SELECTED HSC MAP SKILLS FOR YEAR 11

Image source: Shutterstock

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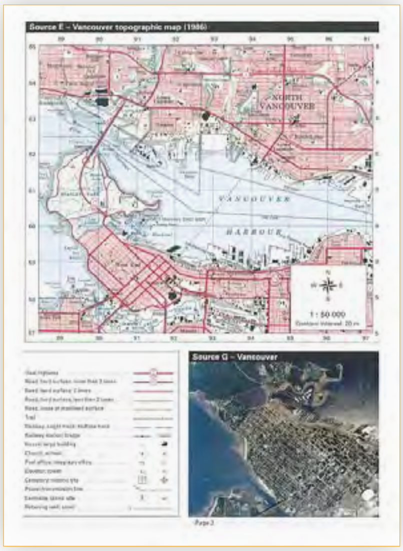
SKILLS

- Locate features using degrees and minutes of **latitude and longitude**
- **Scale*** and direction
- Distinguish between **large-scale and small-scale maps***
- Calculate the **area*** of a feature
- Calculate the **density*** of a feature
- Calculate **local relief** *
- Calculate the **gradient*** of a slope as a ratio
- Determining **sight lines*** between two points
- Identify the **aspect*** of a slope
- Calculating the **vertical exaggeration*** of a cross-section

NOTE: The most problematic skills are those requiring calculations and multiple sources.



Images sourced from:

- AGTA Geography Skills Unlocked Text
- Macmillan Australia GeoWorld NSW Series 7 – 10 Texts
- Grant Kleeman GTA NSW & ACT PPT for Skills workshops
- *2007 HSC Stimulus Booklet*. A PDF of the Stimulus Booklet can be found in the GTA Stage 6 Google Drive Folder for the Teachers of HSC Geography Facebook Group.
- Suggested answers are provided.

1. LATITUDE & LONGITUDE

- Latitude is written first and must ALWAYS include N (north) or S (south)
- Longitude is written next and must ALWAYS include E (east) or W (west)
  EXAMPLE: 31° N 145° E
- Laugh Lots / LA before LO (Alphabet rule)
- Degrees are ALWAYS expressed as WHOLE NUMBERS
- Each degree is split into 60 minutes. Each minute is split into 60 seconds

2. SCALE

The scale indicates the level of detail in different maps and images.

Remember that scale is a ratio or a fraction, and 1/100 is a bigger number than 1/500,000. The larger the second number, the denominator, the smaller the scale of the map.

Do you want 1/100 of a million dollars or 1/20. You want the larger portion – 1/20.

Large scale maps show small areas in large detail (ZOOM IN to see details) – 1:25,000

Large detail e.g., minor roads and tracks; small features e.g., suburb, buildings

Small scale maps (ZOOM OUT to see a larger area) - 1: 250,000

Small detail e.g., only major roads; large features e.g., countries

The **SAD** acronym may help you to remember the information above:

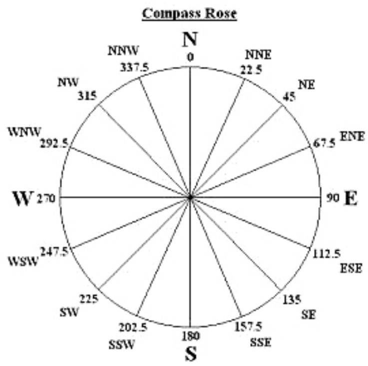
For large scale maps: e.g. 1:25 000	**SAD**	**For small scale maps:** e.g. 1: 1,000,000
Large scale	**SCALE**	Small scale
Small area	**AREA** covered	Large area
Large detail	Amount of **DETAIL**	Small detail

Note: The scale of maps can be compared visually by looking at the level of detail.

TRY THIS	a. Which of the maps above has the smallest scale, Collaroy OR Japan? b. Which of the following represents the largest scale? 1:100,000 OR 1/ 50,000 OR 1cm represents 25 km

3. DIRECTION

- Know up to 16 cardinal (compass) points.
- Know the corresponding bearings (degrees from North)
- When giving direction, always place yourself at the location direction is being determined FROM.
- Use a 360° protractor to avoid making errors with bearings. Start with 0° at the North position and measure going clockwise.



