

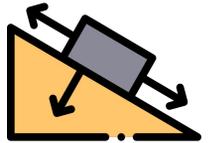


# Helping With Math

## Solving Problems Involving Scale Drawings of Geometric Figures



GRADE 7



Scale drawings are used to easily illustrate and compute the actual sizes of objects that are inconvenient to draw.



Hello! It's grocery day!  
Can you help me find the things I need to buy in the supermarket?



- Scale drawing is commonly used by architects and engineers for planning and building their projects.
- Scale drawing is all about ratio of the drawing size to the actual size of the object. Thus,

**Drawing size : Actual size**



# RATIO AND PROPORTION

## Ratio and Proportion



- **Ratio** is a comparison of two values or quantities.
- It indicates the relationship of the two quantities to one another.
- **Proportion** is also a comparison of two values that indicates that the two values are equivalent.

### Examples of Ratio

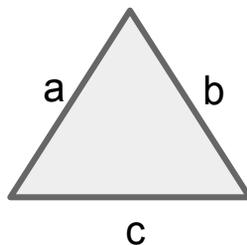
- 5:8
- 9:2
- $\frac{1}{2} : 6$
- $\frac{3}{4}$
- $\frac{1}{4}$



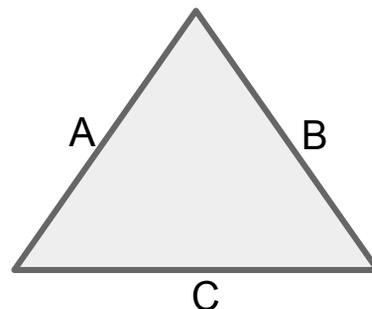
### Examples of Proportion

- $\frac{1}{2} = \frac{4}{8}$
- $\frac{2}{3} = \frac{6}{9}$
- $\frac{3}{4} = \frac{9}{12}$
- $\frac{1}{3} = \frac{2}{6}$
- $\frac{4}{5} = \frac{8}{10}$

### Drawing size



### Actual size



By applying ratio and proportion,

$$\frac{a}{b} = \frac{A}{B} \quad \frac{b}{c} = \frac{B}{C} \quad \frac{c}{a} = \frac{C}{A}$$



# SCALE FACTOR

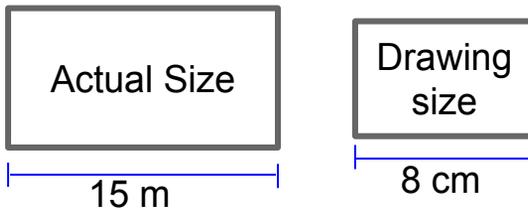


## Scale Factor

- The ratio of the length of two corresponding sides of two similar geometric figures is called scale factor.
- Formula:  
**Actual Size x Scale Factor = Drawing Size**

Example 1:

The actual length of a garden is 15 meters and the length of it in the drawing is 8 cm. What is the scale factor?



$$\frac{\cancel{8 \text{ cm.}}}{\cancel{15 \text{ m}}} \times \frac{\cancel{1 \text{ m}}}{\cancel{100 \text{ cm}}} = \frac{8}{1500} = \frac{\mathbf{2}}{\mathbf{375}}$$

The **scale factor is  $\frac{2}{375}$**  which means that the drawing size is  $\frac{2}{375}$  times the actual size of the garden.



Example 2:

You bought a rectangular cabinet having a width of 2 meters. You decided to draw it and used a scale factor of  $\frac{3}{100}$ . What is the width of your scale drawing?

Formula: Actual Size x Scale factor = Drawing Size

$$2 \text{ meters} \times \frac{3}{100} = \mathbf{0.06 \text{ m}}$$

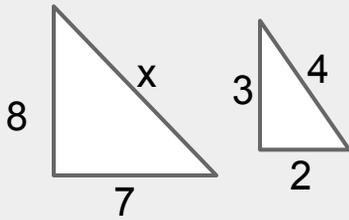


# LET'S PRACTICE!

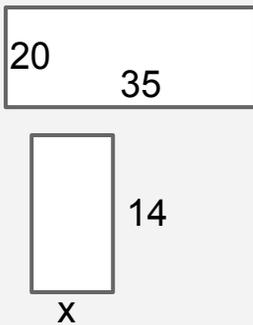


Using the concept of ratio and proportion, calculate x.

