
4. 2 feet by 3 feet or 1 foot by 1.5 feet
5. Yes, the ratios are equal.
6. 6 inches by 9 inches

Problem Solving

1. 78 feet long
2. 68 feet tall
3. 25 feet wide
4. 15 inches wide
5. C
6. F
7. C

Reading Strategies

1. Possible answer: because you are not actually measuring, but using proportions to find a missing length
2. Put the lengths of the sides into the proportion
3. Possible answer: $\frac{18}{6} = \frac{y}{5}$

Puzzles, Twisters & Teasers

1. PROPORTION
2. LENGTH
3. CROSS PRODUCTS
4. SOLVE
5. 25

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Answers for Lesson 6**Practice A**

1. C
2. F
3. B
4. G
5. $\frac{1}{2}$
6. $\frac{1}{4}$
7. $\frac{1}{3}$
8. $\frac{1}{7}$
9. 150 miles
10. 64 inches

Practice B

1. $\frac{1}{25}$
2. $\frac{1}{8}$
3. $\frac{1}{9}$
4. $\frac{1}{11}$
5. $\frac{1}{16}$
6. $\frac{1}{9}$
7. $\frac{1}{5}$
8. $\frac{1}{14}$
9. 35.2 feet
10. 136 miles
11. $40\frac{4}{5}$ inches

Practice C

1. $\frac{1}{4}$
2. $\frac{1}{12}$
3. $\frac{1}{17}$
4. $\frac{1}{21}$
5. length: 56 ft; height: 2 ft
6. length: 300 ft
7. height: 6 in.
8. height: 40 ft
9. length: 9.75 in.; height: 4.125 in.
10. 19 ft
11. 1:95
12. 150 miles
13. $193\frac{1}{5}$ inches

Review for Mastery

1. $\frac{3 \text{ in.}}{24 \text{ in.}}$; $\frac{1}{8}$
2. $\frac{4 \text{ cm}}{20 \text{ cm}}$; $\frac{1}{5}$
3. 84 inches
4. 75 miles