G5-M4-Lesson 22

1. Solve for the unknown. Rewrite each phrase as a multiplication sentence. Circle the scaling factor, and put a box around the factor naming the number of meters.

a. $\frac{1}{2}$ as long as 8 meters = 4 meters

$\left(\frac{1}{2}\right) \times \boxed{8 \text{ m}} = 4 \text{ m}$

Half of 8 is 4, so 1 half of 8 *meters* is 4 *meters*.

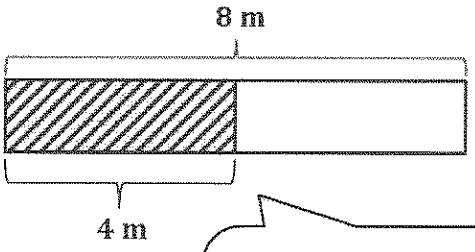
b. 8 times as long as $\frac{1}{2}$ meter = 4 meters

$(8) \times \boxed{\frac{1}{2} \text{ m}} = 4 \text{ m}$

2 times 1 half is equal to 1. So 8 times 1 half (or 8 copies of 1 half) is equal to 4.

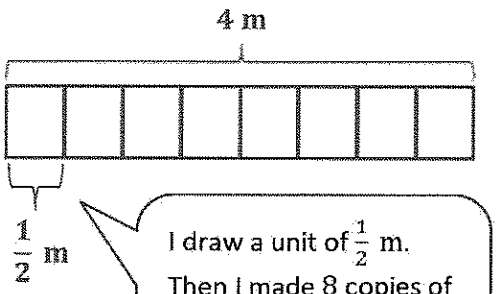
2. Draw a tape diagram to model each situation in Problem 1, and describe what happened to the number of meters when it was multiplied by the scaling factor.

a.



This tape shows a whole of 8 meters. I partition it into 2 equal units to make halves. Half of 8 m is 4 m.

b.



I draw a unit of $\frac{1}{2}$ m. Then I made 8 copies of it to show $8 \times \frac{1}{2}$ m, which is equal to 4 m.

In part (a), the scaling factor $\frac{1}{2}$ is less than 1, so the number of meters decreases.

In part (b), the scaling factor 8 is greater than 1, so the number of meters increases.

3. Look at the inequalities in each box. Choose a single fraction to write in all three blanks that would make all three number sentences true. Explain how you know.

a.

$\frac{3}{4} \times \frac{4}{2} > \frac{3}{4}$ $\quad 2 \times \frac{4}{2} > 2$ $\quad \frac{7}{5} \times \frac{4}{2} > \frac{7}{5}$

Any fraction greater than 1 will work. Multiplying by a factor greater than 1, like $\frac{4}{2}$, will make the product larger than the first factor shown.

Each of these inequalities shows that the expression on the left is greater than the value on the right. Therefore, I need to think of a scaling factor that is greater than 1, like $\frac{4}{2}$.

b.

$\frac{3}{4} \times \frac{1}{3} < \frac{3}{4}$ $\quad 2 \times \frac{1}{3} < 2$ $\quad \frac{7}{5} \times \frac{1}{3} < \frac{7}{5}$

Any fraction less than 1 will work. Multiplying by a factor less than 1, like $\frac{1}{3}$, will make the product smaller than the first factor shown.

Each of these inequalities shows that the expression on the left is less than the value on the right. Therefore, I need to think of a scaling factor that is less than 1, like $\frac{1}{3}$.

4. A company uses a sketch to plan an advertisement on the side of a building. The lettering on the sketch is $\frac{3}{4}$ inch tall. In the actual advertisement, the letters must be 20 times as tall. How tall will the letters be on the actual advertisement?

$$20 \times \frac{3}{4}$$
$$= \frac{20 \times 3}{4}$$
$$= \frac{60}{4}$$
$$= 15$$

The letters will be 15 inches tall.

The letters on the sketch have been scaled down to fit on the page; therefore, the letters on the actual advertisement will be larger. In order to find out how large the actual letters will be, I multiply 20 by $\frac{3}{4}$ inch.