Scale Drawings and Models

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Have you ever looked at a map, sewed a piece of clothing, built a model or assembled a piece of Ikea furniture? Then most likely you have had to use a scale drawing.

What is a scale drawing or a "to scale model"?

- It is a _____ _____of the original object.

When would you use a scale drawing?

- Drawing plans for a house, or building, making a model airplane, using a map, putting together a BBQ etc.

What type of jobs would use a scale drawing or model replica?

- _____ _____

Review:

Proportional Reasoning - A proportion is a statement that compares 2 rates or 2 ratios.

- A ratio is a comparison between 2 numbers with the ***same*** units.

Examples of Ratio:

- A rate is a comparison between 2 numbers with ***different*** units.

Examples of Rate:

If the numerator is 1, then your denominator is the scale factor. If the numerator is not 1, then we need to reduce the fraction into simplest terms.

When we get our numerator to 1, that fraction is our **Scale Factor.**

Scale Factor: is the number the dimensions are _____ by to give the dimensions of the other object. Recall: **Enlargements** and **Reductions**. This is usually a fraction.

Example 1: Measure the drawings below. What scale factor was used to find the dimensions of the enlargement?

Example 2: The ratio of the length to the width of a rectangle is **5:3**. If the rectangle is **24 cm** wide, how long is it?

Length:Width ⇨ 5:3 (we can also write it as a fraction)

$$\frac{Length}{Width} = \frac{5}{3} = \frac{x}{24}$$

Note: We always keep the top and bottom in the same units.

Proportional Reasoning Worksheet

1. Solve for ***x*.**

(a) $\frac{3}{8} = \frac{x}{168}$ (b) $\frac{x}{13} = \frac{7}{91}$

(c) $\frac{x}{7} = \frac{30}{105}$ (d) $\frac{408}{x} = \frac{4}{9}$

2. Solve the following proportions to one decimal place.

(a) $\frac{5}{6} = \frac{12}{x}$ (b) $\frac{7}{15} = \frac{9}{k}$

(c) $\frac{1.2}{4.9} = \frac{m}{7.3}$ (d) $\frac{p}{85} = \frac{76}{39}$

3. The ratio of Tom's age to Mary's is 3:4. If Tom is 15, how old is Mary?

4. If Georgina travels 355 km in 7 hours, how far will she travel in 8.5 hours at the same rate?

Answers:

1. a) 63 b) 1 c) 2 d) 918 2. a) 14.4 b) 19.3 c) 1.8 d) 165.6 3. 20 years old 4. 431 km

Scale Statements

Scale Statement: is a ratio that compares the size of a _____ to the size of the _____.

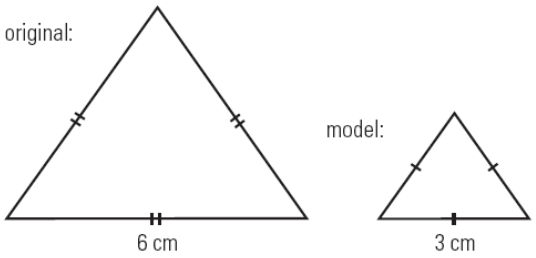
Example 1: A model ship scale statement is **1:350**. If the model is 1 m long, then how long is the real thing?

- We can also write our scale statement as a fraction, which is the scale factor.

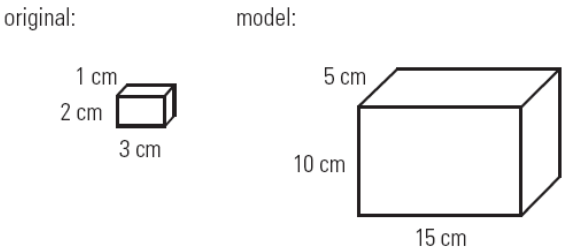
$$\textbf{SF} = \frac{\textit{Model}}{\textit{Real life}} = \frac{1}{350}$$

Example 2: Write a **scale statement** for the reduced or enlarged object, and calculate the **scale factor** used to create the reduced or enlarged object.

(a)



(b)



(c) A man in a photograph is 2cm tall. His actual height is 1.8m. Write a scale statement and determine the scale factor.

(d) The man in the photo is 172 cm tall in real life, in the photo graph he is _____ cm tall. If the height of the truck in the photograph measures _____ cm, what is the height of the actual truck in meters?

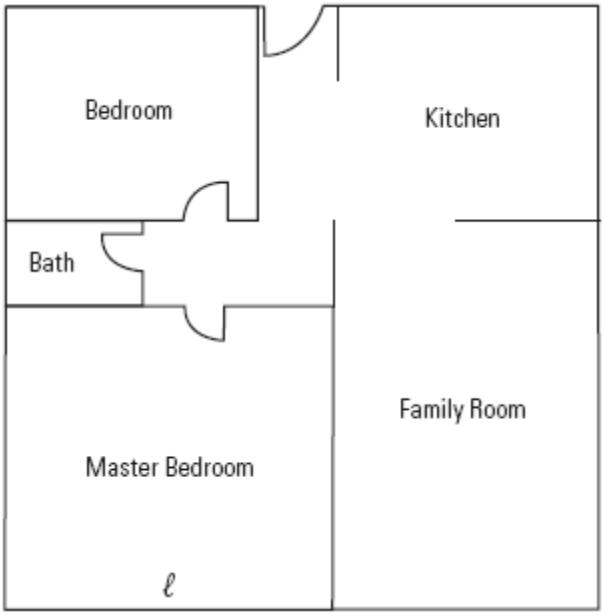
Example 3: On a blueprint lets say that evey **1 /4 inch** is equal to 1 foot in real life.