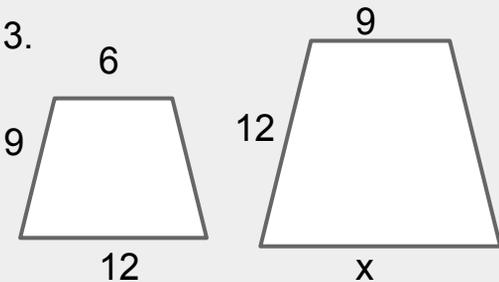
1.



2.



3.



# TABLE OF ACTIVITIES

1. Meat Section
2. What Brand Of Milk Should I Buy?
3. Coffee Lover
4. My Favorite Snacks
5. Choosing Fresh Vegetables
6. What's On My Grocery List?
7. Toiletries
8. Bread For Breakfast
9. Fruits That I Like
10. Pancake Ingredients



## MEAT SECTION

Identify whether the meat is fresh or not. Read each given statement carefully and identify whether it is true or false.

1. A scale ratio is the comparison of two quantities with different units.

\_\_\_\_\_

4. The concept of ratio and proportion is used to solve for the actual dimension of an object.

\_\_\_\_\_

2. Scale drawing is only used to reduce an actual object while keeping it proportionally the same.

\_\_\_\_\_

5. 10:13 is an example of ratio.

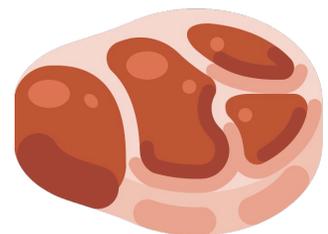
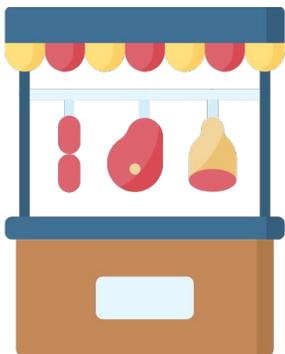
\_\_\_\_\_

