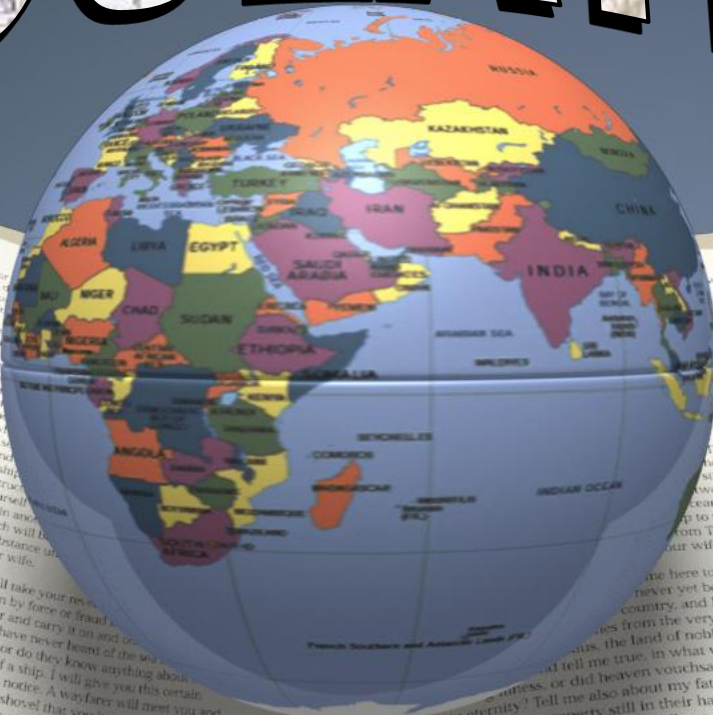


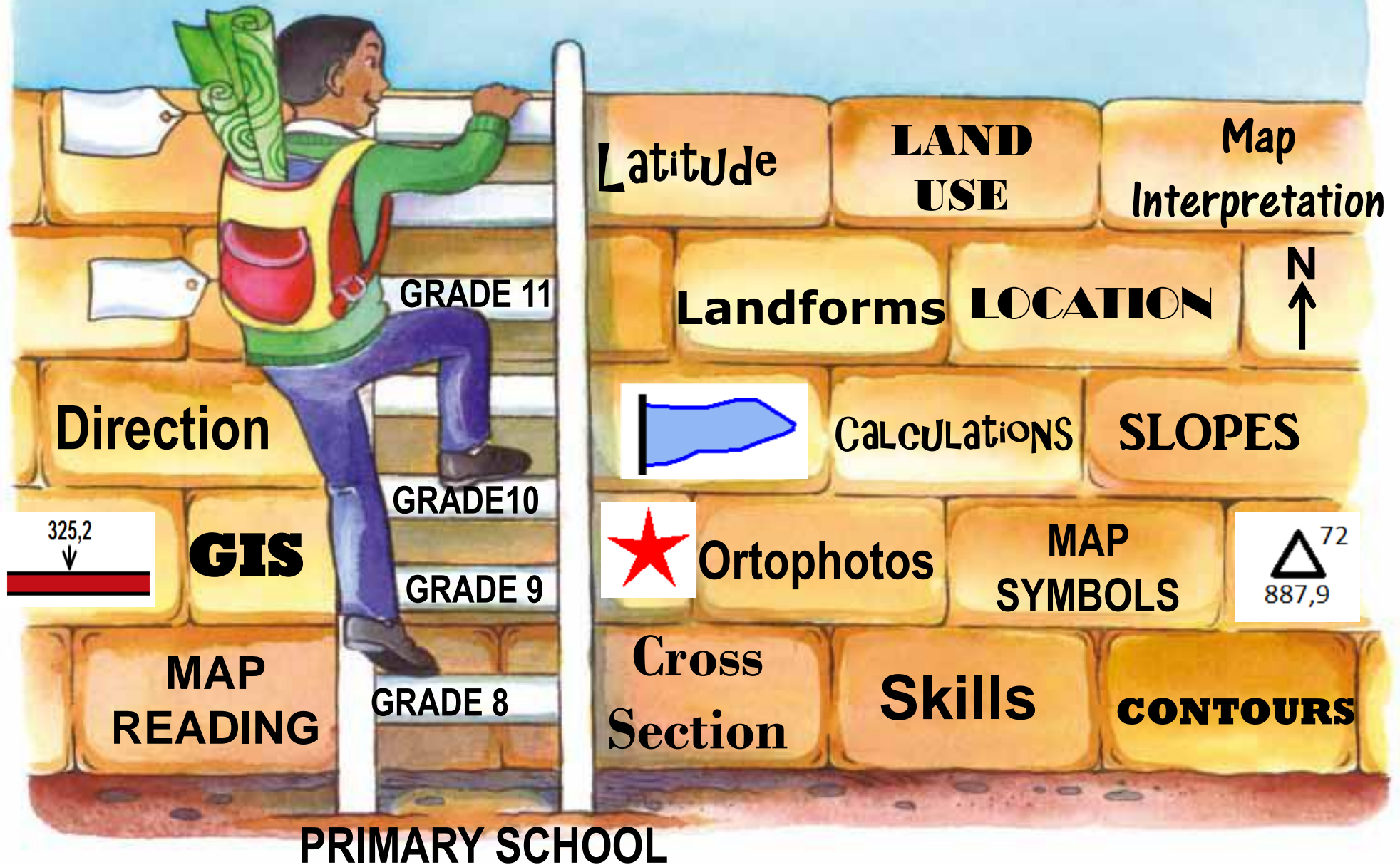
GEOGRAPHY

CALCULATIONS



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Ready for Gr 12 Map Work Exam!!



Calculations

Distance

Distance

$$\frac{\text{Map distance} \times \text{Scale}}{100\ 000}$$

Answer in km

Area

$$L \times b$$

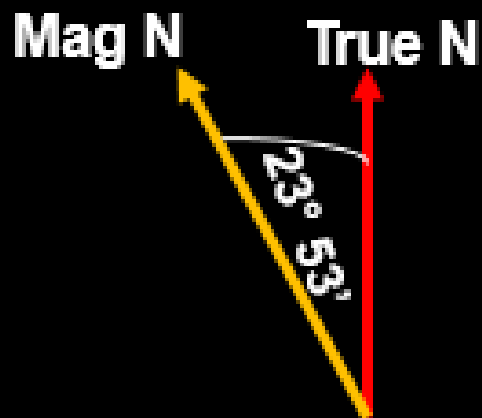
Answer in km²

Gradient

$$\frac{\text{VI (Height)}}{\text{HE (Distance)}}$$

No units (1:23)

