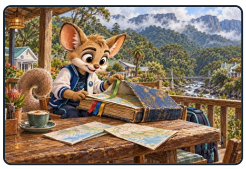
1. Scale diagrams



Name _____ Class _____ Date _____

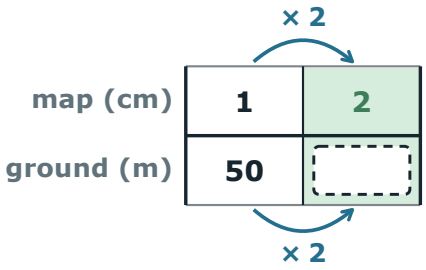
Max's stop · Storms River · village. At a wooden table in Storms River village, on the edge of the Tsitsikamma forest, Max opens the atlas at its green tab: the Eastern Cape chapter begins.

> **Today:** A scale is a ratio: **multiply** a length on the map by the scale to find the real length, and **divide** a real length by the scale to find its length on the map.

Warm-up Map and ground

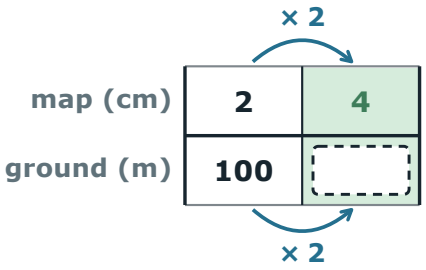
Each answer helps with the next one. Fill in the model, then write the equation.

1 **a) 1 cm represents 50 m. 2 cm = ? m**



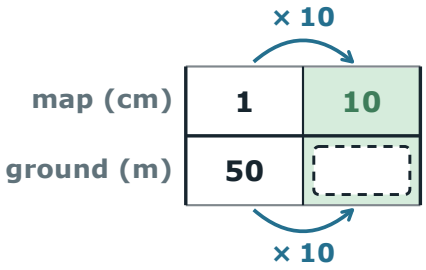
50 m × 2 = _____ m

b) 2 cm represents 100 m. 4 cm = ? m



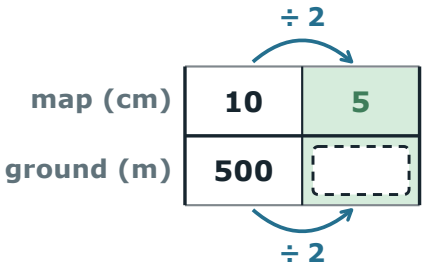
100 m × 2 = _____ m

c) 1 cm represents 50 m. 10 cm = ? m



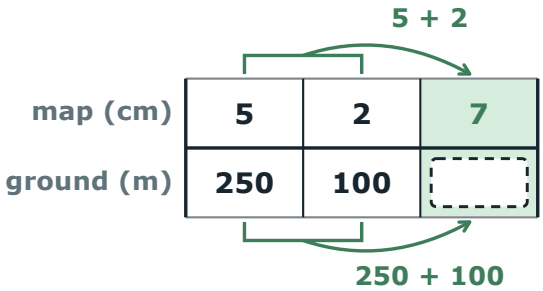
50 m × 10 = _____ m

d) 10 cm represents 500 m. 5 cm = ? m



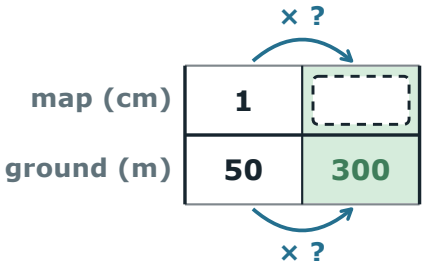
500 m ÷ 2 = _____ m

e) 5 cm: 250 m; 2 cm: 100 m. **7 cm = ? m**



250 m + 100 m = _____ m

f) 1 cm represents 50 m. How many centimetres represent 300 m?

