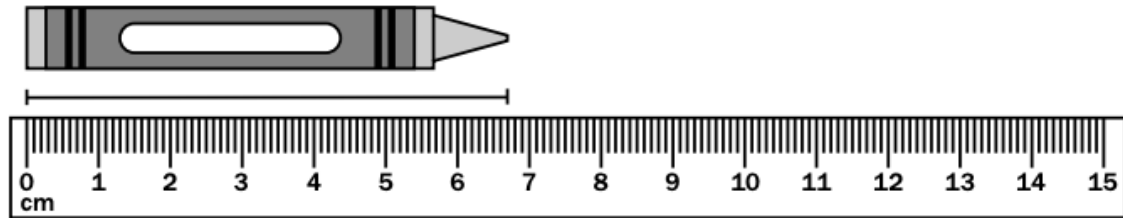


Math 9 Notes - LG 13 Metric conversions

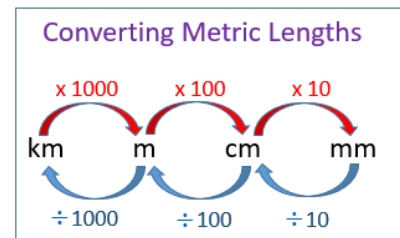
Watch: <https://youtu.be/nVgqPcbLKFA>



1 km = _____ m

1 m = _____ cm

1 cm = _____ mm 1 km = _____ cm



24 km = _____ m

375 mm = _____ cm

5 m = _____ km

430 cm = _____ m

67 cm = _____ m

12 cm = _____ mm

Name: _____ Date: _____

Measuring Units Worksheet

Convert.

1 a. 400 cm = _____ m

1 b. 3,000 m = _____ km

2 a. 700 cm = _____ m

2 b. 7,000 m = _____ km

3 a. 4,000 m = _____ km

3 b. 10 m = _____ cm

4 a. 100 cm = _____ m

4 b. 500 cm = _____ m

5 a. 3 m = _____ cm

5 b. 1,000 m = _____ km

6 a. 8 m = _____ cm

6 b. 6 m = _____ cm

7 a. 9,000 m = _____ km

7 b. 200 cm = _____ m

8 a. 5 km = _____ m

8 b. 6,000 m = _____ km

9 a. 2,000 m = _____ km

9 b. 900 cm = _____ m

10 a. 8,000 m = _____ km

10 b. 10 km = _____ m

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1 a. 4 m
2 a. 7 m
3 a. 4 km
4 a. 1 m
5 a. 300 cm
6 a. 800 cm
7 a. 9 km
8 a. 5,000 m
9 a. 2 km
10 a. 8 km

1 b. 3 km
2 b. 7 km
3 b. 1000 cm
4 b. 5 m
5 b. 1 km
6 b. 600 cm
7 b. 2 m
8 b. 6 km
9 b. 9 m
10 b. 10,000 m

Name: _____ Date: _____

Measuring Units Worksheet

Convert.

1 a. 7 cm = _____ mm

1 b. 50 mm = _____ cm

2 a. 400 cm = _____ m

2 b. 1 m = _____ cm

3 a. 1000 cm = _____ m

3 b. 700 cm = _____ m

4 a. 30 mm = _____ cm

4 b. 20 mm = _____ cm

5 a. 10 mm = _____ cm

5 b. 8 cm = _____ mm

6 a. 6 m = _____ cm

6 b. 5 m = _____ cm

7 a. 2 m = _____ cm

7 b. 800 cm = _____ m

8 a. 9 m = _____ cm

8 b. 3 m = _____ cm

9 a. 90 mm = _____ cm

9 b. 10 cm = _____ mm

10 a. 4 cm = _____ mm

10 b. 60 mm = _____ cm

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1 a. 70 mm
2 a. 4 m
3 a. 10 m
4 a. 3 cm
5 a. 1 cm
6 a. 600 cm
7 a. 200 cm
8 a. 900 cm
9 a. 9 cm
10 a. 40 mm

1 b. 5 cm
2 b. 100 cm
3 b. 7 m
4 b. 2 cm
5 b. 80 mm
6 b. 500 cm
7 b. 8 m
8 b. 300 cm
9 b. 100 mm
10 b. 6 cm