Magnetic declination



Magnetic Bearing

$$\text{Magnetic declination} + \text{Bearing}$$

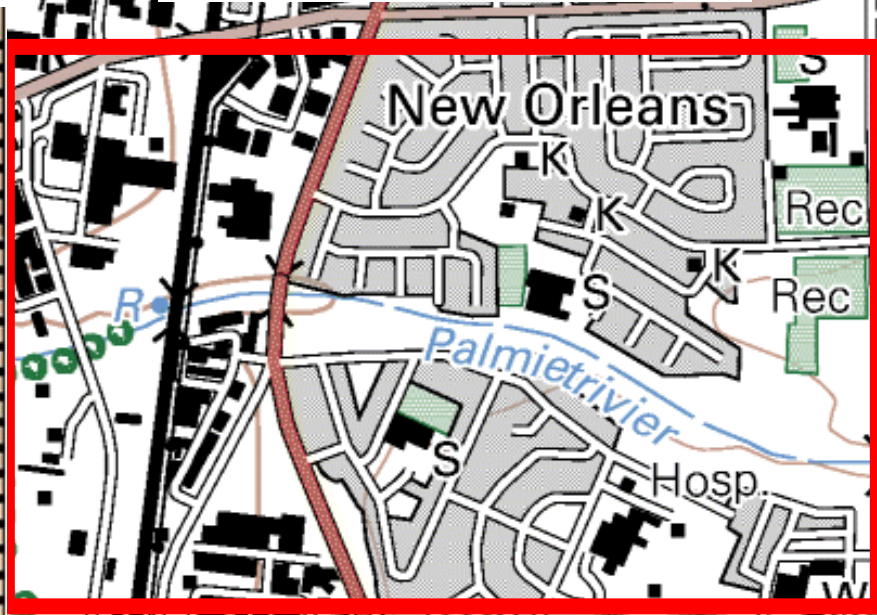
Vertical exaggeration

$$\frac{\text{Vertical scale}}{\text{Horizontal scale}}$$

Answer = X Times

AREA

Calculate area
of the red block



Formula: Area = l x b

1. Calculate length

Map distance x scale
100 000

$$\frac{3,4 \text{ cm} \times 50\,000}{100\,000} = 1,7 \text{ km}$$

2. Calculate breadth

Map distance x scale
100 000

$$\frac{2,2 \text{ cm} \times 50\,000}{100\,000} = 1,1 \text{ km}$$

3. Place in formula

Area = l x b

1,7km x 1,1km

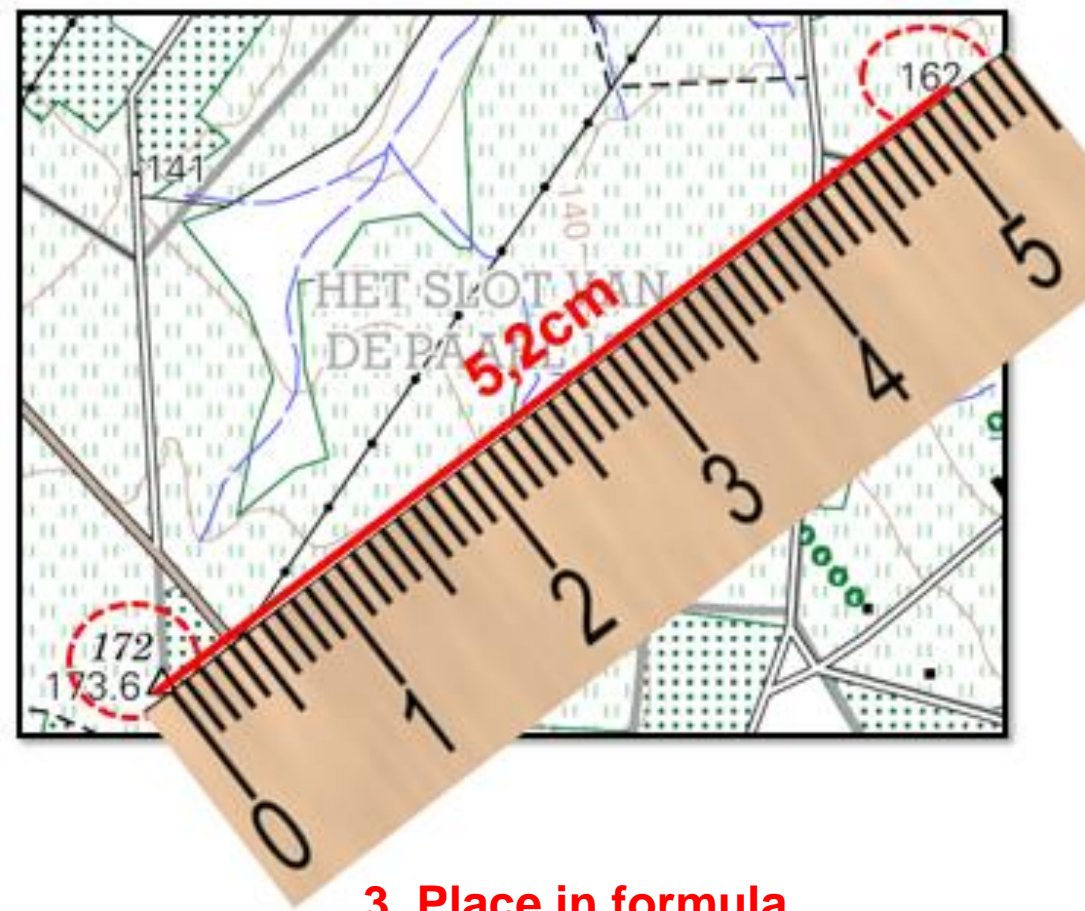
= 1,87 km²

GRADIENT

Calculate the gradient
from Trig Station 172 to
spot height 162

Formula

$$\text{Gradient} = \frac{\text{Difference in height}}{\text{Distance}}$$



1. Calculate difference in height

$$173,6\text{m} - 162\text{m} \\ = 11,6\text{m}$$

2. Calculate distance

$$\frac{5,2\text{cm} \times 50\,000}{100\,000} \\ = 2,6\text{km} \\ = 2\,600\text{m} \text{ (Convert to m)}$$