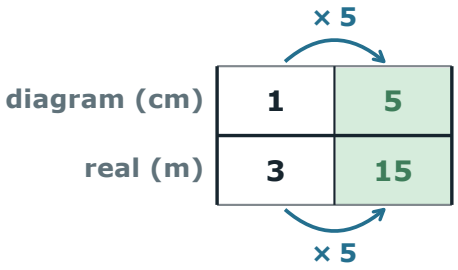


300 m ÷ 50 m = _____ cm

Scale diagrams

KNOWLEDGE **Diagram to real, real to diagram**

WORKED EXAMPLE **On a scale diagram, 1 cm represents 3 m. What does 5 cm represent?**

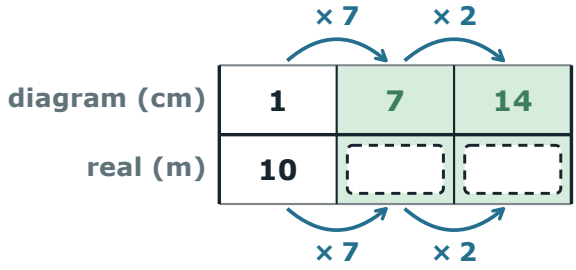


1. Every centimetre on the diagram stands for 3 m, so 5 cm stand for 5 lots of 3 m: **15 m**.

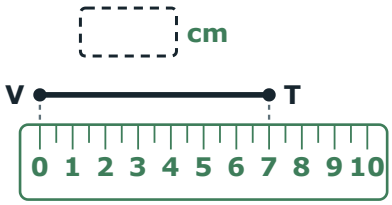
3 m × 5 = 15 m

2 ★ On a scale diagram, **1 cm represents 10 m**. **What does 7 cm represent? And 14 cm?**

10 m × 7 = _____ m, then × 2 = _____ m

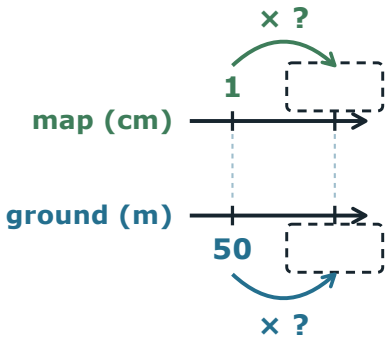


3 ★ **a)** On Max's map, VT is the path to the Big Tree. **Write the length of VT.**



VT = _____ cm

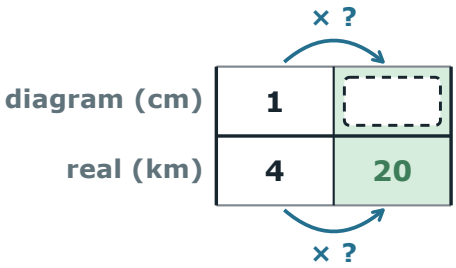
b) Scale: **1 cm represents 50 m**. **So how long is the real path?**



VT = _____ cm, so the real path = _____ m

4 ★ On a scale diagram, **1 cm represents 4 km**. **What would a length of 20 km be on the diagram?**

20 km ÷ 4 km = _____ cm

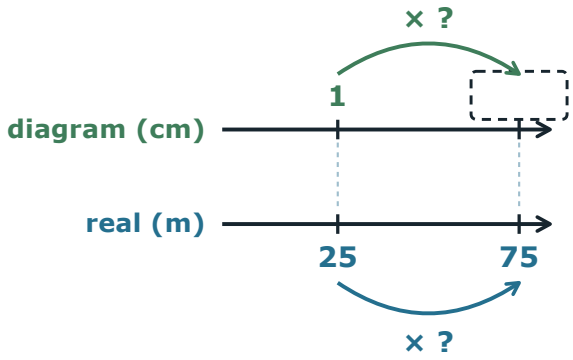


Scale diagrams

5 ★

On a scale diagram, **1 cm represents 25 m**. **What would a length of 75 m be on the diagram?**

75 m ÷ 25 m = _____ cm

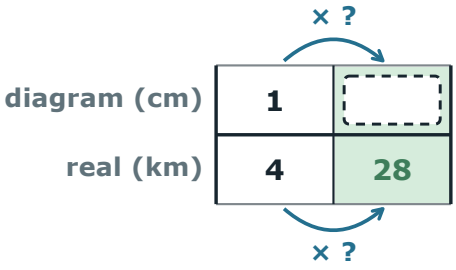


6 ★

a) A diagram has the scale **1 cm represents 4 km**. **Which is the correct calculation to work out how many centimetres would represent 28 km?**

◯ 28 × 4 ◯ 28 ÷ 4

b) So how many centimetres represent 28 km?



