

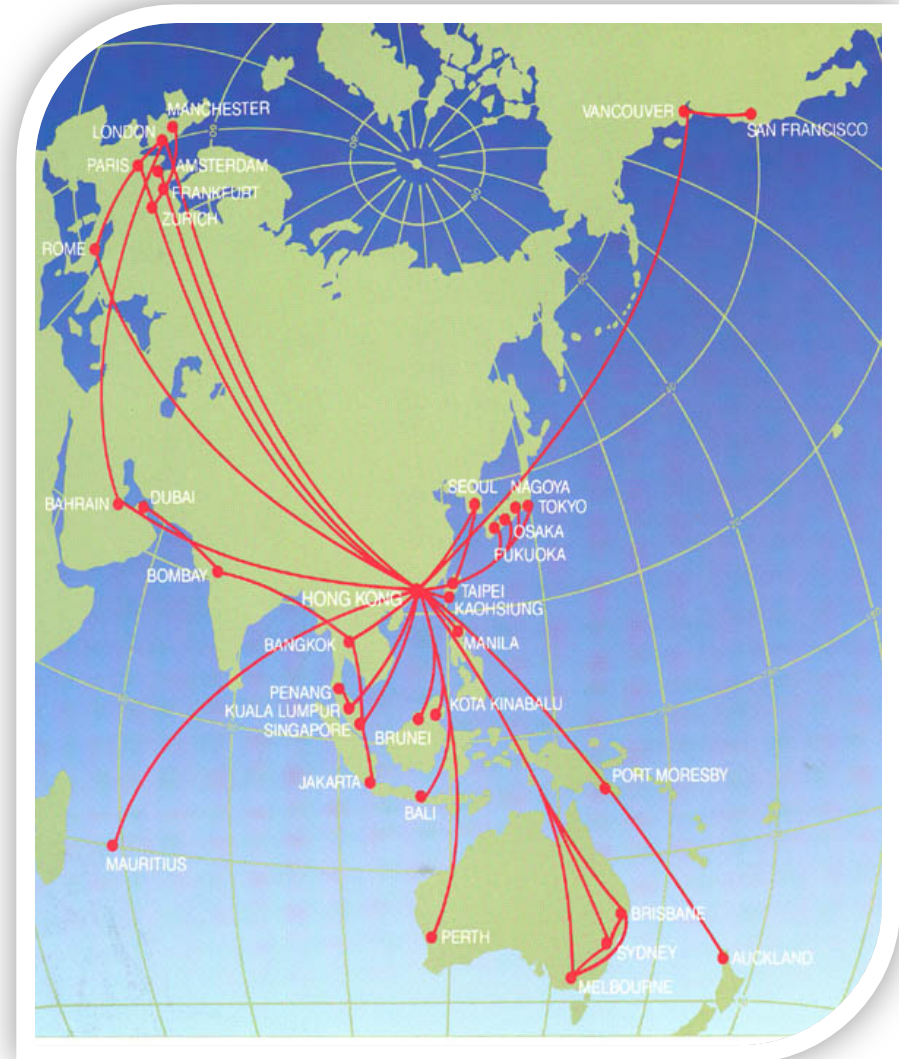
GEOGRAPHY SKILLS:

SCALE



Map Scale

- A scale is a statement of the **relationship** between distances on a map and distances in **real life**.
- A drawing that is made according to scale will be an **exact copy** of the real object, but will be smaller or larger than the real object.



Section A:

Three Types of Scale

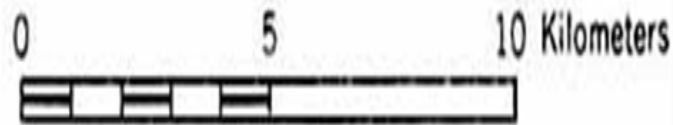
Three Types of Scale

- **There are three different ways to write scale.**

**Stated
Scale**

- $1 \text{ cm} = 250 \text{ km}$

**Linear
Scale**



**Ratio
Scale**

- $1:25\ 000\ 000$

Map Scales

Stated Scale 1 cm = 8 km

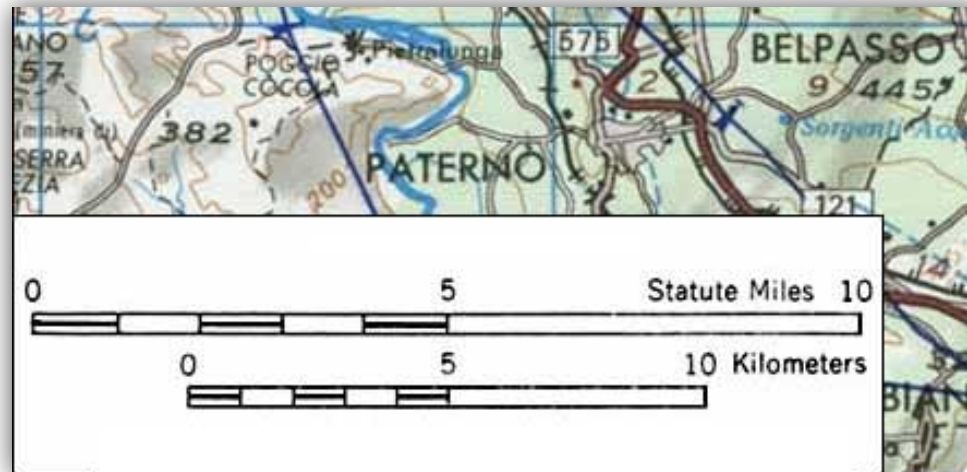
- A stated scale says exactly how much distance is represented by 1 cm, in this case, 8 km.
- It is the most useful scale for **calculating distances**.



Map Scales

Linear Scale:

- A linear scale is usually present on most maps. It tells us how much **map distance** represents a certain real distance.
- For example, the scale shows the map distance that equals 10 kilometers in **real distance**.



Map Scales

Ratio Scale

- A ratio scale will almost always be found on maps. It is very **accurate**.
- In this example we can see that 1 unit on the map represents 25 000 000 units in real life.
- So, $1 \text{ cm} = 25\,000\,000 \text{ cm}$ and $1 \text{ m} = 25\,000\,000 \text{ m}$, etc.



Map Scales: Changing Scales

- Distances such as 25 000 000 cm are very difficult to imagine. So, we usually change a ratio scale into a stated scale.
- In this example, we would use the **metric system** to help us change the ratio scale of 1:25 000 000 into a stated scale of 1 cm = 250 km.

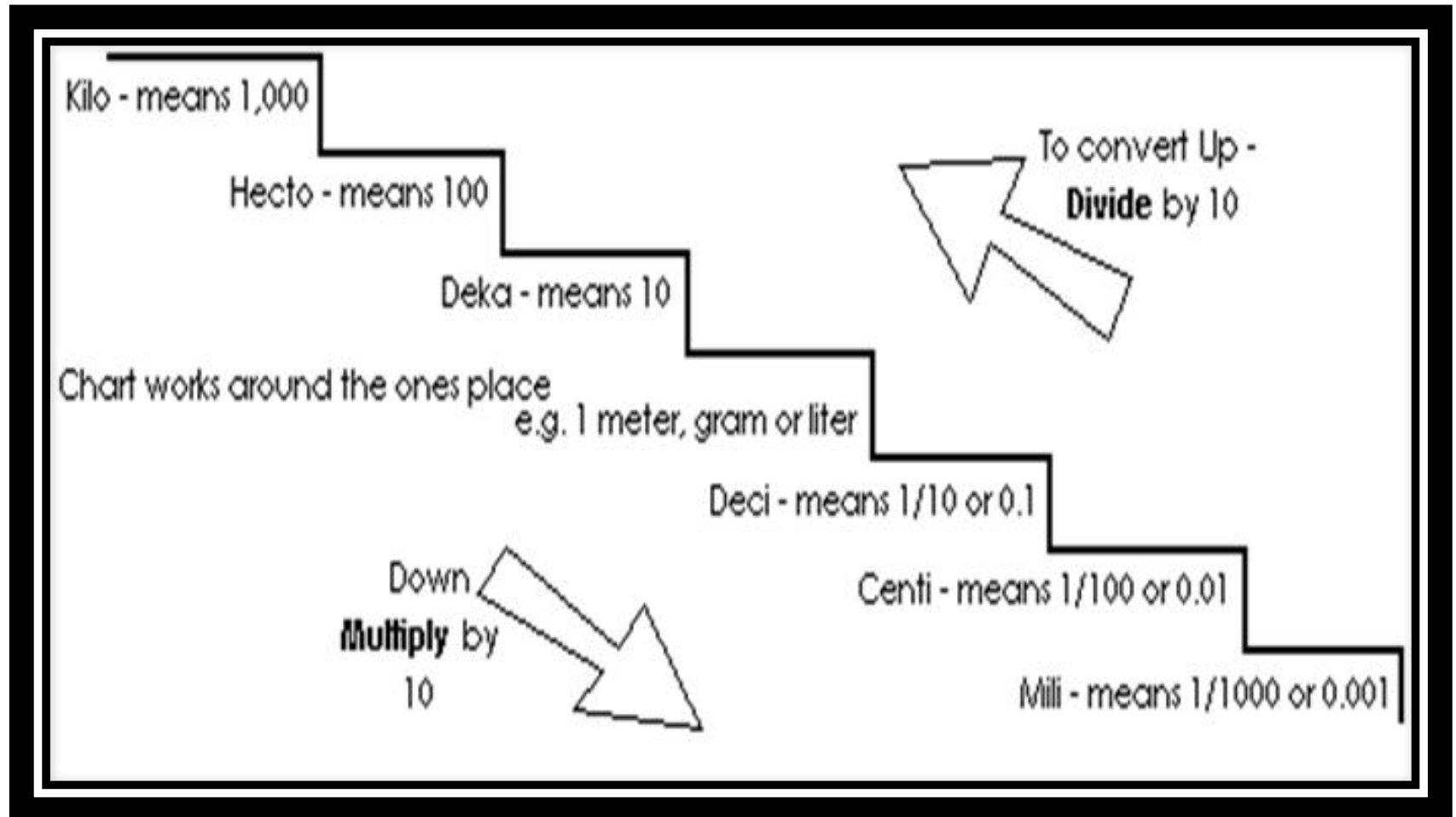
Section B:

Metric System Review

Metric System Review

- Recall that the metric system is based on **multiplying** and dividing by 10. To change from one unit to another you just need to multiply or divide by 10 the correct number of times.

Metric System Review



Metric System Review

- Another way to say this is that you just need to move the **decimal place** the correct number of spaces to the left (dividing) or right (multiplying). For scale calculations, you need to learn a quick method of changing units.

Metric System Review

Quick Method of Changing Units

a) To change cm into km, move your decimal five places to the left.

ex. $550\,000\text{ cm} = 5.5\text{ km}$

b) To change km into cm, move your decimal five places to the right.

ex. $72\text{ km} = 7\,200\,000\text{ cm}$

Metric System Review

Practice 1. Make the following conversions using the shortcut method.

- | | | | |
|-------------------|----|-------------|----|
| a) 47 000 cm = | km | d) 89 km = | cm |
| b) 321 400 cm = | km | e) 6.5 km = | cm |
| c) 4 000 000 cm = | km | f) .54 km = | cm |

Metric System Review

Practice 1. Make the following conversions using the shortcut method.

a) $47\ 000\ \text{cm} = 0.47\ \text{km}$

b) $321\ 400\ \text{cm} = 3.214\ \text{km}$

c) $4\ 000\ 000\ \text{cm} = 40\ \text{km}$

d) $89\ \text{km} = 8\ 900\ 000\ \text{cm}$

e) $6.5\ \text{km} = 650\ 000\ \text{cm}$

f) $.54\ \text{km} = 54\ 000\ \text{cm}$

Section C:

**Changing from
Ratio Scale to Stated Scale**

Changing from **Ratio** Scale to **Stated** Scale

- It is easiest to calculate distance using a Stated Scale, but most maps don't include Stated Scales.
- So, to change Ratio Scale into Stated Scale, do the following.

• 1:25 000 000

Ratio Scale

Stated Scale

• 1 cm = 250 km



Changing Scales

1. Write the Ratio Scale.

□ $1:550\ 000$

2. Change it to a Stated Scale.

□ $1\text{ cm} = 550\ 000\text{ cm}$

3. Change the Stated Scale Units from cm into km, by moving your decimal **five places** to the left.

□ $1\text{ cm} = 5.5\text{ km}$

Changing Scales

Practice 2. Find the ratio scale of the main map and change it to a stated scale.

ex. p132

1 : 44 000 000

1 cm = 44 000 000 cm

1 cm = 440 km

a) p65

b) p116

c) p136

d) p71

Changing Scales

Practice 2.

a) p65

1: 7 000 000

1 cm = 7 000 000cm

1 cm = 70km

b) p116

1 : 13 000 000

1 cm = 13 000 000cm

1 cm = 130km

c) p136

1:25 000 000

1 cm=25 000 000cm

1 cm = 250km

d) p71

1:50 000

1 cm = 50 000cm

1 cm=0.5km

Section D: Solving scale questions using **cross-multiplication**

- Now that you know how to change a ratio scale into a stated scale, you can calculate the real distance between two places shown on a map. To do so though, you need to know how to cross-multiply.