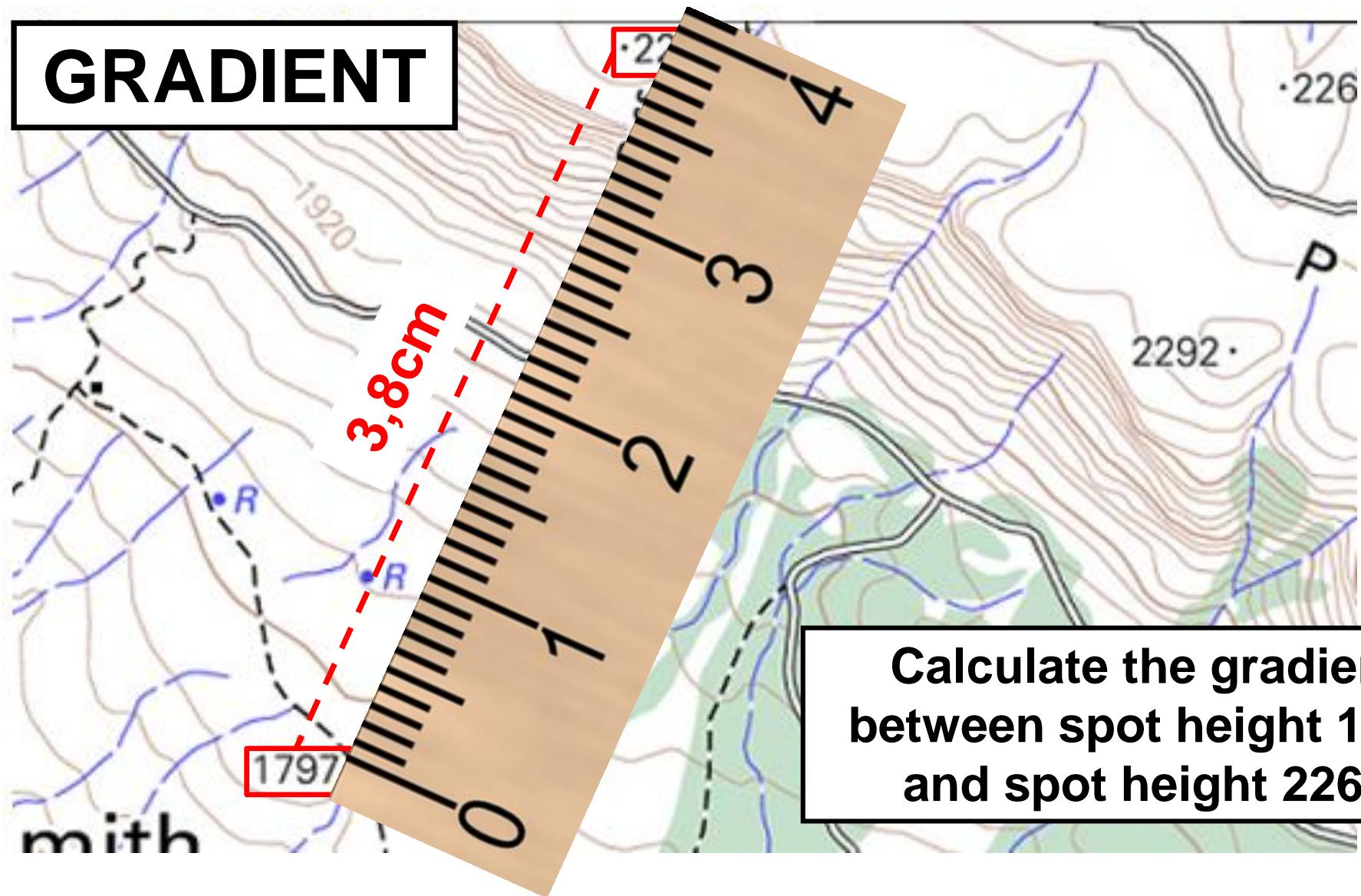
3. Place in formula

$$\text{Gradient} = \frac{\text{Difference in height}}{\text{Distance}}$$

$$\frac{11,6}{2\,600} \text{ SIMPLIFY}$$

$$= 1:224,13$$

GRADIENT



Calculate the gradient
between spot height 1797
and spot height 2263

Gradient = $\frac{\text{Height}}{\text{Distance}}$

$$VI = 2263 - 1797 = 466\text{m}$$

$$\begin{aligned} HE &= \frac{3.8 \text{ cm} \times 50\,000}{100\,000} \\ &= 1.9 \text{ km (convert)} \\ &= 1\,900\text{m} \end{aligned}$$

