# 7 Drawing Objects and Shapes

Using Equivalent Ratios

A ratio compares two numbers.
For example, 5 to 26, or 5:26, is the ratio of vowels to total letters in the alphabet.

Equivalent ratios describe the same relationship. Suppose that you wrote the alphabet twice. The ratio of vowels to total letters would be 10:52. The two ratios, 5:26 and 10:52, are equivalent ratios.

$$\overset{\times 2}{\frac{5}{26} = \frac{10}{52}}_{\times 2} \qquad \overset{\div 2}{\frac{5}{26} = \frac{10}{52}}_{\div 2}$$
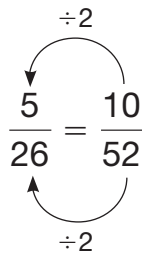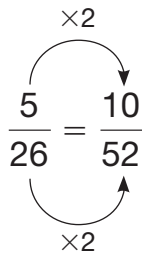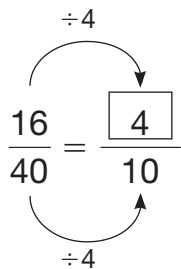
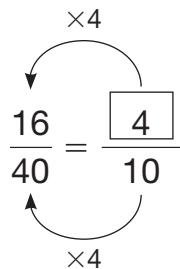You get an equivalent ratio when you multiply or divide both terms in a ratio by the same number.

Sometimes, one number in a pair of equivalent ratios is missing.

$$16:40 = ?:10$$

To calculate the missing number, determine the factor that the numbers in one ratio are multiplied or divided by to get the other ratio.

$$\overset{\div 4}{\frac{16}{40} = \frac{\boxed{4}}{10}}_{\div 4} \quad \text{or} \quad \overset{\times 4}{\frac{16}{40} = \frac{\boxed{4}}{10}}_{\times 4}$$

1. Calculate the missing terms.

a) $\overset{\times \underline{\quad}}{\frac{6}{24} = \frac{12}{\boxed{}}}_{\times \underline{\quad}}$

b) $\overset{\div \underline{\quad}}{\frac{5}{40} = \frac{\boxed{}}{8}}_{\div \underline{\quad}}$

2. Calculate the missing term.

a) $3:5 = \boxed{}:25$

c) $\dfrac{8}{36} = \dfrac{2}{\boxed{}}$

b) $\dfrac{12}{60} = \dfrac{\boxed{}}{20}$

d) $12:15 = \boxed{}:5$

Comparing Similar Shapes

3. Rectangle *ABCD* was enlarged to make rectangle *EFGH*. The angles did not change.

All the side lengths of rectangle *ABCD* were multiplied by 2.
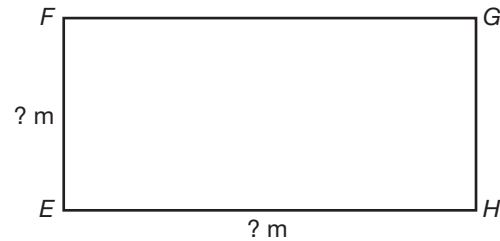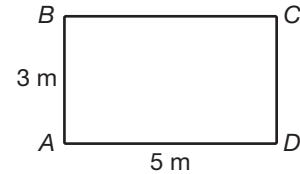
a) How long is *HE*? _____

b) How long is *EF*? _____

c) How long is *GH*? _____

d) The ratio of length : width for rectangle *ABCD* is 5 : 3. What is the ratio of length : width for rectangle *EFGH*? _____ : _____

e) What is the ratio from Part d) in lowest terms?

_____ : _____

B ┌──────────┐ *C*
3 m
A └──────────┘ *D*
    5 m

F ┌────────────────┐ *G*
? m
E └────────────────┘ *H*
      ? m

Multiplying Mixed Numbers by Whole Numbers

$3\frac{1}{4}$ is a mixed number.

$3\frac{1}{4} = 3$ wholes and $\frac{1}{4}$

3 wholes $= \frac{12}{4}$,

so $3\frac{1}{4} = \frac{12}{4} + \frac{1}{4}$

$= \frac{13}{4}$

$\frac{13}{4}$ is the fraction name for $3\frac{1}{4}$.

Method 1: Multiply the whole numbers. Then multiply the fraction parts.	**Method 2:** Change the mixed number to a fraction.
$4 \times 3\frac{1}{4}$ in. $= (4 \times 3$ in.$) + \left(4 \times \frac{1}{4}$ in.$\right)$ $= 12$ in. $+ 1$ in. $= 13$ in.	$4 \times 3\frac{1}{4}$ in. $= \frac{4}{1} \times \frac{13}{4}$ in. $= \frac{4 \times 13}{1 \times 4}$ in. $= \frac{52}{4}$ in. $= 13$ in.

4. Multiply.

a) $5 \times 2\frac{1}{8}$ in. = _____

= _____

= _____

b) $2 \times 6\frac{1}{2}$ ft = _____

= _____

= _____