4. TOPOGRAPHIC MAPS

a. Area and Grid References (AR and GR)

– Use the *Alphabet Rule* (Eastings - before Northings)
– Think *CAPITAL L* – to give an AR of a grid square. Bottom left-hand corner.
– When writing a capital L, you draw the down line first – this is the Eastings.

b. Scale, distance and area

On a topographic map, scale is shown in 3 ways. HSC students need to understand ratios.

TRY THIS	1: 100,000 means .... 1: 250,000 means .... 1:50,000 means .... Convert the following scales to ratios: 1centimetre represents 3,000 metres .... 1 centimetre represents 200 metres ....

To calculate the AREA of a feature

1. For a regular shaped feature (square or rectangle), use the scale to measure the dimensions and calculate the area using Length x Breadth in km. Follow rules for circles and triangles.
2. Use the scale to determine the area of 1 grid square. Count how well the feature fills one or more grid squares.
3. For larger areas calculate the number of completely filled grid squares PLUS the number of incomplete grid squares divided by two.
4. Make conversions to different units of measurements for area as needed

   *1km^2 = 100ha   1 hectare(ha) = 10,000m^2 (100m×100m)

c. Area and Density

Density = the number of features per 1 km^2

(1 grid square on a 1:100,000 map with grid squares of 1cm x 1cm is 1km^2)

(1 grid square on a 1:25,000 map with grid squares 2 sm x 2 cm is 1 km ^{2})

TRY THIS	*** Use the Vancouver topographic map from the 2007 HSC on page 18** What is the scale of the map? .... What does this mean in metres and km? .... If the area of a grid square is 1 km^2, what is the approximate area of Stanley Park north of the 60 Northing ....

d. Topography, relief and landforms

- Topography is the shape of the land.
- Relief is the differences in the height of land shown on a topographic map by contour lines and spot heights.

Be able to…

- *Recognise common landform features*
- Determine the ***direction a river flows.*** (This direction is named by where the river is flowing to)
- Calculate differences in height between places
- Calculate *local relief*
- Explain how local relief impacts on sight lines and human activities
- Calculate *gradient*
- Explain how gradient impacts on human activities

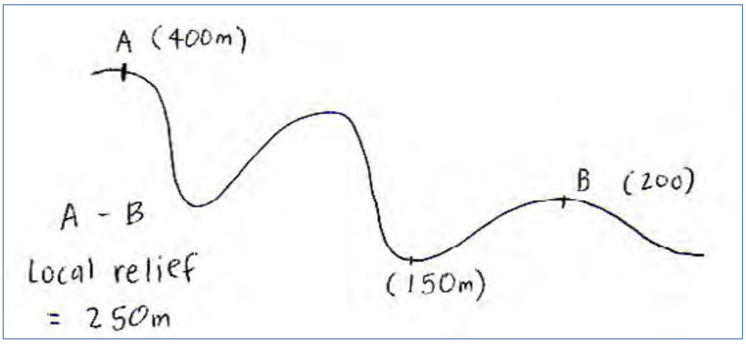
- ***Local relief***

  Local relief is the difference between the highest and lowest points along a transect. (Look for higher or lower points between the start and finish of a transect)

- ***Sight lines***

  A sight line is the ability to see one location from another. This is often referred to as intervisibility
  Often the local relief means a higher point between two places stops a person seeing one place from another.

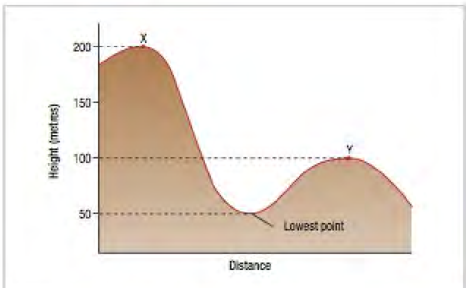
  Examples:



Landform	Contour pattern	Description	Picture
Steep slope		Contour lines close together	
Gentle slope		Contour lines far apart	
Hill		Rounded area projected above surrounding land	
Valley		V shaped in Australia, caused by water erosion	
Ridge		Long narrow continuous elevation	
Creek		Marked by blue line, contours indicate direction of flow	
Spur		Subsidiary summit of a mountain, lower than the summit of the mountain but connected by a ridge	
Saddle		Two hills with a dip in between	
Cliff		Rock face exposes a clear vertical drop in height	
Shoreline		Fringe of land at edge of large water body eg: ocean, sea, lake	
Headland		Large area surrounded by water on 3 sides, rocky due to exposure and weathering	

G Kleeman GTA Skills PPT

TRY THIS	
	Can a person standing at A see place B? What is the local relief between X and Y? Why would understanding local relief be important for: – a farmer – a town planner



2.3.06 Calculating local relief

- ***Gradient***

  Gradient is the slope of the landform between two given points.

  Gradient (GR) = Change in height (VR) divided by land distance (HR)

  $$GR = \frac{\text{VR (Vertical rise) – use contours}}{\text{HR (Horizontal run) – use map scale to calculate}}$$

  e.g. The gradient of a slope that rises 200m between two places 6.4 km apart

  $$\frac{VR}{HR} = \frac{200\text{ m (RISE)}}{6400\text{ m (RUN)}}$$ **Make sure the units of measurement are the same top and bottom

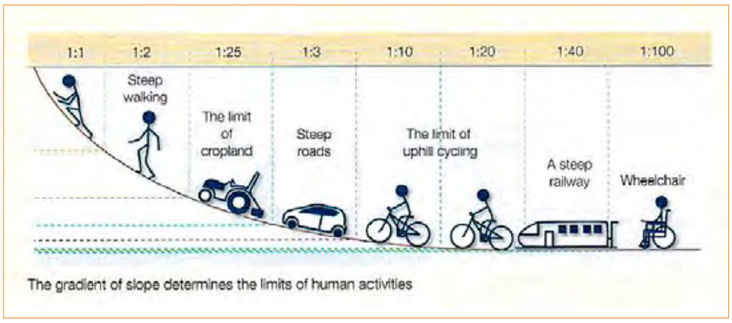
  $$= \frac{1}{32}$$

  This means that for or every 32 metres travelled horizontally you rise by 1metre.

Why is gradient important?

Gradient influences many human activities eg agriculture, location of infrastructure such a rail lines, and physical events such as landslides and runoff – linked to erosion.

What vocations would this be useful for?
Town planning; Infrastructure planning; farming; bushfire management.



The gradient of slope determines the limits of human activities

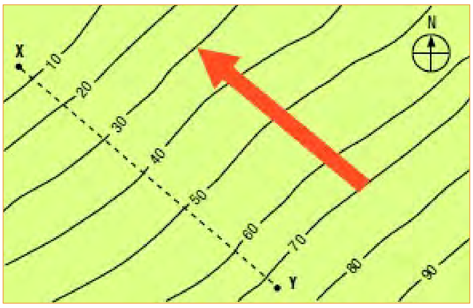
- ***Aspect***

  The direction a slope is facing.
  Example:
  What is the aspect of the slope in the diagram?

  ……………………………………………………………..

  Why is this useful knowledge?

  ……………………………………………………………..
  ……………………………………………………………..

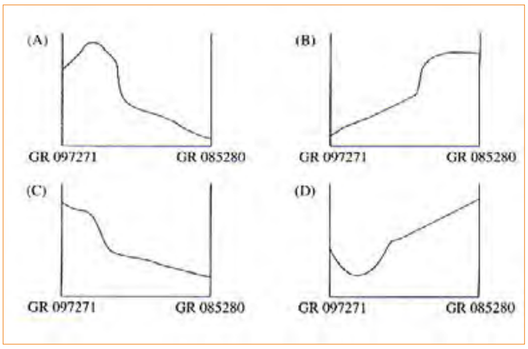


Source: G Kleeman GTA Skills PPT

- ***Cross section***

  Height is graphed to show the shape of the land

  You need to be able to…
  - *Draw or complete a cross section*
  - Recognise a cross section that matches pattern of contour lines on a map.
  - Calculate the ***vertical exaggeration*** of a cross section
  - Explain why vertical exaggeration is used.



