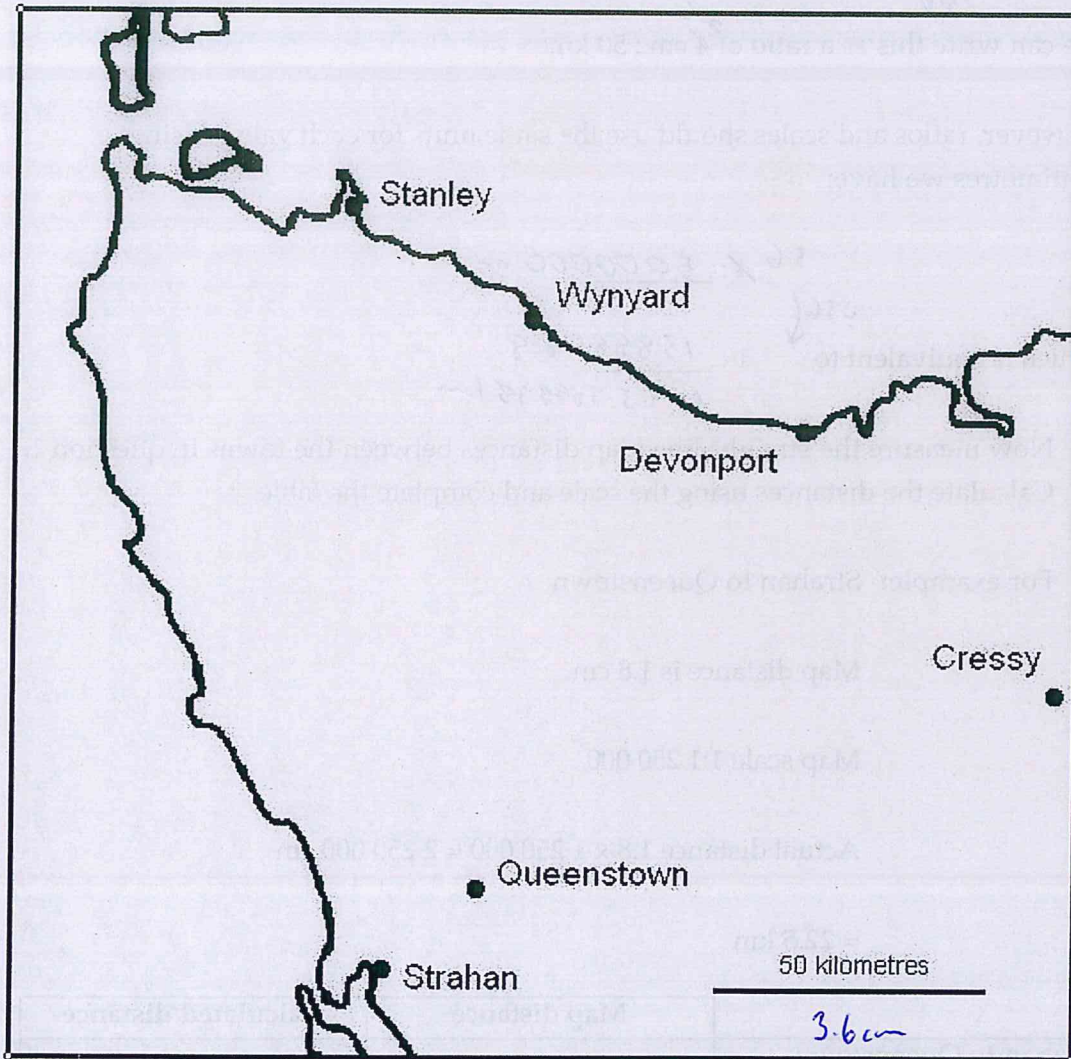


Working with scales worksheet

Here is a map of north-western Tasmania. On the map is a 4 cm line that represents an actual distance of 50 km.



- 1 Without making any measurements or calculations, estimate the direct distance between:
- Strahan and Queenstown *Answers will vary ~ 1.6 cm*
 - Stanley and Wynyard *Answers will vary ~ 2.8 cm*
 - Devonport and Queenstown *Answers will vary ~ 7.4 cm*

- Wynyard and Cressy *Answers will vary ~ 8.5 cm*
- Strahan and Cressy *Answers will vary ~ 9.5 cm*

On the map, ~~4~~ ^{3.6} cm represents 50 km.