3. Scale drawing is used by architects and engineers in planning and building their projects.

\_\_\_\_\_

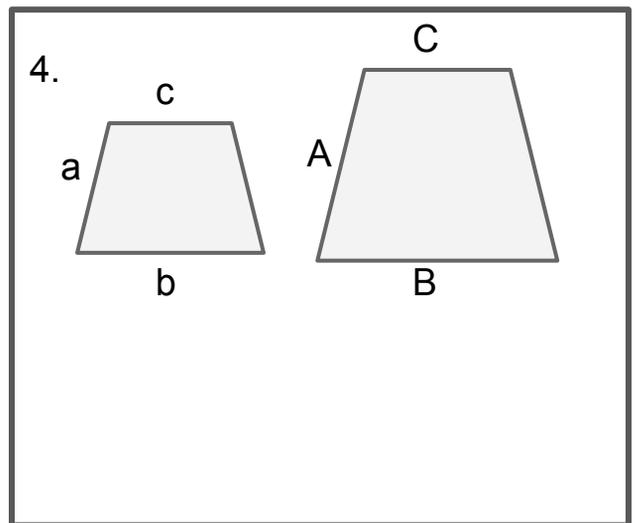
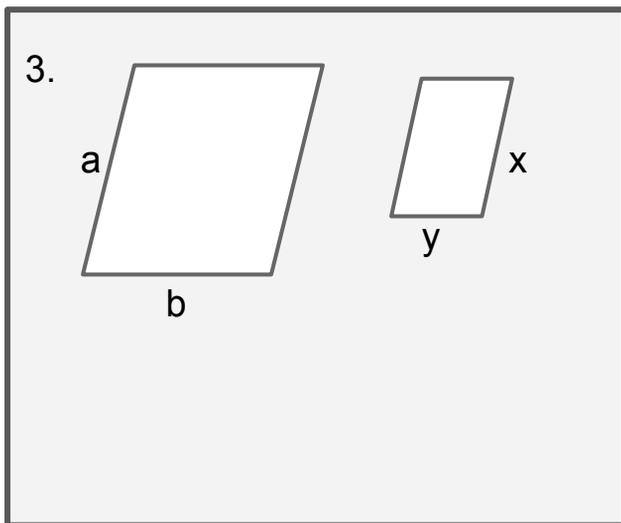
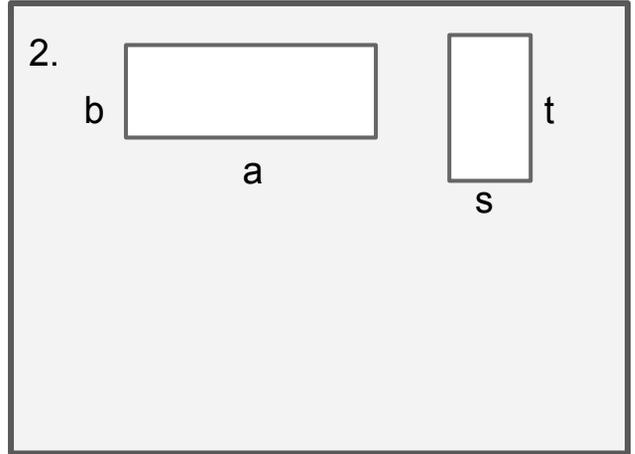
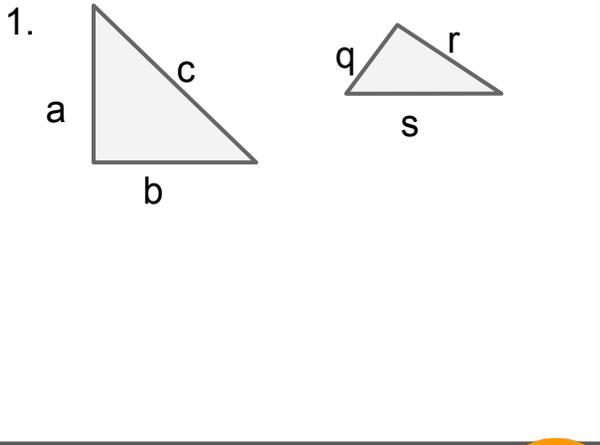
6. The ratio of the length of two corresponding sides of two similar geometric figures is called scale factor.

\_\_\_\_\_



# WHAT BRAND OF MILK SHOULD I BUY?

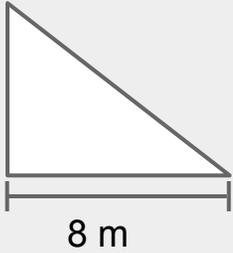
Oh no! I don't know how to identify the best milk brand to buy. Help me identify it by writing all the proportional relationships of the sides of the following geometric figures.



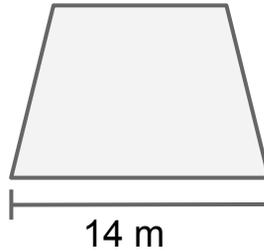
# COFFEE LOVER

Before drinking your coffee, you should answer the problems first. Given the following scale factor, draw the equivalent scale drawing of the following and indicate the calculated length of the side.

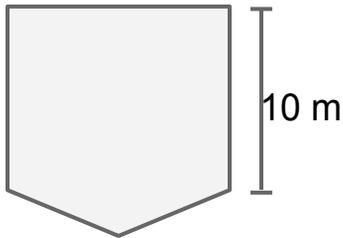
1.  $1/25$



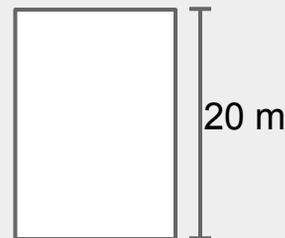
2.  $1/30$



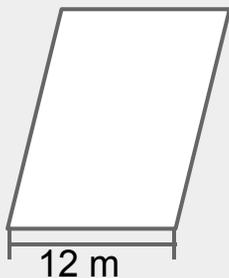
3.  $1/160$



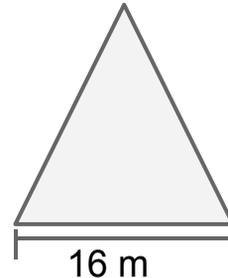
4.  $1/126$



5.  $1/18$



6.  $1/38$



# MY FAVORITE SNACKS

Answer the following to convince your Mom to buy your favorite snacks. Determine the scale factor of the following problems. Show your solution on the space provided.