- ***Vertical exaggeration***

  The vertical scale is increased to exaggerate changes in the shape of the land unable to be seen when the vertical (VS) and horizontal (HS) scales are the same (as they are in the real world).

$$VE = \frac{VS \text{ (the scale from the graph)}}{HS \text{ (the scale from the map)}}$$

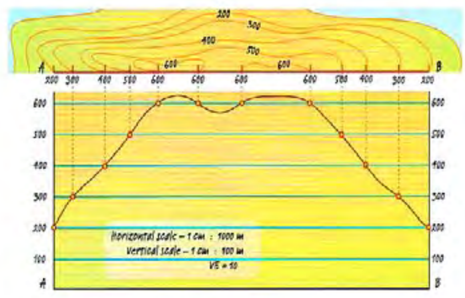
Example:

VS = 1 cm represents 20m

HS = 1 cm represents 100000 i.e. 1000m

$$VE = \frac{1}{20} \Big/ \frac{1}{1000}$$

$$= \frac{1000}{20} = 50$$



Constructing a cross-section from a topographic map

A VE between 8 and 10 gives a reasonable indication of the shape of the land.

TRY THIS	Calculate the vertical exaggeration for a cross section with a VS of 1 cm represents 250 metres and a HS scale of 1:200,000 What would be the advantage of changing the vertical exaggeration of a cross section from 5 to 20?

- ***Estimating the scale of a photograph using a map***

  Often there will a map and photograph of the same area. Photographs usually do not come with a scale like the map. You can use the map to create a scale for the photograph.

Steps

There are a few numbers to determine:

– The distance between two points on a map in km

– The distance between the same two points on the photograph in cm

- On the map find two points that also appear on the photograph. (See A and B above)
- Measure the land distance between A and B using the scale of the map. (km)
- Now measure the distance between the same two points on the photograph (in cm).
- This answer gives you a scale for the photograph 1cm represents the land distance.

Example:

On a map with a scale of 1:50000. The distance between two headlands is 4cm. The real distance is 2km (2000 m and 200 000 cm). On the photograph the distance between the two headlands is 2cm. On the photograph 2cm represents 2km (2000m or 200000cm) or 1cm represents 1km. As a ratio – this is 1: 100000

TRY THIS	a. Calculate the scale of the Vancouver photograph 2007 HSC Stimulus b. Use the scale to calculate the area covered by the photograph.

5. SYNOPTIC CHARTS
(Weather at a point in time OR predicted atmospheric conditions)

Weather maps or synoptic charts show atmospheric conditions. Make links to topics.

a. Remember these connections

AIR PRESSURE
(shown by contour lines in hectopascals hPa)
(Linked to global circulations / summer & winter)

Determines

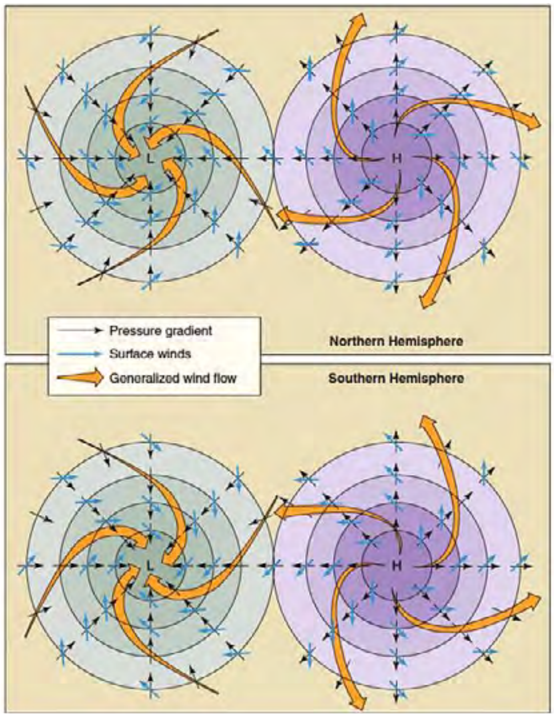
WIND DIRECTION
(Australia: Clockwise into a Low,
Anticlockwise away from a High)

Determines

AIR MASSES
(Equatorial, Tropical Maritime, Southern Maritime,
Tropical Continental)

Determine

WEATHER
(temperature, humidity, wind, likelihood of rain)



Use the letter S to assist in remembering **wind circulation patterns around high, and low**, pressure cells in the Southern hemisphere.

