2.3 Scale Drawings

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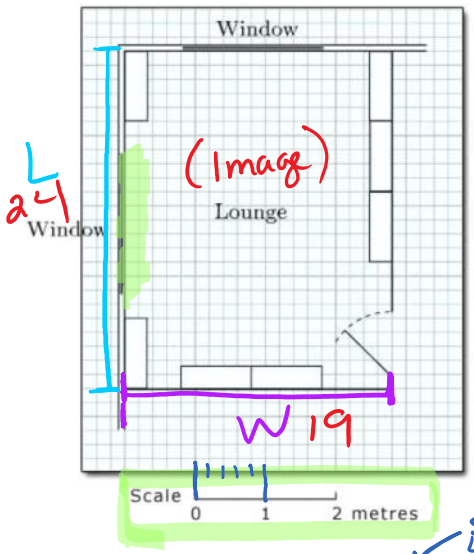
2.3 SCALE DIAGRAMS

Name:_____ Block_____

Scale Diagram - a drawing that shows a real object, but with enlarged (scale factor > 1) or reduced (scale factor < 1) sizes of length, width, etc... measurements.

The scale on a diagram is shown as a ratio of length in drawing : length in reallife image : actual

Reading Scale Diagrams



a) Explain the scale of the diagram

The scale means the length of 5 boxes/units in the diagram is equal to 1m (100cm) in real life (actual room).

b) Convert the scale of the diagram to a 1 : 20 ratio.

5 boxes = 1m 1m = 100cm

ratio ⇒ image : actual

5 : 100cm

simplify ÷5 2:5

1 : 20

want this # to be larger

cm

always want the scale simplified to "1 : ___"

1 : 20 is the multiplier

c) What are the actual dimensions of this room? (size L x W)

image dimensions L x W

24 by 19

×20 ×20

actual dimensions: 480cm by 380cm

d) How long is the window on the left side of the room?

image length = 10 boxes ×20

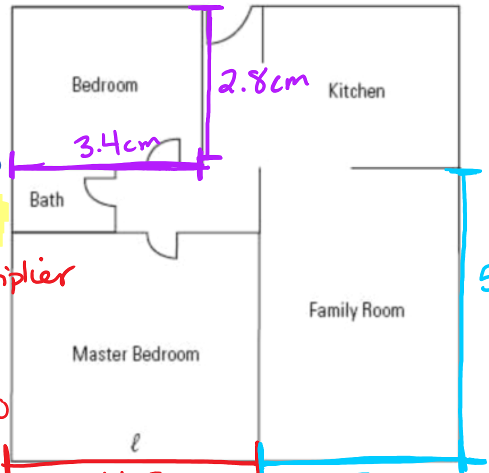
actual length = 200cm

how many m? $\frac{200\text{cm}}{100\text{cm}} \times \frac{1\text{m}}{} = 2\text{m}$

*To determine the actual length multiply each dimension by the scale factor (multiplier)

PRACTICE

Try This 1: The diagram below shows a house floor plan. The indicated wall (ℓ) in the actual master bedroom is **12.5 feet** long.
(3.8m)



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

convert to ratio

$$\text{Scale Factor} = \frac{\text{image}}{\text{actual}} = \frac{4.5\text{cm}}{3.8\text{m}} = \frac{4.5\text{cm}}{380\text{cm}} \Rightarrow 4.5 : 380$$

$3.8\text{m} \cdot \frac{100\text{cm}}{1\text{m}} = 380\text{cm}$

simplify ÷4.5 → **1 : 84.4** ← multiplier

b) What are the dimensions of the family room?

Image = 5cm by 3.5cm (×84.4, ×84.4)

Actual = 422cm by 295.4cm ÷100

... in m? = 4.22m by 2.95m

c) What are the dimensions of the smaller bedroom?

Image: 3.4 cm by 2.8cm (×84.4, ×84.4)

Actual: 286.96cm by 236.32cm

In m? 2.87m by 2.36m

Try This 2: 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.

$$\text{Scale Factor} = \frac{\text{image}}{\text{actual}} = \frac{5\text{cm}}{4.2\text{m}} = \frac{5\text{cm}}{420\text{cm}} \Rightarrow 5 : 420$$

÷5 ÷5 → **1 : 84**

b) An alligator is drawn at the same scale. In the drawing, it is ~~5.9 cm~~ 4.6cm long. How long is the actual alligator?

image

* Solve by proportional reasoning

$$\frac{1}{84} = \frac{4.6}{?} = 386.4\text{cm}$$

(÷, ×; 84 = scale factor)