1. The swimming pool has an actual width of 20 meters and its width in the drawing size is 5 centimeters. Determine its scale factor.

2. Your Dad is a pilot and he gave you an airplane toy with a length of 30 centimeters. Determine the scale factor if an actual airplane has a length of 40 meters.



3. The garden in your house has a length of 10 meters. Your architect brother drew it in a paper width a length of 7 centimeters. Determine the scale factor.

4. Your family owns a boat that has a length of 25 meters . One rainy day, you made a paper boat that has a length of 17 centimeters. Determine the scale factor for the comparison of the boat you made and the actual boat your family owns.



## CHOOSING FRESH VEGETABLES

Can you help me find fresh vegetables? In order for you to help me, you need to read and answer the following problems carefully. Write your solutions on the space provided.

1. The rectangular field has a width of  $x$  and a length of 21 meters. The drawing size has a width of 15 centimeters and a length of 22 centimeters. Find the actual width of the rectangular field.



2. You are assigned to calculate the actual width of a basketball court with a length of 25 meters. The scale drawing of the basketball court has a width of 14 centimeters and a length of 18 centimeters. Find the actual width of the rectangular basketball court.

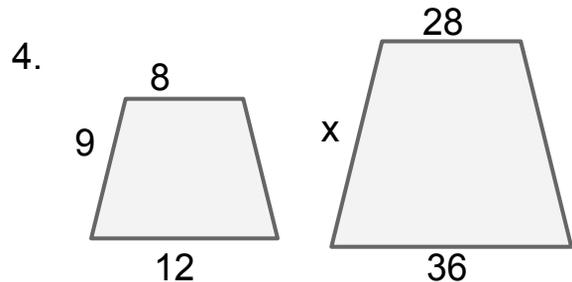
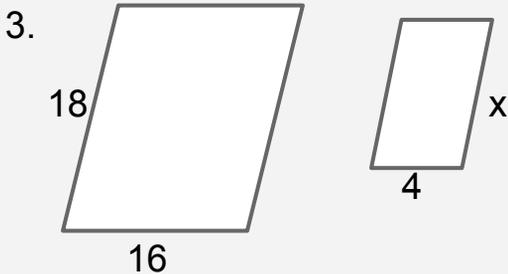
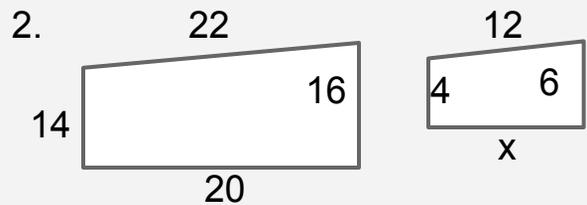
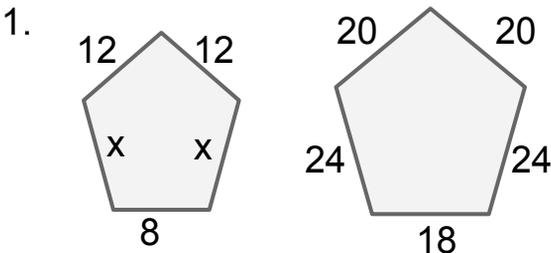


3. You visited the rectangular land that your family owns and measured its dimensions. You found out it was 30 meters wide and 45 meters long. You drew a scale drawing of the land and put 18 centimeters on its width. What should be the length of your scale drawing?



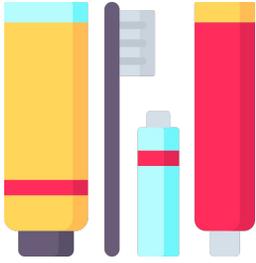
# WHAT'S ON MY GROCERY LIST?