Solving scale questions using cross-multiplication

□ **Practice 3.** Solve these questions using cross-multiplication.

□ a) $\frac{1}{5} = \frac{4}{x}$

b) $\frac{1}{40} = \frac{12}{x}$

□ c) $\frac{1}{350} = \frac{25}{x}$

d) $\frac{1}{4500} = \frac{300}{x}$

Solving scale questions using cross-multiplication

□ **Practice 3.** Solve these questions using cross-multiplication.

□ a) $\frac{1}{5} = \frac{4}{x}$

b) $\frac{1}{40} = \frac{12}{x}$

□ c) $\frac{1}{350} = \frac{25}{x}$

d) $\frac{1}{4500} = \frac{300}{x}$

Section E: **Five Steps** to Calculate Real Distance

Now, you are ready to calculate the real distances between places shown on a map by following these five simple steps.

- Step A. Find the **ratio scale**.
- Step B. **Change** the ratio scale into a stated scale.
- Step C. **Measure** the **map distance** in cm.
- Step D. Use cross-multiplication to solve this **equation**:

$$\frac{\text{scale (cm)}}{\text{scale (km)}} = \frac{\text{map distance (cm)}}{\text{real distance (km)}}$$

- Step E. Write a **conclusion** (a therefore statement). Include the **country names**.

Section E: Five Steps to Calculate Real Distance

Example: Madrid to Moscow

Step A 1:25 000 000

Step B 1 cm = 250 km

Step C m.d. = 13.2 cm

Step D
$$\frac{\text{scale (cm)}}{\text{scale (km)}} = \frac{\text{map distance (cm)}}{\text{real distance (km)}}$$

$$\frac{1 \text{ cm}}{250 \text{ km}} = \frac{13.2 \text{ cm}}{x}$$

$$1x = 13.2(250)$$

$$x = \mathbf{3300 \text{ km}}$$

Step E \therefore Madrid, **Spain** is 3300km from Moscow, **Russia**.

Section E: Five Steps to Calculate Real Distance

Example: Casablanca to Cairo

Step A 1:37 000 000

Step B 1 cm = 370 km

Step C m.d. = 10.2 cm

Step D
$$\frac{\text{scale (cm)}}{\text{scale (km)}} = \frac{\text{map distance (cm)}}{\text{real distance (km)}}$$

$$\frac{1 \text{ cm}}{370 \text{ km}} = \frac{10.2 \text{ cm}}{x}$$

$$x = 3374 \text{ km}$$

Step E ∴ Casablanca, **Morocco** is 3774 km from Cairo, **Egypt**.

Map Scales:

Large Scale vs. Small Scale

Large Scale vs. Small Scale



Verbal Scale
 1 in. = 1,485 mi
 1 cm = 940 km



Representative fraction
 $\frac{1}{94,000,000}$



Verbal Scale
 1 in. = 585 mi
 1 cm = 370 km



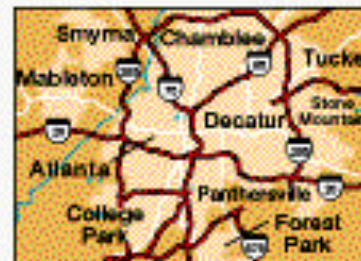
Representative fraction
 $\frac{1}{37,000,000}$



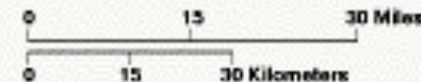
Verbal Scale
 1 in. = 250 mi
 1 cm = 160 km



Representative fraction
 $\frac{1}{16,000,000}$



Verbal Scale
 1 in. = 20 mi
 1 cm = 13 km



Representative fraction
 $\frac{1}{1,300,000}$

Small scale

Large scale



Map Scales:

Large Scale vs. Small Scale

- A map showing the whole world is on a very **small scale** (1:360 000 000 000) which allows for an overall view, but not much detail.
- Small scale maps are ideal for travelling by car because they cover large areas of land.



1:250 000

Map Scales:

Large Scale vs. Small Scale

- A town plan is on a much **larger scale** so that features such as roads can be shown clearly (1 cm:500m)
- Large scale maps are better for showing individual buildings in detail because they only cover a small area of land.

