

3 Maps

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Math 9
Section 7.1 and 7.2 - Maps as Scale Diagrams

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Learning Outcomes Covered:

7E: I use scale factors to understand maps.

What is a **MAP**?
a scale diagram of the real world



Each map has a scale. Most often, scales are written as 1 cm : 20 km

Example 1: Interpret what the following scales mean.

(a) 1 : 300
 1 cm on map
 is 300 cm in real life

(b) 1 : 2 500 000
 1 cm on map
 is 2 500 000 cm in real life
 $\rightarrow 2.5 \times 10^6$

Yo! If they don't write the units, they are cm!

The number in (b) is quite big. There is another way we can represent the scale.

1 : 2 500 000 ^{cm} can be written as 1 cm : 25 km

Some scales are shown as pictures:



This scale shows that 3 cm on the map represents 60 km. Written as a ratio: 1 cm : 20 km
(6 ÷ 3) 1 cm (6 ÷ 3) 20 km

model should be a 1

Example 2: If the distance between two cities on a map is 8 cm, and the map uses a scale of 1 : 100 km, find the actual distance on the Earth.

cm

$$SF = \frac{\text{model}}{\text{actual}}$$

$$\frac{1 \text{ cm}}{100 \text{ km}} = \frac{8 \text{ cm}}{x \text{ km}}$$

The actual distance is 800 km.

$$x = 800 \text{ km}$$



Example 3: St. John's is 2125 km from Toronto. How far apart are they on a map with a scale of 1 : 50 000 000?

$$SF = \frac{\text{model}}{\text{actual}}$$

$$\frac{1}{50\,000\,000} = \frac{x}{2125}$$

$$= 500 \text{ km}$$

$$\frac{1 \text{ cm}}{500 \text{ km}} = \frac{x \text{ cm}}{2125 \text{ km}}$$

$$\frac{500x}{500} = \frac{2125}{500}$$

$$x = 4.25 \text{ cm}$$

They are 4.25 cm apart on the map

Example 4: When working with maps that represent large area, we will use a ruler to measure the distances that cities lie apart from each other.



- (a) If the scale of the map of Canada is $1\text{ cm} = 460\text{ km}$, what is the actual distance between Calgary and Halifax?

$$SF = \frac{\text{model}}{\text{actual}} \quad \frac{1\text{ cm} = 8\text{ cm}}{460\text{ km} \times \text{km}}$$

The actual distance is 3680 km . $x = (460)8$
 $x = 3680\text{ km}$

- (b) If the scale of the map of Canada is $1\text{ cm} = 460\text{ km}$, how much farther in kilometres is it between Calgary and Vancouver than between Vancouver and Winnipeg?

difference in distance = $4 - 1.5 = 2.5\text{ cm}$

$$\frac{1\text{ cm} = 2.5}{460\text{ km} \times x}$$

The distance is 1150 km . $x = 1150\text{ km}$

- (c) If the distance between Fort McMurray and Winnipeg is 1200 km , what is the actual scale of the map of Canada at the top of this page?

$$\frac{3\text{ cm}}{1200\text{ km}} \div 3 \rightarrow \frac{1\text{ cm}}{400\text{ km}}$$

- (d) If it is 2600 km between Saskatoon and Montreal, how far is it between Vancouver and Toronto?

$$\frac{5.5x}{5.5} = \frac{18720}{5.5}$$

$$\frac{5.5\text{ cm}}{2600\text{ km}} = \frac{7.2\text{ cm}}{x\text{ km}}$$

$x = 3403.63$
 $\approx 3404\text{ km}$

It is 3404 km from Vanc. to T.O.

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from Vancouver to 10.

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