Let's find out what's on the grocery list. Analyze the following geometrical shapes and find the value of  $x$ .



# TOILETRIES

Solve the following problems so we can buy toiletries. From the given set of data, calculate what is being asked in each item. Apply the concept of scale factor to answer the questions.



1.  
Scale factor:  $\frac{3}{20}$   
Actual length: 20 meters  
What is the length of the scale drawing?



2.  
Scale factor:  $\frac{7}{100}$   
Drawing length: 18 cm  
What is the actual length?

3.  
Scale factor:  $\frac{4}{115}$   
Actual width: 15 meters  
What is the width of scale drawing?

4.  
Scale factor:  $\frac{3}{175}$   
Actual length: 41 m.  
What is the length of the scale drawing?

5.  
Scale factor:  $\frac{3}{200}$   
Drawing width: 12 cm  
What is the actual width?



# BREAD FOR BREAKFAST

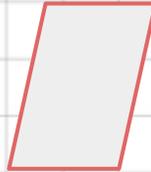
Should I buy a large bread or a small one? Help me decide. Based on the graph, draw another scale drawing with the following conditions:



1. Twice as long as the side lengths of the triangle below.



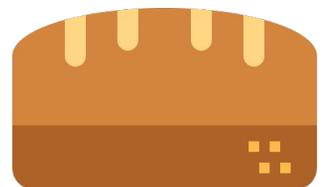
2. The width is thrice as long as the width of the given parallelogram.



3. The width is twice and the length is half as the side lengths of the rectangle below.



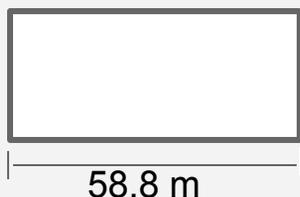
4. Twice as long as the side lengths of the square below.



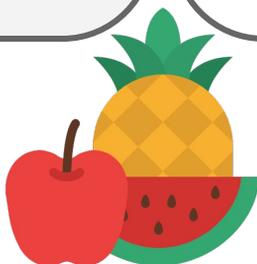
# FRUITS THAT I LIKE

Help me choose fresh fruits! Read the following word problems carefully. Answer the questions and show your solution on the space provided.

1. The figure below shows the scale drawing of a rectangular airport. If the scale factor is  $\frac{1}{85}$ , what is the actual length of the airport?



2. Sandra wants to create a unique triangular frame. She started by drawing a scale drawing with a height of 20 centimeter. If the scale factor is  $\frac{7}{26}$ , what is the actual height of the frame?



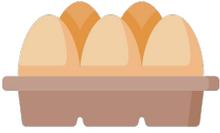
3. Anna will be renovating his rectangular room with a width of 4 meters and a length of 6 meters. Her architect drew a scale drawing and used a scale factor of  $\frac{1}{25}$ . What is the width of the scale drawing of Anna's room?

4. Paul plans to create a huge aquarium for his fishes. He drew a scale drawing of the aquarium and used a scale factor of  $\frac{1}{20}$ . If he wants it to have a 1 meter height, what is the height of the scale drawing?

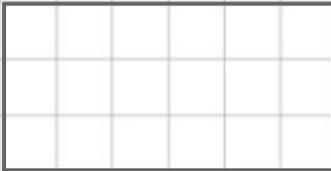


# PANCAKE INGREDIENTS

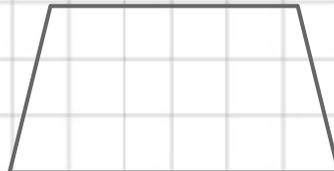
Let's find out what are the ingredients in making pancakes by reading and answering the following word problems carefully.



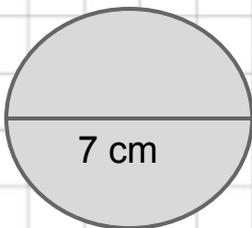
1. The figure below represents a swimming pool. The scale ratio used is 1 centimeter to 167 centimeter. The box measures 1 cm by 1 cm. Find the actual dimension of the swimming pool.