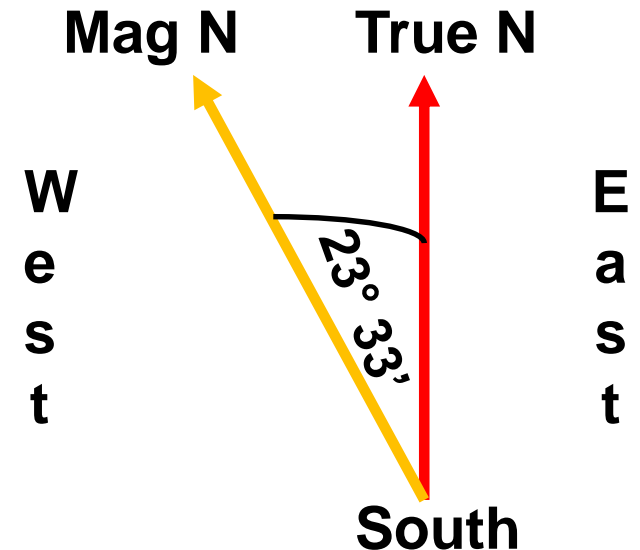
$$\begin{aligned} \text{Gradient} &= \frac{466}{1\,900} \\ &\text{(Simplify)} \\ &= 1:4.07 \end{aligned}$$

MAGNETIC DECLINATION

(Difference in degrees between TRUE NORTH and MAGNETIC NORTH)

TIP

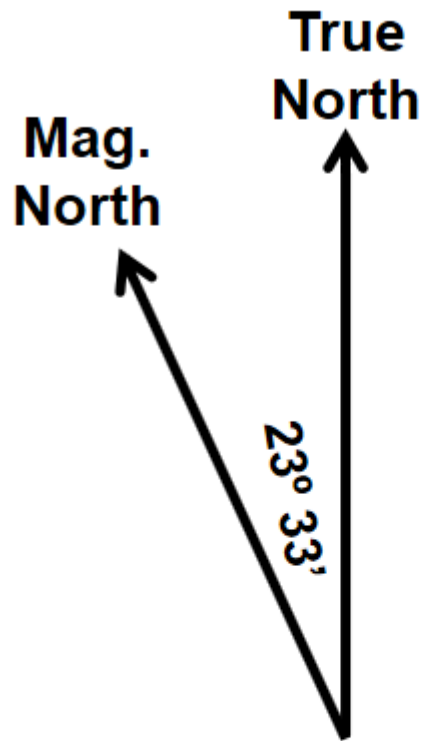
DRAW the information of magnetic declination supplied in the question.
A mental image will be of help with the the calculation!



Consider the following:

1. What is the mean mag. declination (in degrees & minutes)?
2. In which direction is the magnetic declination?
3. In which year is the magnetic declination given?
4. What is the mean annual change?
5. In what direction is the average yearly change?
6. For what year must the mag. declination be calculated?

MAGNETIC DECLINATION



Mean magnetic declination
 $23^{\circ} 33'$ West of True
North(July2002).
Mean annual change
 $6'$ Westwards.

Calculate the magnetic
declination for 2011.

1. Calculate difference in years

Difference 2011 – 2002
in years: = 9 years

2 Calculate degrees over amount of years

Degrees: 9 years X $6' W$
 = $54' West$

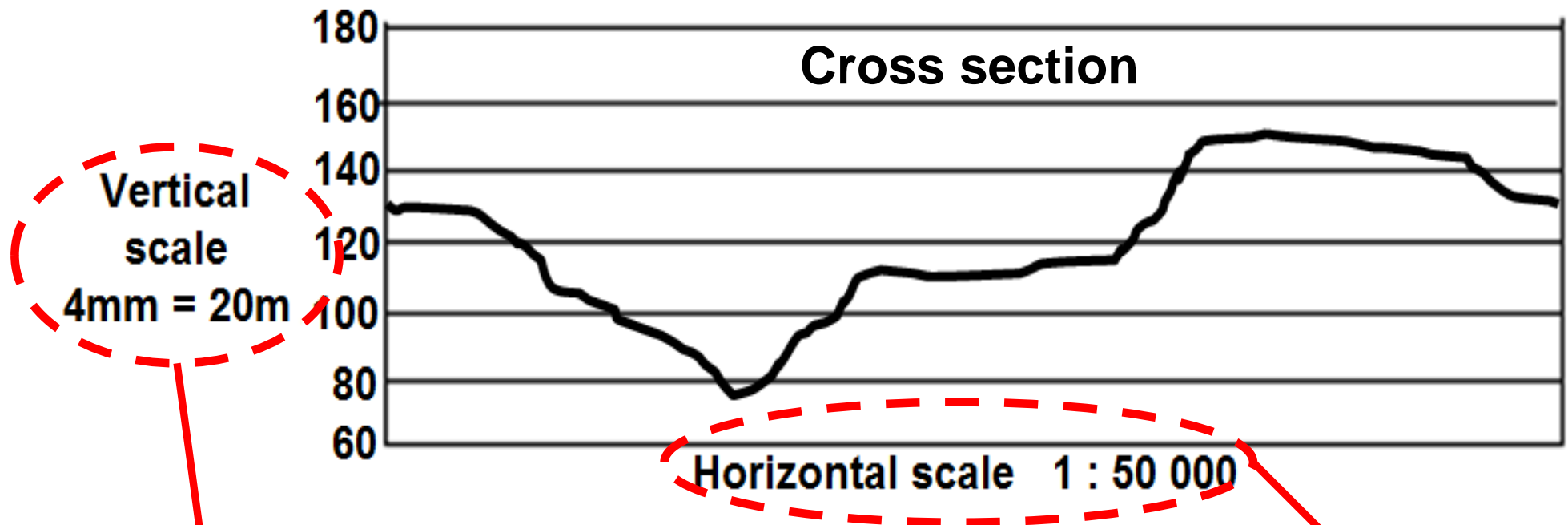
3. Calculate magnetic declination for 2011