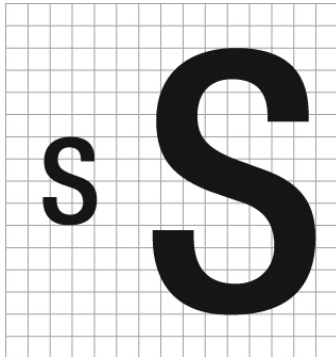


Scale factors can be used to make enlargements or reductions

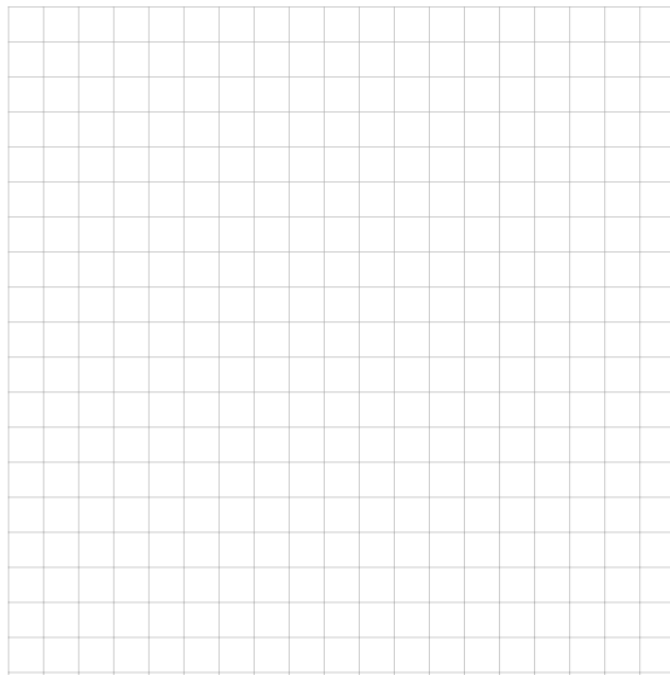
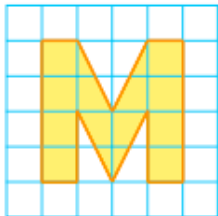
S.F. > 1

S.F. < 1

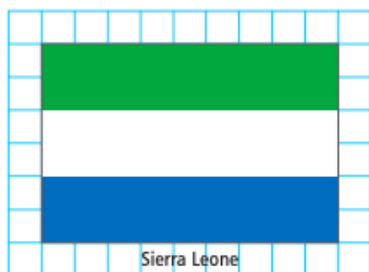
What is the scale factor used to enlarge the letter on the left?



Draw the letter M using a scale factor of 3.



Draw the flag using a scale factor of $\frac{1}{3}$



A photo has a length to width ratio of 3:1.
Assume you have a photo that is 12cm long.

- What would be the dimensions of an enlargement that has a scale factor of 5?
- What would be the dimensions of a reduction with a scale factor of 0.25?

Name : _____

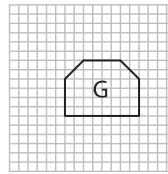
Scale Factors - MCQ

Sheet 1

1) What would be the actual length, if the length of the model is 25 m and the scale factor is lesser than one?

- a) 20 m b) 25 m c) 30 m

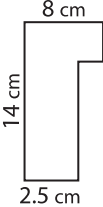
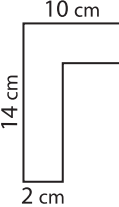
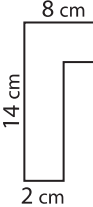
2) Which figure is the scaled copy of figure G?



- a)  b)  c) 

3) Which of the following figures is the scaled copy of the figure A?

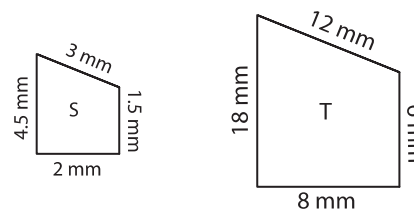


- a)  b)  c) 

4) What happens to the new image if the scale factor of the original image to new image is 1 : 3?

- a) Enlargement b) Reduction c) Remains same

5) Identify the scale factor of figure S to T.