We can write this as a ratio of ~~4~~ ^{3.6} cm : 50 km.

However, ratios and scales should use the same units for each value. Using centimetres we have:

Which is equivalent to $\frac{3.6}{5000000} : 1$ *or 1388888.8*
or 13.888888 km

- Now measure the straight-line map distances between the towns in question 1. Calculate the distances using the scale and complete the table.

For example: Strahan to Queenstown

Map distance is 1.8 cm.

Map scale 1:1 250 000

Actual distance $1.8 \times 1\,250\,000 = 2\,250\,000$ cm

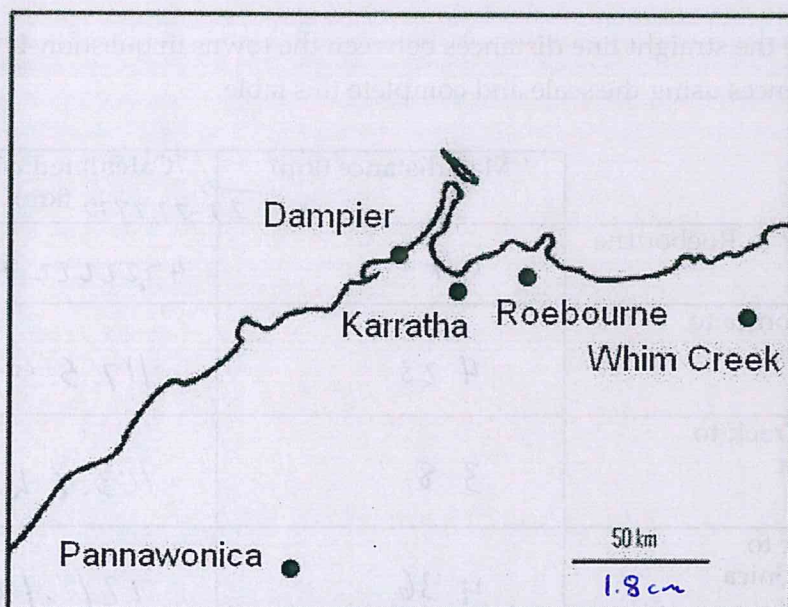
= 22.5 km

	Map distance	Calculated distance
Strahan to Queenstown	1.6 cm	22.2 km
Stanley to Wynyard	2.78 cm	38.6
Devonport to Queenstown	7.39 cm	102.6 km
Wynyard to Cressy	8.50 cm	118.1 km
Strahan to Cressy	9.52 cm	132.2 km

3 Comment upon the accuracy of your estimations in question 1.

Not very accurate
- Answers will vary

This is a map of north-west Western Australia. On this map is a 2 cm line that represents an actual distance of 50 km.



4 Without making any measurements or calculations, estimate the direct distance between:

- Dampier and Roebourne *- Answers will vary ~ 50 km*
- Pannawonica and Karratha *- Answers will vary ~ 135 km*
- Whim Creek and Karratha *- Answers will vary ~ 110 km*
- Dampier and Pannawonica *- Answers will vary ~ 140 km*
- Roebourne and Whim Creek *- Answers will vary ~ 90 km*

- 5 The scale on this map is 2 cm represents 50 km. Using centimetres for both measurements we have a scale of:

$$\begin{array}{l} 1-8 \\ 2: \underline{5000000} \\ \div 1.8 \downarrow \end{array} \quad \begin{array}{l} \downarrow \div 1.8 \end{array}$$

Which is equivalent to 1 : 2777777.7

- 6 Measure the straight line distances between the towns in question 4. Calculate the distances using the scale and complete this table.

	Map distance (km)	Calculated distance $\times \frac{27.77777}{50}$ (km)
Dampier to Roebourne	1.7	47.22222 km
Pannawonica to Karratha	4.23	117.5 km
Whim Creek to Karratha	3.8	105.6 km
Dampier to Pannawonica	4.36	121.1 km
Roebourne to Whim Creek	2.92	81.1 km

- 7 Reference to a road atlas of Australia gives the following distances between towns:

Tasmanian towns	Road distance (km)	WA towns	Road distance (km)
Strahan to Queenstown	41	Dampier to Roebourne	60
Stanley to Wynyard	61	Pannawonica to Karratha	200
Devonport to Queenstown	182	Whim Creek to Karratha	124
Wynyard to Cressy	174	Dampier to Pannawonica	219
Strahan to Cressy	260	Roebourne to Whim Creek	84

- 8 How close are your calculations and these distances?

consistently shorter some within 5% some almost double.