Magnetic declination in 2011:
 = $23^{\circ} 33' + 54' W$
 = $23^{\circ} 87' W$

= $24^{\circ} 27' West of True North$

On your own: Calculate the magnetic declination for 2019

VERTICAL EXAGGERATION

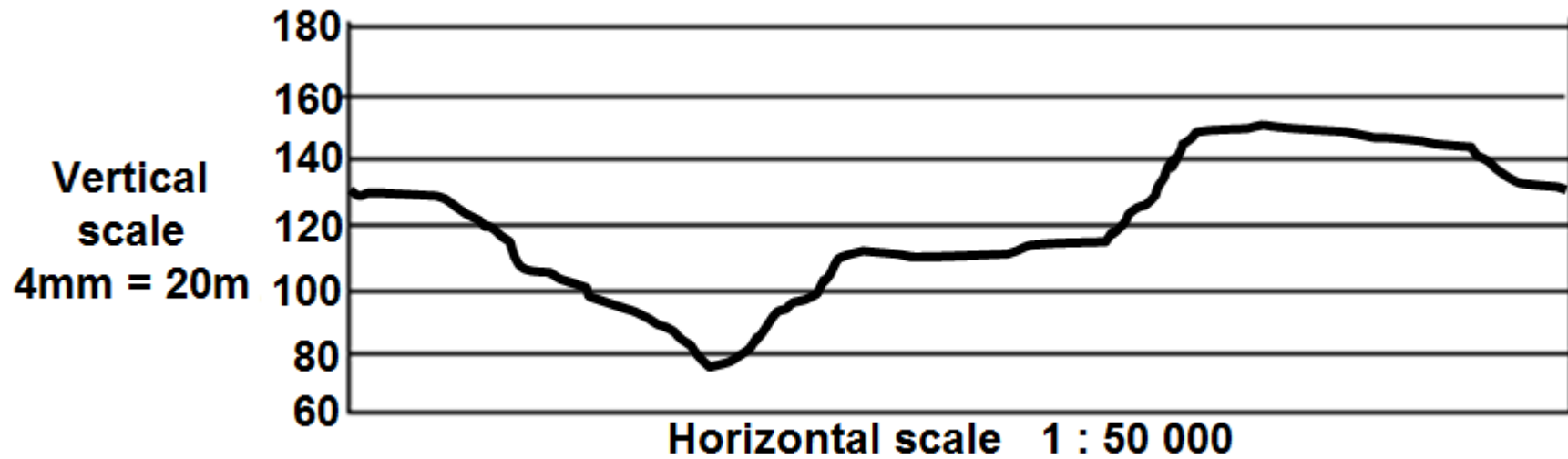


Q: Why are cross sections exaggerated when they are drawn?