28 km ÷ 4 km = _____ cm

7 ★

a) A diagram has the scale **1 cm represents 4 km**. **Which is the correct calculation to work out how many kilometres 15 cm represents?**

◯ 15 × 4 ◯ 15 ÷ 4

b) So how many kilometres does 15 cm represent?

diagram (cm)	1	15
real (km)	4	

4 km × 15 = _____ km

8 ★

a) A soccer pitch is **120 m long** and 90 m wide. Max makes an accurate scale drawing of it: **1 cm represents 20 m**. **How many centimetres would represent 120 m?**

drawing (cm)	1	
real (m)	20	120

120 m ÷ 20 m = _____ cm

b) And how many centimetres would represent the width, 90 m?

drawing (cm)	1	0,5	
real (m)	20		90

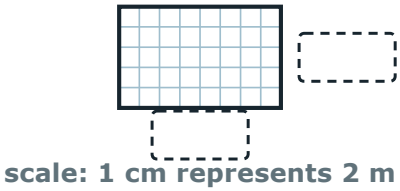
20 m ÷ 2 = _____ m

90 m = _____ cm

Scale diagrams

9 ★ The plan of a hall is drawn on centimetre squares, and **1 cm represents 2 m**. **How long and how wide is the real hall?**

length: 8 × 2 = _____ m · width: 5 × 2 = _____ m

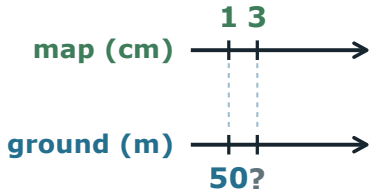


10 ★ On a map, **1 cm represents 50 m**. **What does 3 cm represent?**

So how many centimetres represent 450 m?

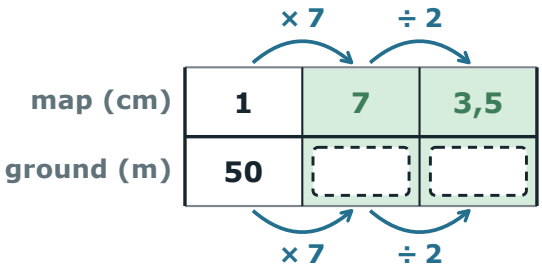
50 m × 3 = _____ m

450 m ÷ 50 m = _____ cm



11 ★ On a map, **1 cm represents 50 m**. A path is **3,5 cm** long on the map. **How long is the real path?**

50 m × 7 = _____ m, then ÷ 2 = _____ m



12 ★ On a road map, **1 cm represents 5 km**. Two towns are **12 cm** apart on the map. **How far apart are they really?**

Draw your model

5 km × 12 = _____ km

13 ★ On a scale diagram, **1 cm represents 3 m**. **What does 9 cm represent?**

Draw your model

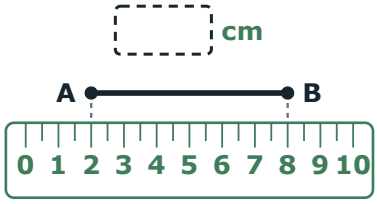
3 m × 9 = _____ m

14 ★ On a scale diagram, **1 cm represents 20 m**. **What would a length of 160 m be on the diagram?**

diagram (cm)	1	
real (m)	20	160

160 m ÷ 20 m = _____ cm

15 ★ **Write the length of the line AB.**



AB = _____ cm

Scale diagrams

APPLICATION **Lwazi's trail map** Draw your own model, then write your number sentence.

16 ★★ On Lwazi's trail map **1 cm represents 50 m**. The boardwalk from the forest gate to the Big Tree is **9 cm** long on the map. **How long is the boardwalk really?**

_____ = _____ m

Draw your model

17 ★★ On the trail map (1 cm represents 50 m) the path from the village to the forest gate is **7 cm** long. Max walks **there and back**. **How far does he walk?**

50 m × 7 = _____ m, then × 2 = _____ m

map (cm)	1	7	14
ground (m)	50		

18 ★★ Lwazi has paced out a new loop through the ferns: **600 m**. He wants to draw it on the trail map, where 1 cm represents 50 m. **How long is the loop on the map?**

_____ = _____ m · 600 m = _____ cm

Draw your model

19 ★★ Lwazi's plan for a new picnic deck beside the Big Tree is drawn on centimetre squares: **1 cm represents 2 m**. **How long and how wide will the real deck be?**



scale: 1 cm represents 2 m

length: _____ = _____ m

width: _____ = _____ m

20 ★★ On a plan of the village campsite a fence that is really **30 m** long is drawn **6 cm** long. **What does 1 cm represent on this plan?**

The gate is drawn **2 cm** wide on the plan. **So how wide is the real gate?**

_____ = _____ m

_____ = _____ m

plan (cm)	6	1	2
real (m)	30		

21 ★★ On the trail map (1 cm represents 50 m) a cable of the tree-top canopy tour is drawn **1,5 cm** long. **How long is the real cable?**

50 m × 3 = _____ m, then ÷ 2 = _____ m

map (cm)	1	3	1,5
ground (m)	50		

REASONING **Bigger on the ground, smaller on the map** Decide, then explain how you know.