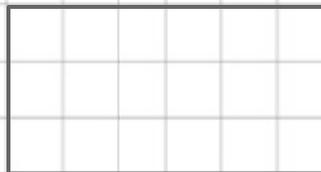
2. The scale ratio used to draw the garden below is 1 centimeter to 59 centimeters. Find the actual length of the garden if each box measures 1 cm by 1 cm.



3. The actual diameter of the swimming pool is to be determined. If the scale factor used to draw the pool is  $\frac{1}{43}$ , what is the actual diameter of it?



4. The scale drawing of a land is shown below. Find the actual length of the land if the scale ratio used is 1 centimeter to 500 cm. Note that each box measures 1 cm by 1 cm.



# ANSWER GUIDE

## Activity 1

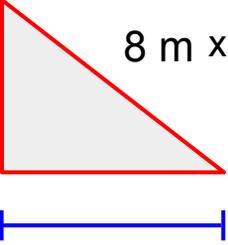
1. False    2. False    3. True    4. True    5. True    6. True

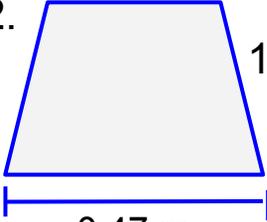
## Activity 2

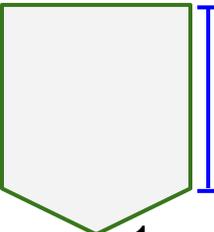
1.  $\frac{a}{b} = \frac{r}{q}$      $\frac{a}{c} = \frac{r}{s}$      $\frac{b}{c} = \frac{q}{s}$     2.  $\frac{a}{b} = \frac{t}{s}$

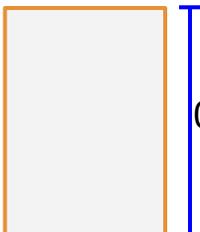
3.  $\frac{a}{b} = \frac{x}{y}$     4.  $\frac{a}{b} = \frac{A}{B}$      $\frac{a}{c} = \frac{A}{C}$      $\frac{b}{c} = \frac{B}{C}$

## Activity 3

1.   
 $8 \text{ m} \times \frac{1}{25} = 0.32 \text{ m}$   
0.32 m

2.   
 $14 \text{ m} \times \frac{1}{30} = 0.47 \text{ m}$   
0.47 m

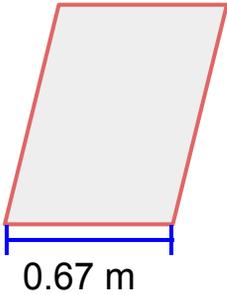
3.   
 $10 \text{ m} \times \frac{1}{160} = 0.06 \text{ m}$   
0.06 m

4.   
 $20 \text{ m} \times \frac{1}{126} = 0.16 \text{ m}$   
0.16 m



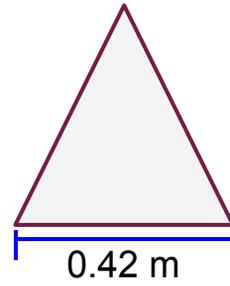
# ANSWER GUIDE

5.



$$12 \text{ m} \times \frac{1}{18} = 0.67 \text{ m}$$

6.



$$16 \text{ m} \times \frac{1}{38} = 0.42 \text{ m}$$

## Activity 4

$$1. \quad \frac{0.05 \text{ m}}{20 \text{ m}} = \frac{1}{400}$$

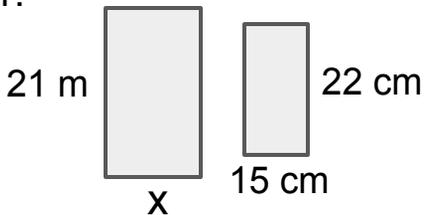
$$3. \quad \frac{0.07 \text{ m}}{10 \text{ m}} = \frac{7}{1000}$$

$$2. \quad \frac{0.3 \text{ m}}{40 \text{ m}} = \frac{3}{400}$$

$$4. \quad \frac{0.17 \text{ m}}{25 \text{ m}} = \frac{17}{2500}$$

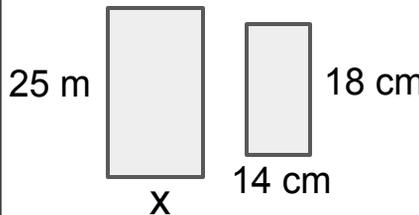
## Activity 5

1.