1) Write a scale statement in the form of 1:*x.*

2) What is the actual length of a room if it measures 3 3/4 inches on the blue print?

Example 4: In a picture, a man measures **2.3 cm**. His actual height is **1.78 m**. He is standing beside a flagpole that measures **7.6 cm** in the picture. What is the actual height of the flagpole, to the nearest tenth of a metre?

Example 5: The diagram below shows a house floor plan. The indicated wall (ℓ) in the actual master bedroom is **12.5 feet** long.



a) What scale was used to draw the floor plan?

b) What are the dimensions of the family room?

c) What are the dimensions of the smaller bedroom?

Scale Factors Worksheet

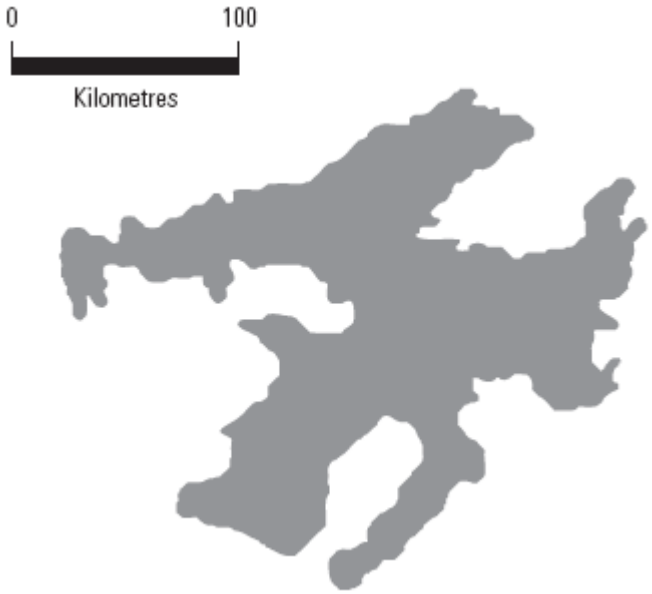
1. A beluga whale that is actually 4.2 m long is represented in a children's picture book with the following picture.

a) Measure the drawing and write a scale statement for the picture.

b) An alligator is drawn at the same scale. In the drawing, it is **5.9 cm** long. How long is the actual alligator?

2. A **7.8-m** object is represented in a picture as being **1.5 cm**. What is the scale factor?

3. The shoreline of Great Bear Lake is approximately **2719 km** (not counting islands). If a map is drawn with a scale of **3 cm:100 km**, how long would the shoreline be on the map?



4. The tallest building in Canada is First Canadian Place in Toronto. The tower is 298 m tall, and the antenna reaches to **355 m**. A model of the building, without the antenna, is **11.9 cm** tall.

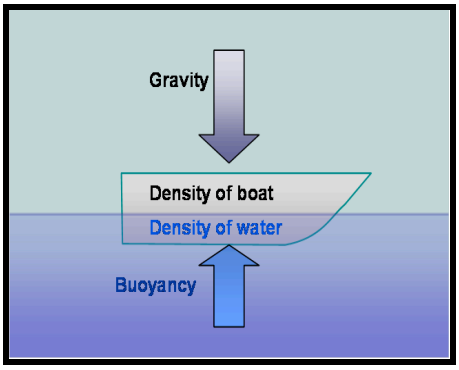
   a) What scale was used to build the model?

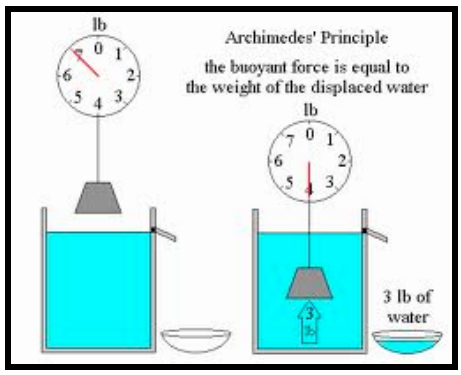
   b) How long will the antenna on the model be?

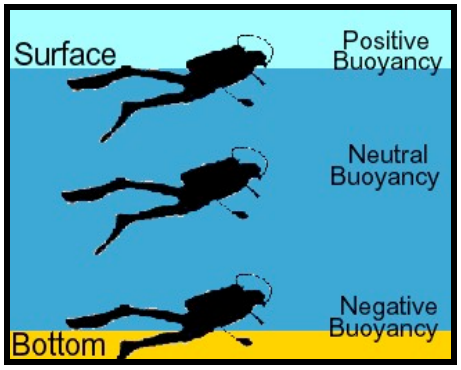
5. A diagram of a bookcase in an instruction booklet uses a scale of 1:30. If the diagram is **7.8 cm** tall, **5.4 cm** wide, and **1 cm** deep, what are the actual dimensions of the bookcase?

Answers:
1. a) 1:84 b) 496 cm 2 a) 0.30 cm b) 375 cm 3. 1:520 4. 81.57 cm 5. a) 1:2504 b) 2.3 cm

Bill Nye Video Worksheet - Buoyancy







1. The reason why some things float or sink is because water is _____.

2. If you were to weigh the water displaced by a boat, the water would be equal to the weight of the _____.

3. What is displacement? _____

4. Objects displace as much water as they _____.

5. Floating and Sinking: Why does the tennis ball that is cut in half float higher in the water than the tennis ball that isn't cut in half?

   _____

6. ***EUREKA*** is Greek for "_____".

7. When something sinks we say it is _____buoyant.

8. When something floats we say it is _____buoyant.

9. When something does not sink or float, we say it is _____buoyant.

10. Scuba diving is all about buoyancy. What do scuba divers use to change their buoyancy?_____

11. Hot air is _____ dense than its surrounding air.
    (less or more)