22 ★★★

a) On a diagram **1 cm represents 5 m**. Anele wants to work out how many centimetres would represent 10 m. She writes: "10 × 5 = 50, so 50 cm represents 10 m." **Explain the mistake Anele has made.**

- ◯ She multiplied: a real length is made SMALLER for the diagram, so she should divide by 5
- ◯ She should have added 5 to 10
- ◯ Nothing is wrong: 50 cm represents 10 m

b) So how many centimetres represent 10 m?

Draw your model

_____ = _____ cm

Explain: _____

23 ★★★

a) Map A has the scale **1 cm represents 50 m**. Map B has the scale **1 cm represents 200 m**. Anele says: "The walk to the Big Tree is drawn longer on map B, because 200 is more than 50." **Do you agree?**

- ◯ No: on map B each centimetre stands for more, so the same walk is drawn shorter
- ◯ Yes: the bigger the number in the scale, the longer the line
- ◯ It makes no difference: the walk is the same length on every map

b) The walk to the Big Tree is really **400 m**. **How long is it on map B?**

Draw your model

_____ = _____ cm

Explain: _____

24 ★★★

a) On a scale diagram, "a line twice as long stands for a real length twice as long." Always, sometimes or never true?

◯ always ◯ sometimes ◯ never

b) On a diagram **4 cm represents 12 m**. **What does 8 cm represent?**

Draw your model

_____ = _____ m

Explain: _____

Scale diagrams

25 ★★★

a) On the trail map 1 cm represents 50 m. The boardwalk is **9 cm on the map**; the road to the village is **really 400 m** long. **Which is longer in real life?** Write <, > or =.

9 cm on the map _____ 400 m

b) Check: what do 9 cm on the map represent?

Draw your model

_____ = _____ m

Explain: _____

26 ★★★

a) Scale: **1 cm represents 2 km**. A picnic site is 6 km from the village. "On the map it is 3 cm away, in any direction." True or false?

◯ True ◯ False

b) Check: how many centimetres represent 6 km?

Draw your model

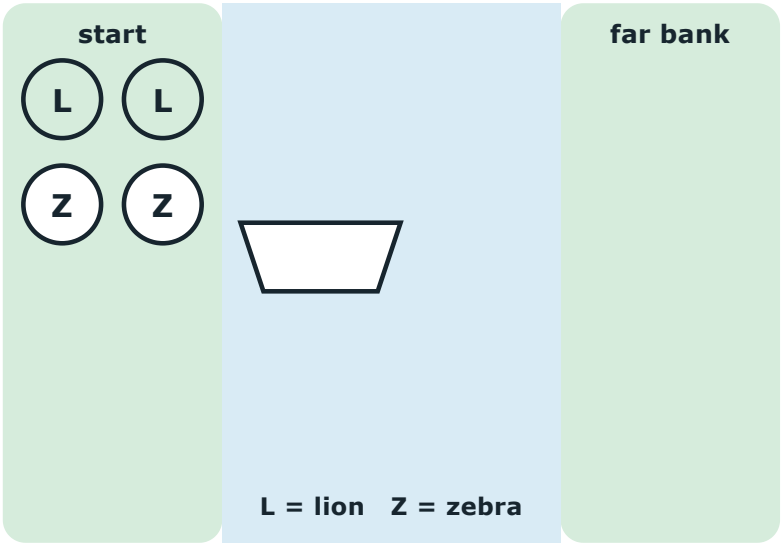
_____ = _____ cm

Explain: _____

27 PROBLEM OF THE DAY **Lions and zebras**

In Storms River, Max reads a puzzle in an old storybook: two lions and two zebras wait at a river. The raft carries one or two animals and any animal can paddle. Wherever there are zebras on a bank, the lions on that bank may never outnumber them. A bank with no zebras on it is safe.

Get all the animals across in at most 7 crossings. Write down who is on the raft at every crossing.



Think further: What is the fewest number of crossings? Can three lions and three zebras cross with the same raft?

Explain one thing you learned.

I can do this: ◯ independently ◯ with help ◯ I need more practice