÷100

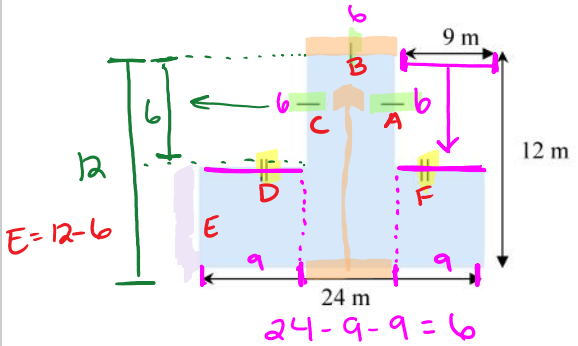
3.864 m

Finding Missing Dimensions

To avoid clutter many scale drawings include a minimum amount of information.

As a result you will often have to use information on the diagram to find other pieces of information you need to solve a problem.

Example #1:
Using the diagram below, find the lengths of the walls A, B, C, D and E.



B=C=A=6m

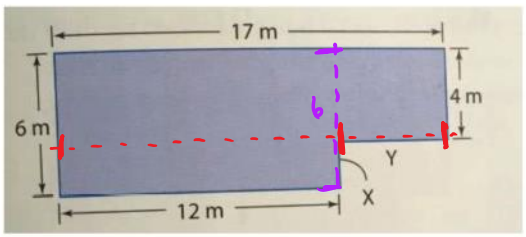
D=F=9m

E=6m

PRACTICE

1. Determine the missing dimensions.

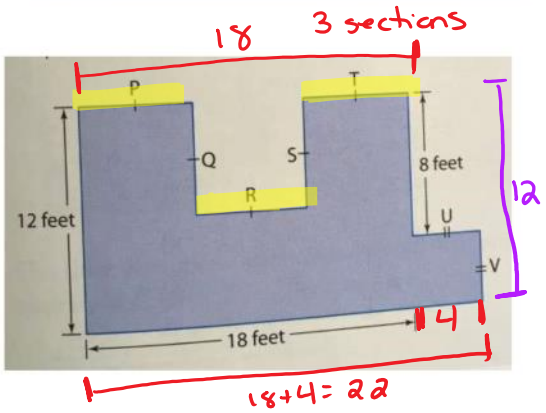
a)



X=6-4=2m

Y=17-12=5m

b)



T=↘

P=↘

S=Q=R=T=P=6

Q=↗ 18÷3=6

R=↗

U=↘

U=V=12-8=4

Example #2.

Express the scale in ratio form:

Reminder: when representing scale the ratio must use the same

a) 1 mm to 1 cm 1mm : 1cm

Express the scale in ratio form.

Reminder: scale the ratio must use the same units!

a) 1 mm to 1 cm

1mm : 1cm
1mm : 10mm
1 : 10

start with 1

b) 1 m to 1 km

1m : 1km
1m : 1000m
1 : 1000

Example #3

Determine the actual distance represented by the following lengths on a scale diagram using a 1: 100 scale.

distances given are the image

a) 14 cm

14cm ÷ actual? = 1/100 × actual

image / actual

scale factor

multiplier

= 1400cm (or 14m)

b) 2.85 cm

2.85cm ÷ ? = 1/100 × ?

= 285cm = 2.85m

c) 7 m

7m ÷ ? = 1/100 × ?

= 700m = 0.7km

d) 3.7 mm

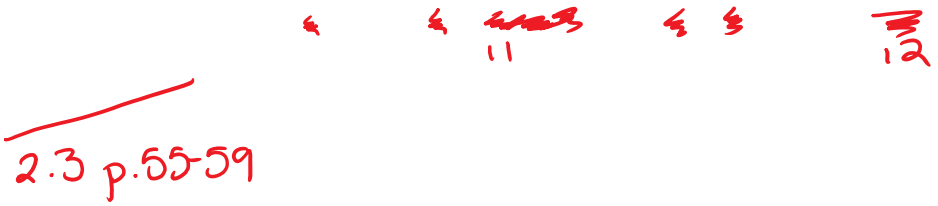
3.7mm ÷ ? = 1/100 × ?

= 370mm = 37cm

Homework

ASSIGNMENT #3
~~2.4 pg 64 - 67~~
2.3 p.55-59

Required questions	Extra practice	Extension
~~1~~, 2, 3, 4, 5, ~~6~~, 8, ~~10, 12, 13~~ (11)	~~7~~, 9, ~~11~~	~~15~~, ~~16~~ (12)


11
12
2.3 p.55-59