Section 4.2

Scale: a comparison between the actual size of an object and the size of its diagram.

➢ Can be expressed as a _____, as a _____, as a _____, in words, or in a diagram.

Scale diagram: a drawing that is _____to the actual figure or object.

➢ May be smaller or larger than the actual object, but must be in the same _____.

Proportion: is a relationship that shows two ratios are equal. It can be written in _____ or ratio form.

➢ The corresponding parts of each ratio must be in the same units.

$$scale = \frac{diagram\ measurement}{actual\ measurement}$$

Note: If the scale is given in words or shown in the diagram the measurements may be given in different units. However when a scale is written as a ratio or a fraction the units **must be the same**!

➢ **For example:** If the scale states "1 millimeter represents 4 centimeters" then written as a ratio the scale is 1:40 which means that every millimeter on the image represents 40 millimeters (4 centimeters) on the actual object.

➢ When determining the scale factor using $Scale\ Factor = \frac{image\ length}{object\ length}$ the image length and object

length also need to be the same units. Thus the Scale Factor for "1 millimeter represents 4 centimeters" is $SF = \frac{1}{40} = 0.025$ which means that every measurement on the image is 2.5% of the original object.

Warm-up 1: Complete the chart.

Fraction	$\overline{4}$					$\overline{10}$	$\overline{2}$
Ratio		1:8		**1:50**			
Percent			50%		**100%**		

Example 1: Determine the scale factor and the scale for each ratio.

a) $\dfrac{0.\overline{3}}{15}$

b) $\dfrac{\overline{17}}{850}$

.

Scale factor: _____

The scale is $1:$_____which means every 1 unit in the diagram represents

_____ units of the actual length.

Scale factor: _____

The scale is $1:$_____which means every 1 unit in the diagram represents

_____ units of the actual length.

c) $\dfrac{6.2}{24.8}$

d) $\dfrac{24}{18}$

Scale factor: _____

The scale is $1:$ _____ which means every 1 unit in the diagram represents _____ units of the actual length.

Scale factor: _____

The scale is $1:$ _____ which means every 1 unit in the diagram represents _____ units of the actual length.

e) $\dfrac{30}{37.5}$

f) $\dfrac{5}{2}$

Scale factor: _____

The scale is $1:$ _____ which means every 1 unit in the diagram represents _____ units of the actual length.

Scale factor: _____

The scale is $1:$ _____ which means every 1 unit in the diagram represents _____ units of the actual length.

Example 2: Find the missing value in each proportion.

a) $\dfrac{1}{2} = \dfrac{x}{250}$

b) $\dfrac{1}{3.2} = \dfrac{14}{y}$

c) $\dfrac{1}{z} = \dfrac{6.3}{24.9}$

d) $\dfrac{1}{0.25} = \dfrac{w}{6.25}$

Example 3: Calculate the missing value in each proportion.

a) $\dfrac{1}{8} = \dfrac{\square}{624}$

b) $\dfrac{25.2}{50} = \dfrac{\square}{}$

c) $\dfrac{1}{0.6} = \dfrac{58}{\square}$

d) $\dfrac{1}{\square} = \dfrac{15.3}{1224}$
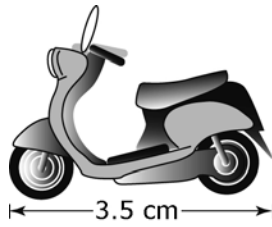
e) $\dfrac{1}{75} = \dfrac{\square}{6450}$

f) $\dfrac{1}{\square} = \dfrac{5.6}{1.68}$

Example 4: An actual laptop has a width of 39.48 cm. Find the Scale and Calculate the scale factor used in the image of the laptop. Express the answer to the nearest hundredth.
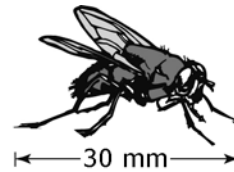

4.2 cm
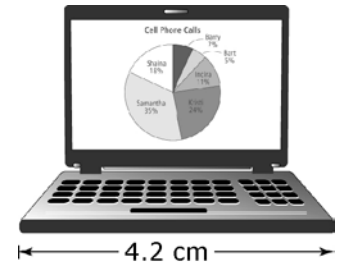
Example 5: Calculate the actual length of each object.

a) The scale for the image of the scooter is 1:20.

3.5 cm

b) The scale for the enlarged image of the housefly is 1:0.3.

30 mm

Example 6: A driving distance is 650 km. The distance shown on a map is 4 cm.
   a) Express the map scale in words.
   b) What is the scale factor?