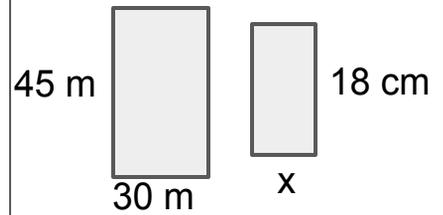
$$\frac{0.22 \text{ m}}{21 \text{ m}} = \frac{0.15 \text{ m}}{x}$$

$$x = 14.32 \text{ m}$$



$$\frac{0.18 \text{ m}}{25 \text{ m}} = \frac{0.14 \text{ m}}{x}$$

$$x = 19.44 \text{ m}$$



$$\frac{0.18 \text{ m}}{45 \text{ m}} = \frac{x}{30 \text{ m}}$$

$$x = 0.12 \text{ m}$$



# ANSWER GUIDE

## Activity 6

$$1. \quad \frac{12}{x} = \frac{20}{24}$$

$$x = 14.4$$

$$3. \quad \frac{18}{16} = \frac{x}{4}$$

$$x = 4.5$$

$$2. \quad \frac{16}{20} = \frac{6}{x}$$

$$x = 7.5$$

$$4. \quad \frac{8}{9} = \frac{28}{x}$$

$$x = 31.5$$

## Activity 7

$$1. \quad 20 \text{ m} \times \frac{3}{20} = 3 \text{ m}$$

$$4. \quad 41 \text{ m} \times \frac{3}{175} = 0.70 \text{ m}$$

$$2. \quad 18 \text{ cm} \times \frac{100}{7} = 257.14 \text{ cm}$$

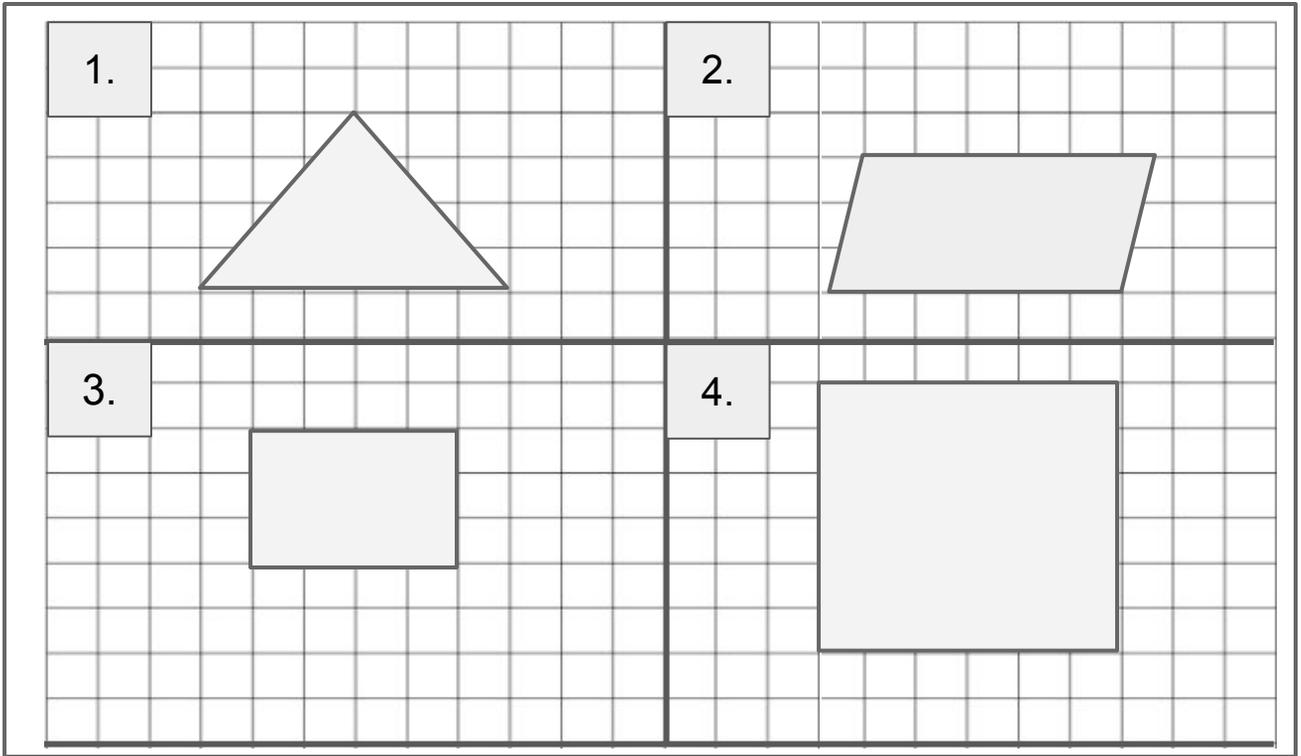
$$5. \quad 12 \text{ cm} \times \frac{200}{3} = 800 \text{ cm}$$

