**Math 20-2: U8L5 Teacher Notes**

**Similar 3-Dimensional Objects: Scale Models and Scale Diagrams**

**Key Math Learnings:**

**By the end of this lesson, you will learn the following concepts:**

* Explain, using examples, how scale diagrams are used to model a 3-D object.
* Determine, using proportional reasoning, the scale factor, given one dimension of a 3-D object and its representation.
* Determine, using proportional reasoning, an unknown dimension of a 3-D object, given a scale diagram or a model.
* Draw, with or without technology, a scale diagram of a given 2-D shape, according to a specified scale factor (enlargement or reduction).
* Solve a contextual problem that involves a scale diagram.

**3-Dimensional Scale Diagrams**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** can be used to represent 3-dimensional shapes as well.

To create a scale diagram, you must determine an appropriate scale to use. This is called the **\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_.**

It depends on the dimensions of the original shape and the size of diagram that is required. You can multiply any \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ of an object by the \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_ to calculate the corresponding measurement of the similar object.

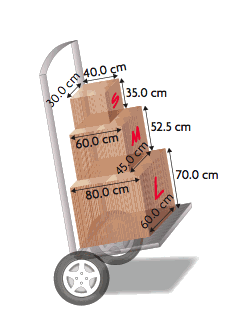
You can determine the scale factor k, used to create a scale model of an object by using any corresponding linear measurements of the object and the scale model:





When a scale factor is between 0 and 1, the new object is a:

When a scale factor is greater than 1, the new object is an:

**Example**

Toni works for a moving company. The company sells three different-sized boxes, as shown.

a) Are the boxes similar? Explain.

b) The letters on the boxes (S, M, L for small, medium, large) increase in height in proportion to the size of the box. The red M on the medium box is 24 cm tall. Determine the heights of the S and the L.

***Solution***

**Example**

Umiaks are boats that are used in the Arctic for transportation and for traditional whale hunting. The frame of an umiak is built from spruce wood. Traditionally, the outer cover was made from animal skins, such as walrus and bearded-seal skins, but today it can be made from ballistic nylon. A typical umiak is 32 ft long, with a beam (width) of 48 in. Determine these dimensions on a scale model built using a scale ratio of 1:24.

***Solution***