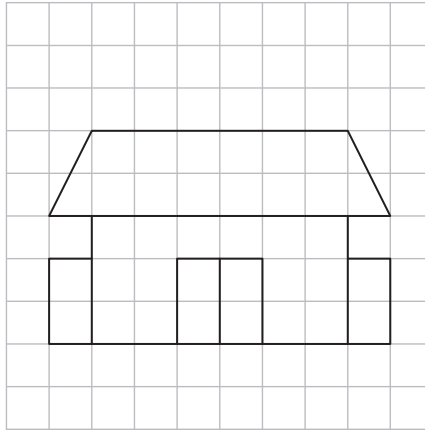
- a) 4 : 1 b) 1 : 4 c) 1 : 4.5

Name : _____

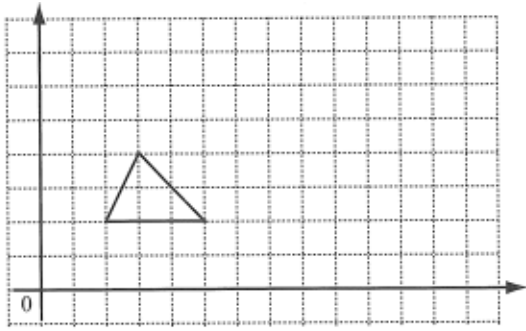
Enlarge / Reduce

Sheet 1

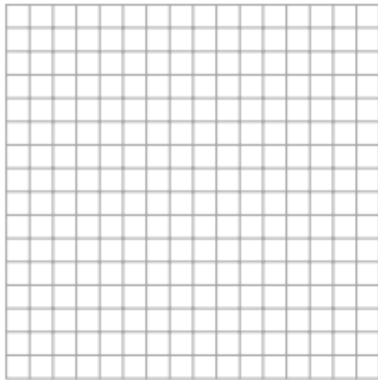
Enlarge the image using the scale factor of 2.



Draw a triangle using a scale factor of 2.

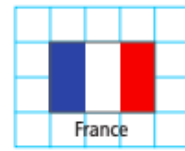


Draw a butterfly using a scale factor of 3

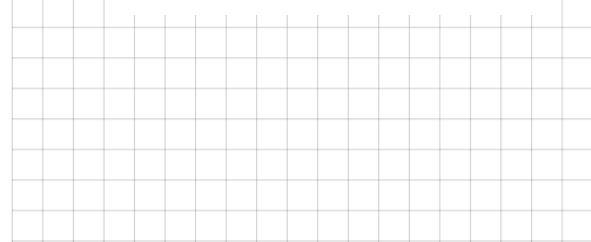
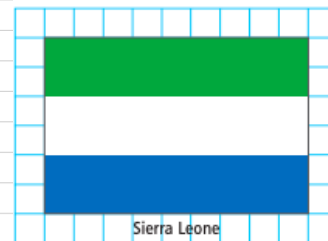


A photo has a length to width ratio of 5:6.
Assume you have a photo that is 10cm long.

Draw an enlargement of the flag using a scale factor of 4.



Draw an image of the flag using a scale factor of $\frac{1}{3}$.



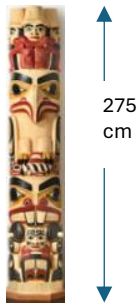
- What would be the dimensions of an enlargement that has a scale factor of 2?
- What would be the dimensions of a reduction with a scale factor of 0.4?

LG 13 - Scale factors and diagrams
 Watch: <https://youtu.be/B3HHh0Xgvsg>



Scale factor – ratio between 2 corresponding sides of a similar object.

Can be written like: $\frac{\text{DRAWING}}{\text{ACTUAL}}$ or Drawing: Actual



The actual length X **SCALE FACTOR** = drawing length

$$275 \text{ cm} \times \text{S.F.} = 5 \text{ cm}$$

$$\text{S.F.} = \frac{\text{DRAWING}}{\text{ACTUAL}} = \frac{5 \text{ cm}}{275 \text{ cm}} = \frac{1}{55}$$



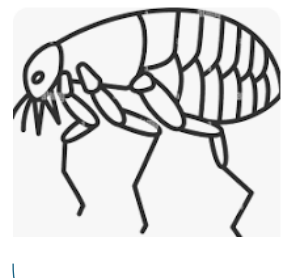
Scale factors are multipliers – they don't have units!!!!

We can also write this ratio as Drawing : Actual

If the drawing is smaller than the actual object it is called a **REDUCTION**. (s.f. < 1)



$$\text{S.F.} = \frac{\text{DRAWING}}{\text{ACTUAL}} = \frac{20 \text{ mm}}{10 \text{ mm}} = 2$$



We can also write this ratio as Drawing : Actual

If the drawing is LARGER than the actual object it is called an **ENLARGEMENT**. (s.f. > 1)

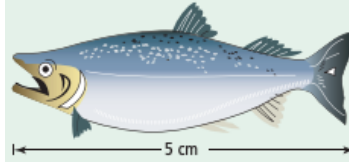
If using a proportion, you can leave units as long as tops match and the bottoms match. If I want to know the height of my flea drawing I can calculate using a proportion.

$$\frac{\text{DRAWING}}{\text{ACTUAL}} = \frac{2 \text{ cm}}{10 \text{ mm}} = \frac{\text{ } }{8 \text{ mm}}$$

Using scale factor to find a length (actual length is 9.2 times bigger):

Show You Know

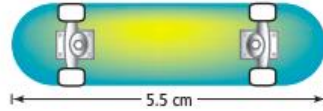
The scale for the diagram of the chinook salmon is 1:9.2.