A: To see the relief of the landscape

FORMULA : $VE = \frac{VS}{HS}$

Calculate the Vertical exaggeration



STEP 1
Convert VS
to ratio scale

$$4\text{mm} = 20\text{m}$$

$$4\text{mm} = 20\,000\text{mm} \quad (\text{same units})$$

$$4 : 20\,000$$

$$1 : 5\,000$$

STEP 2
Place in
formula

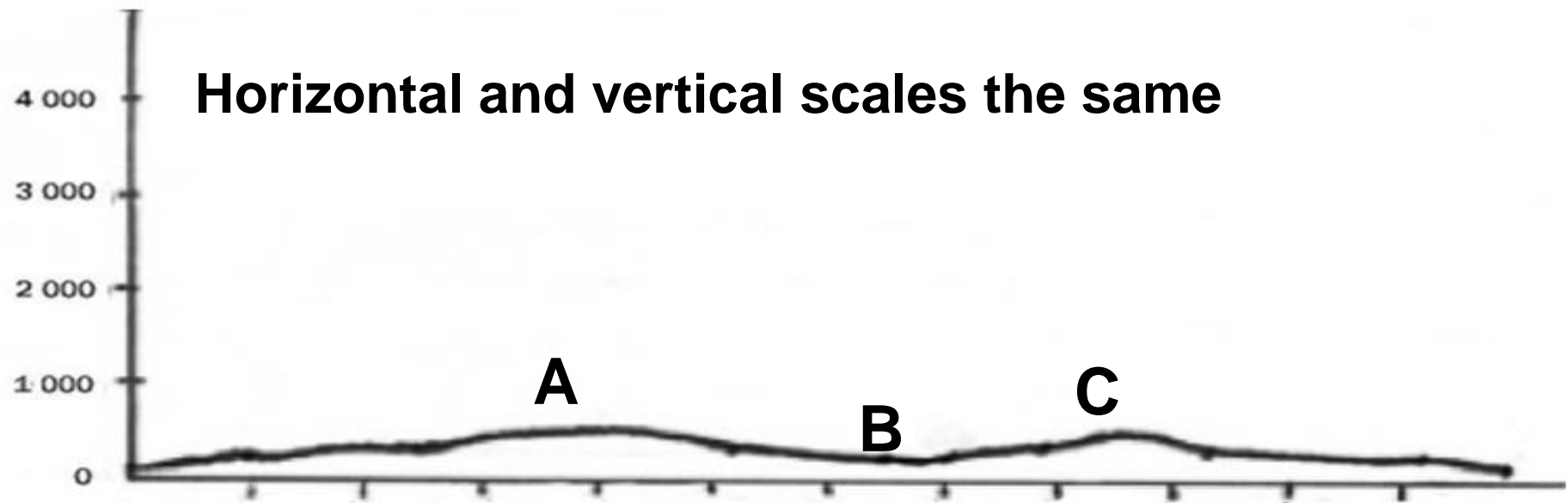
$$VE = \frac{VS}{HS}$$

$$= \frac{1}{5\,000} \div \frac{1}{50\,000}$$

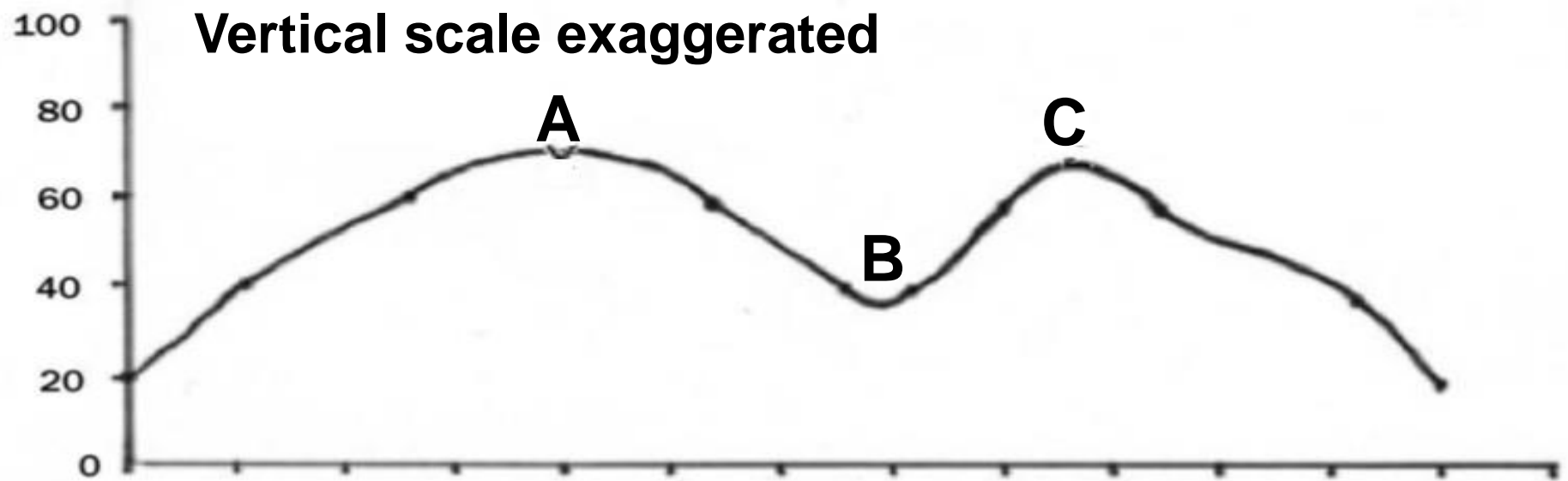
$$= \frac{1}{5\,000} \times \frac{50\,000}{1}$$