High (Top of S is drawn going anticlockwise)

Low S outhern

(Bottom of the S is drawn going clockwise)

b. Know how the atmosphere changes with the passing of a front (especially a cold front)

These will include air pressure (give before & after hPa readings), wind direction (from _____ to ________) wind strength (use wind arrows or closeness of isobars), temperature and humidity (what air mass is affecting the weather before and after the front), possible cloud cover (more, less, possible type of cloud) and likelihood of rain.

*Be specific in your answer by reading data eg direction, air pressure from stimulus provided

c. Know about East Coast Lows that impact on coastal weather conditions in NSW.

d. Know that winds affect sea conditions – waves and swell.

Onshore winds create swell and waves and bring atmospheric moisture onshore that increases the likelihood of precipitation (orographic or convectional)

Offshore winds e.g., Westerlies on the East Coast of NSW flatten the sea

e. Types of precipitation eg orographic, frontal and convectional.

These terms may be relevant to questions about precipitation.

SUGGESTED ANSWERS

TRY THIS

a. Which of the maps above has the smallest scale, Collaroy OR Japan? **Japan**

b. Which of the following represents the largest scale?
1:100,000 OR **1/ 50,000** OR 1cm represents 25 km

TRY THIS

1: 100,000 means **1cm represents 1 km or 1000 metres**

1: 250,000 means **1 cm represents 2.5 km or 2,500 cm**

1:50,000 means **1 cm represents ½ or 0.5 km or 500 metres**

Convert the following scales to ratios:

1centimetre represents 3,000 metres **1:300,000**

1 centimetre represents 200 metres **1:20,000**

TRY THIS

*** Use the Vancouver topographic map from the 2007 HSC on page**

What is the scale of the map? **1: 50,000**

What does this mean in metres and km? **1cm represents 0.5 km or 500 metres**

If the area of a grid square is 1 km^2, what is the approximate area of Stanley Park north of the 60 Northing **3.5 km^2**

TRY THIS

Can a person standing at A see place B? **No**

What is the local relief between X and Y? **250 m**

Why would understanding local relief be important for:

– a farmer: **needs to see distant places for livestock or fire threats, rain, planning activities**

– a town planner: **planning land use, roads, communications**

TRY THIS

Calculate the vertical exaggeration for a cross section with a VS of 1 cm represents 250 metres and a HS scale of 1:200,000