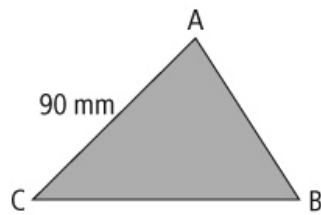
Calculate the actual length of the salmon.

Using proportion to find a length:

The **scale diagram** of a skateboard uses a scale of 1:14. What is the actual length of the skateboard?



A scale diagram of a field uses a scale of 2 mm:1 m. Determine the actual distance from A to C.



Quick reminder if you need to convert from one unit to another.

$$1 \text{ km} = 1000 \text{ m} \quad 1 \text{ m} = 100 \text{ cm} \quad 1 \text{ cm} = 10 \text{ mm}$$

$$543 \text{ cm} = \underline{\hspace{2cm}} \text{ m}$$

$$4.6 \text{ m} = \underline{\hspace{2cm}} \text{ cm}$$

$$7.6 \text{ cm} = \underline{\hspace{2cm}} \text{ mm}$$

Practice

Determine the missing value in each proportion.

$$\frac{1}{9} = \frac{\blacksquare}{117}$$

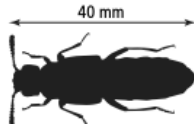
$$\text{b) } \frac{1}{12} = \frac{10.5}{\blacksquare}$$

$$\frac{1}{3} = \frac{\blacksquare}{144}$$

$$\text{b) } \frac{1}{\blacksquare} = \frac{5.2}{117}$$

What is the real-life size?

The Euvira Micmac beetle below is enlarged using a scale factor of 1:0.05.

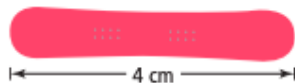


Use the scale factor to calculate the actual length of each object.

- a) The scale factor for the image of this hockey stick is 1:42.



What scale factor was used to create the image of the snowboard if its actual length is 166 cm? Express your answer to the nearest hundredth.



8. What is the scale factor?

$$\text{a) } \blacksquare = \frac{30}{200}$$

$$\text{b) } \blacksquare = \frac{21}{12.5}$$

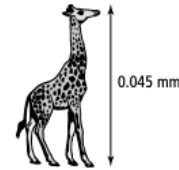
9. Determine the scale factor.

$$\text{a) } \blacksquare = \frac{0.5}{25}$$

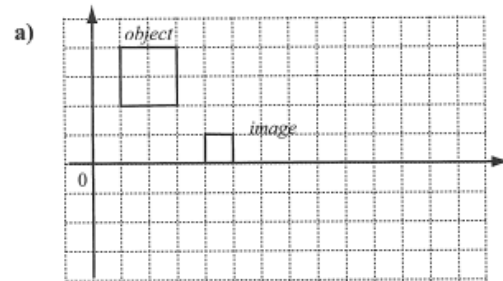
$$\text{b) } \blacksquare = \frac{1.6}{3.2}$$

What is the scale used in this diagram?

The average height of a male giraffe is 6 m.



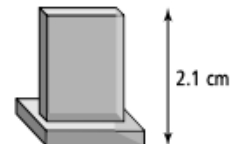
Find the scale factor.



Scale Factor _____

What scale factor is used to create each image below?

- a) The actual size of this award is 34.3 cm.



Examples with scale drawings

- a A scale is such that 2 cm on the scale drawing represents 5 m in real life.
Write this scale as a ratio.

As a ratio the scale is 2 cm : 5 m.
Remember that 5 m = 500 cm.

$$\begin{aligned}\therefore 2 \text{ cm} : 5 \text{ m} &= 2 \text{ cm} : 500 \text{ cm} \\ &= 2 : 500 \\ &= 1 : 250\end{aligned}$$

So the scale is 1 : 250.

Before simplifying, then units for both terms must be the same.
The 'cm' was cancelled on each side of the ratio.

Divided both sides by the common factor 2.



Your turn...



Scale drawings

- 3 Find the real length (x) of some object if the scale drawing has length 6.5 cm and the scale is given by:

a 1 : 35

b 13 : 1

c 5 : 16

- 4 Find the length on the scale drawing (x) of a real life object of length 4 m if the scale is given by:

a 44 : 1

b 1 : 9

c 3 : 40

**Scale drawings**

- 1 Find the scales for each of these:
 - a 1 cm on the scale drawing represents 2 m in real life. [Hint: start 1 cm : 2 m ...]