- 9 Does one map appear to be more accurate than the other?

The second map seems more accurate consistently.

- 10 Discuss possible reasons for your answers to these questions.

Road distances are longer than straight "as the crow flies" distances. Some areas are more hilly and roads have to go around features.

Name: _____

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Curriculum Connection
E1.2

Drawing Buildings Using Scale Factors

Questions

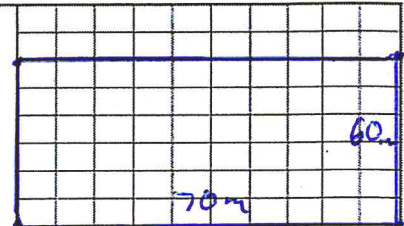
Use the grid to draw the dimensions of the buildings



1 square = 1cm

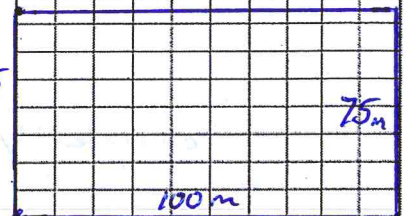
1) A building's base is 42m wide and 70m long. Use a scale factor of 1cm to 7m.

$$\begin{aligned} & \times 10 \quad \begin{pmatrix} 6 \times 6 \\ 6 \text{ cm} : 42 \text{ m} \end{pmatrix} \times 6 \\ & \quad \quad \quad \downarrow \times 6 \\ & \quad \quad \quad 10 \text{ cm} : 70 \text{ m} \end{aligned}$$



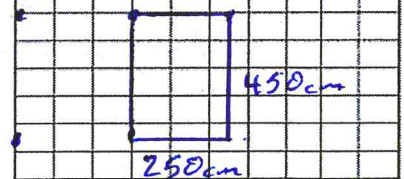
2) A building has a base with the following dimensions: 100m by 75m. Use a scale factor of 1cm to 10m.

$$\begin{aligned} & \times 10 \quad \begin{pmatrix} 10 \text{ cm} : 100 \text{ m} \end{pmatrix} \times 10 \\ & \quad \quad \quad \downarrow \times 7.5 \\ & \quad \quad \quad 7.5 \text{ cm} : 75 \text{ m} \end{aligned}$$



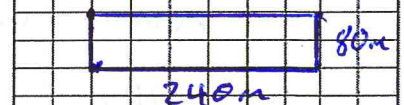
3) A building's base is 450cm long and 250cm wide. Use a scale factor of 1cm:100cm.

$$\begin{aligned} & 2.5 \times \begin{pmatrix} 4.5 \times 5 \\ 4.5 \text{ cm} : 450 \text{ cm} \end{pmatrix} \times 4.5 \\ & \quad \quad \quad \downarrow \times 2.5 \\ & \quad \quad \quad 2.5 \text{ cm} : 250 \text{ cm} \end{aligned}$$



4) A large building has a base of 240m by 80m. Use a scale factor of 1cm to 40 metres.

$$\begin{aligned} & \times 2 \quad \begin{pmatrix} 6 \times 6 \\ 6 \text{ cm} : 240 \text{ m} \end{pmatrix} \times 6 \\ & \quad \quad \quad \downarrow \times 6 \\ & \quad \quad \quad 2 \text{ cm} : 80 \text{ m} \end{aligned}$$



5) A building has a base of 140m by 50m. Use a scale factor of 1cm to 20m.

$$\begin{aligned} & \times 2.5 \quad \begin{pmatrix} 7 \times 7 \\ 7 \text{ cm} : 140 \text{ m} \end{pmatrix} \times 7 \\ & \quad \quad \quad \downarrow \times 2.5 \\ & \quad \quad \quad 2.5 \text{ cm} : 50 \text{ m} \end{aligned}$$

