6.1 Part 1 *Review*

Rewrite each fraction so that the numerator and denominator have the same units. Then simplify.

1. $\frac{10 \text{ in.}}{3 \text{ ft}}$ $\frac{10 \text{ in}}{36 \text{ in}}$ $\boxed{\frac{5}{18}}$

2. $\frac{350 \text{ g}}{1 \text{ kg}}$ $\frac{350 \text{ g}}{1000 \text{ g}}$ $\boxed{\frac{7}{20}}$

3. $\frac{4 \text{ lb}}{30 \text{ oz}}$ $\frac{64 \text{ oz}}{30 \text{ oz}}$ $\boxed{\frac{32}{15}}$

4. $\frac{3000 \text{ ft}}{2 \text{ mi}}$ $\frac{3000 \text{ ft}}{10,560 \text{ ft}}$ $\boxed{\frac{25}{88}}$

6.1 Part 2 More on Proportions

A <u>geometric sequence</u> is one in which each number after the first is found by multiplying the previous number by a given factor.

3, 15, 75, 375, 1875

×5 ×5 ×5 ×5

Example 1

Find the next three terms in each geometric sequence.

12, 24, 48, 96, 192, 384

×2 ×2

−3, 9, −27, 81, −243, 729

×−3 ×−3

512, 256, 128, 64, 32, 16

$\times\frac{1}{2}$ $\times\frac{1}{2}$

Check out the ratios that we can make of a term compared to the following term.

3, 15, 75, 375, 1875

×5 ×5 ×5 ×5

$\frac{3}{15} = \frac{15}{75} = \frac{75}{375} = \frac{375}{1875}$

$\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$

The terms between any two nonconsective terms of a geometric sequence are called the ***geometric means***.

Example 2

Find the geometric mean between 2 *and* 10.

$2 \mid 20$
$2 \mid 10$
5

$2, \underline{x}, 10$

$\frac{2}{x} \quad \frac{x}{10}$

$\sqrt{x^2} = \sqrt{20}$

$x = \pm 2\sqrt{5}$

Example 3

Find the geometric mean between 35 *and* 40.

$35, \underline{x}, 40$

$\frac{35}{x} \quad \frac{x}{40}$

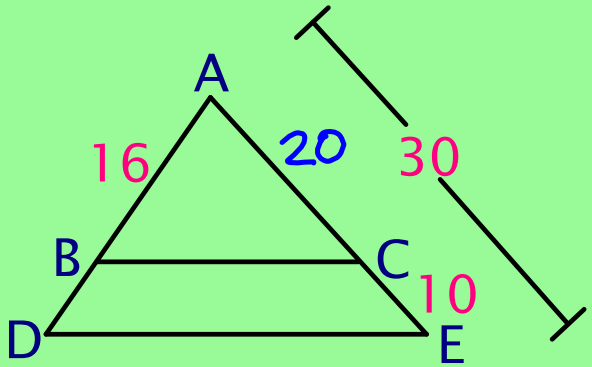
$\sqrt{x^2} = \sqrt{35 \cdot 40}$

$x = \pm\sqrt{7 \cdot 5 \cdot 5 \cdot 2 \cdot 2 \cdot 2}$

$x = \pm 10\sqrt{14}$

Example 4

In the diagram $\frac{AB}{BD} = \frac{AC}{CE}$. *Find the length of* $\overline{BD}$.



$\frac{16}{x} \quad \frac{20}{10}$

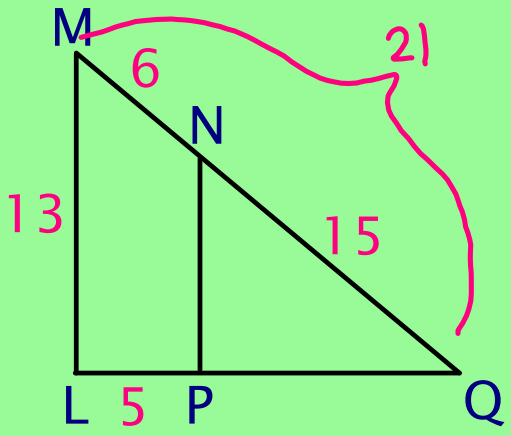
$\frac{20x}{20} = \frac{160}{20}$

$x = 8$

$BD = 8$

Example 5

In the diagram $\frac{MQ}{MN} = \frac{LQ}{LP}$. *Find the length of* $\overline{LQ}$.



$\frac{21}{6} = \frac{x}{5}$

$\frac{6x}{6} = \frac{105 \div 3}{6 \div 3}$

$x = \frac{35}{2}$

$\boxed{LQ = \frac{35}{2}}$

Example 6

A scale model of the Titanic is 107.5 *inches long and* 11.25 *inches wide. The Titanic itself was* 882.75 *feet long. How wide was it?*

	model	actual
ℓ	107.5 in	882.75 ft
w	11.25 in	x ft

$\frac{107.5x}{107.5} = \frac{9930.9375}{107.5}$

$\boxed{x \approx 92.4 \text{ ft} \leftarrow \text{width}}$

Example 7

A map has a scale of 3 cm:18 km. If Riverside and Smithville are 54 km apart, then how far apart are they on the map? Write a proportion and solve.

$$\frac{3\text{ cm}}{18\text{ km}} \overset{\times 3}{=} \frac{x}{54\text{ km}}$$

$$\times 3$$

$$x = 9\text{ cm}$$

Example 8

A 6.5 ft tall car standing next to an adult elephant casts a 33.2 ft shadow. If the adult elephant casts a shadow that is 51.5 ft long, then how tall is the animal?

car height / car shadow: $\frac{6.5\text{ ft}}{33.2\text{ ft}} = \frac{x}{51.5\text{ ft}}$ ele. height / ele. shadow

$$\frac{33.2x}{33.2} = \frac{334.75}{33.2}$$

$$x \approx 10.1\text{ ft} \leftarrow \text{elephant's height}$$