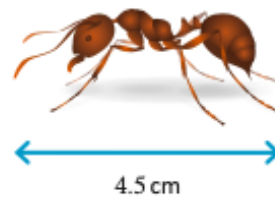
 - b 2 cm on the scale drawing represents 1 m in real life.

 - c 20 cm represents 1 km.

 - d 1 m represents 4 cm.

 - e 1250 mm represents 250 km.

- 2 Look at the scale drawing of a fire ant. If the scale drawing of the ant has scale 12 : 1, find the length of the ant in real life.
[Hint: Let the real life length be x .]



Math 9 LG 13 Scale and Maps
 Watch: https://youtu.be/Ah3i_vstaTO



Review: **1 km = 1000m** **1 m = 100 cm** **1 km = 100 000 cm**

230 000 cm = _____ km 5 km = _____ cm 854 000 cm = _____ km

Map scale:

The scale on the map is 1 : 100 000.

Blizzards for lunch? How far is the walk?
 The distance measured from THSS to DQ on the map is 2 cm.



The flying distance from Dawson City to Whitehorse is 540 km. The distance shown on the map is 3 cm. What is the scale of the map?



Step1: Convert to the same units:

540 km = _____ cm

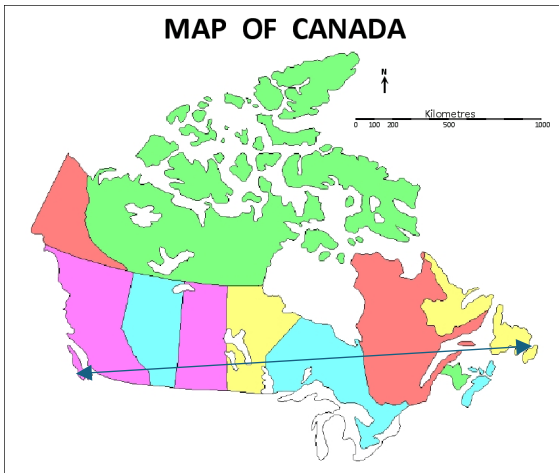
Step 2: Set up as a proportion.

$$\frac{\text{distance on map}}{\text{distance in real life}} = \frac{3}{5400000} = \frac{1}{\square}$$

Scale of map = _____ : _____

This means that 1 cm on the map is equal to _____ cm in real-life.

1. The distance from Victoria to St. John's (coast to coast) is 7822 km. If that distance measured on the map is 5.74 cm, what is the scale of the map?



Step 1: Convert to the same units:

$$\underline{\hspace{2cm}} \text{ km} = \underline{\hspace{2cm}} \text{ cm}$$

Step 2: Set up as a proportion:

$$\frac{\text{distance on map}}{\text{distance in real life}} = \frac{5.74}{\square} = \frac{1}{\square}$$

Scale of map = $\underline{\hspace{1cm}}$: $\underline{\hspace{1cm}}$

This means that 1 cm on the map is equal to $\underline{\hspace{2cm}}$ cm in real-life.

2. A map of the Lower Mainland show the distance Vancouver and Maple Ridge is 11 cm. The actual distance is 44 km.



What is the scale of this map? $\underline{\hspace{1cm}}$: $\underline{\hspace{1cm}}$

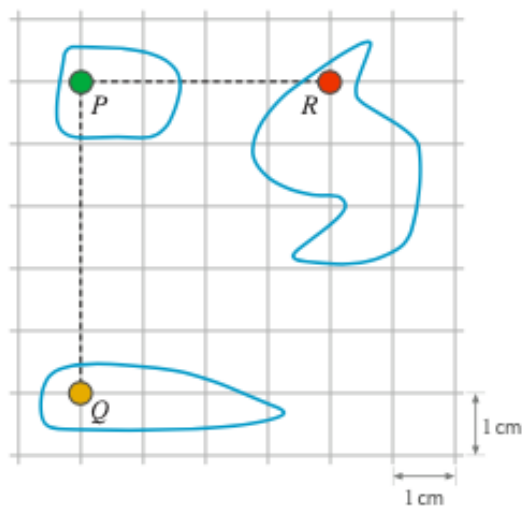
3. The distance between two points on a map is 6 cm. In real life this distance measures 1.2 km. What is the scale of the map?
4. A map has a scale of 1 : 50000. If the distance between two points is 4 cm, how far is it in real life.



Maps

1 A map has a scale of 1 : 95 000. What is the real distance (x) if two points on the map are 12 cm apart?

2 Points P , Q and R are locations on 3 islands for this map. Each grid on the map is 1 cm by 1 cm.



(i) If the real life distance between the two points P and Q is 8 kilometres, find the scale of this map given that each grid unit is 1 cm.

(ii) Using this map scale, find the distance between P and R .