$$3. \quad 15 \text{ m} \times \frac{4}{115} = 0.52 \text{ m}$$



# ANSWER GUIDE

## Activity 8



## Activity 9

1.  $58.8 \text{ m} \times 85 = 5000 \text{ m}$

3.  $\text{m} \times \frac{1}{25} = 0.16 \text{ m}$

2.  $0.2 \text{ m} \times \frac{26}{7} = 0.74 \text{ m}$

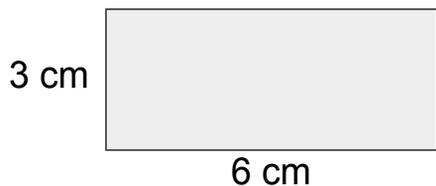
4.  $1 \text{ m} \times \frac{1}{20} = 0.05 \text{ m}$



# ANSWER GUIDE

## Activity 10

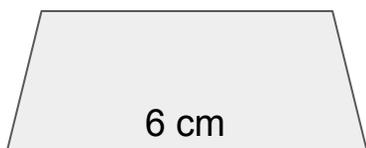
1.



$$3 \text{ cm} \times \frac{167 \text{ cm}}{1 \text{ cm}} = \boxed{501 \text{ cm width}}$$

$$6 \text{ cm} \times \frac{167 \text{ cm}}{1 \text{ cm}} = \boxed{1002 \text{ cm length}}$$

2.



$$6 \text{ cm} \times \frac{59 \text{ cm}}{1 \text{ cm}} = \boxed{354 \text{ cm}}$$

3.

$$7 \text{ cm} \times \frac{43}{1} = \boxed{301 \text{ cm}}$$

4.



$$6 \text{ cm} \times \frac{500 \text{ cm}}{1 \text{ cm}} = \boxed{3000 \text{ cm}}$$



# Copyright Notice

This resource is licensed under the [Creative Commons Attribution-NonCommercial 4.0](https://creativecommons.org/licenses/by-nc/4.0/) International license.

You are free to:

- **Share** – copy and redistribute the material in any medium or format
- **Adapt** – remix, transform, and build upon the material

Under the following terms:

- **Attribution** – You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.
- **NonCommercial** – You may not use the material for commercial purposes.

For more information on this license, visit the following link:

<http://creativecommons.org/licenses/by-nc/4.0/>

Where possible, free-use images are sourced from online repositories such as Wikipedia and Wikimedia Commons. References and sources for images are provided in the speaker notes section of this document.

Thank you!



# Thank you

Thank you so much for purchasing and downloading this resource.

We hope it has been useful for you in the classroom and that your students enjoy the activities.

For more teaching and homeschooling resources like this, don't forget to [come back](#) and download the new material we add every week!

Thanks for supporting **Helping With Math**. We can provide teachers with low-cost, high-quality teaching and homeschooling resources because of our loyal subscribers and hope to serve you for many years to come.

- The Entire Helping With Math Team :)