$$\frac{VS}{HS} \quad \frac{1/250}{1/2000} \quad \frac{2000}{250} = 8$$

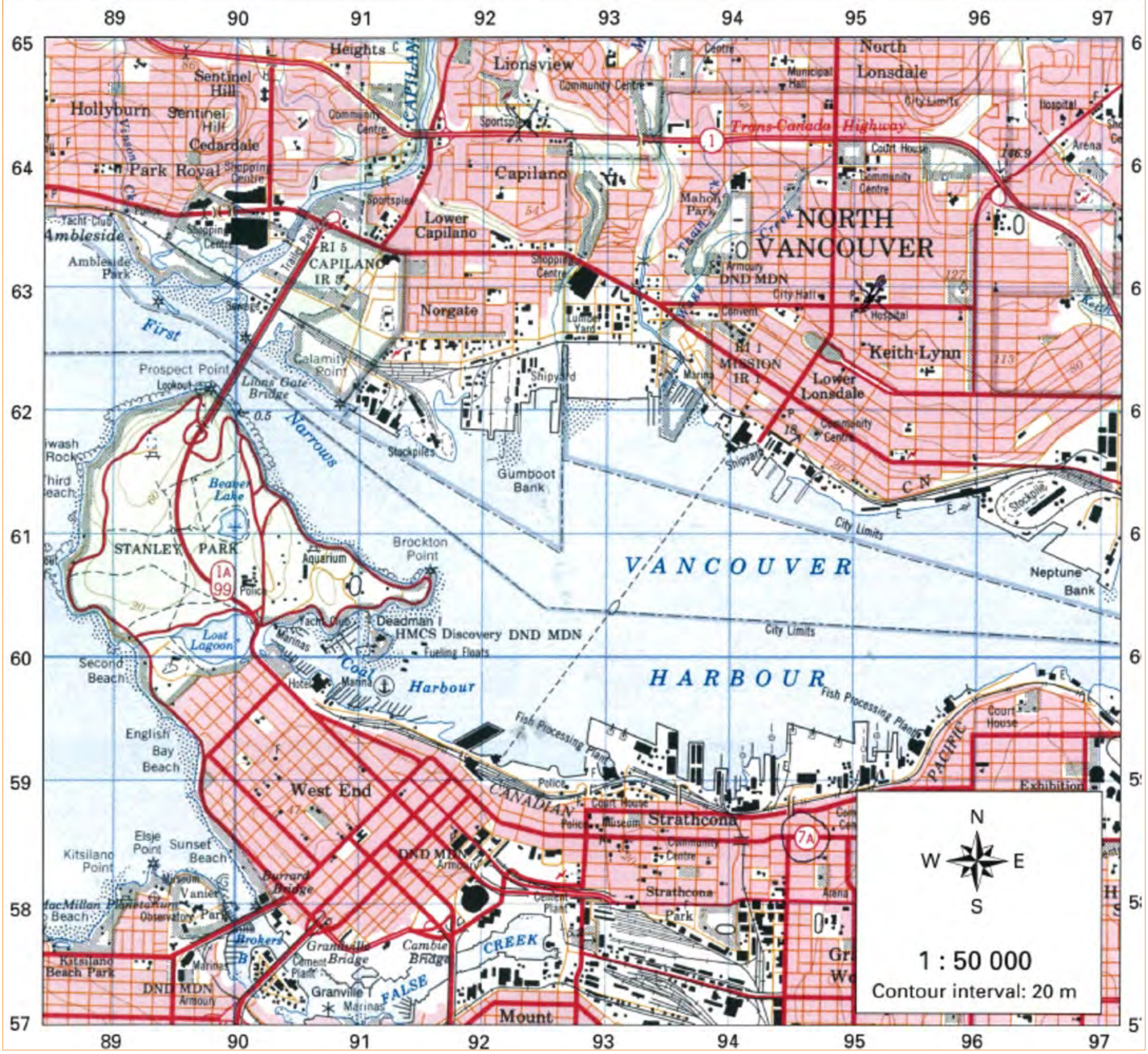
What would be the advantage of changing the vertical exaggeration of a cross section from 5 to 20? **To see the shape of the land more clearly**

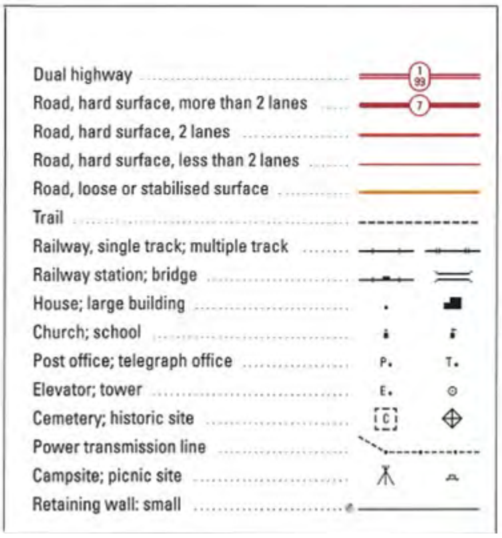
TRY THIS

a. Calculate the scale of the Vancouver photograph 2007 HSC Stimulus
1: 35,000 (1 cm represents 350 metres)

b. Use the scale to calculate the area covered by the photograph.
9.3 km^2. (3.33 km x 2.8 km)

Source E – Vancouver topographic map (1986)





Source G – Vancouver

NSW Board of Studies *2007 HSC Examination Stimulus* Page 18