$$= 10 \text{ Times}$$

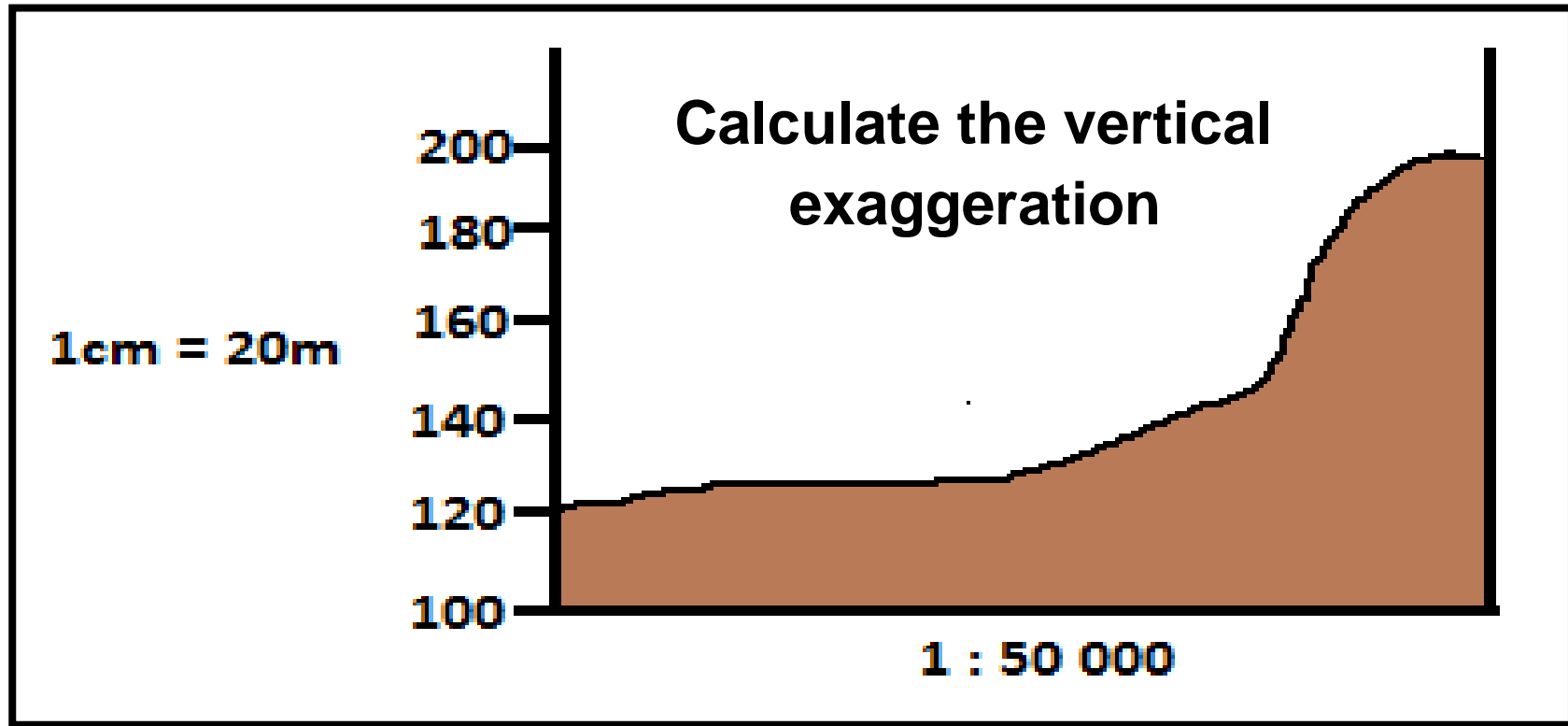
Horizontal and vertical scales the same



Vertical scale exaggerated



EXAMPLE VERTICAL EXAGGERATION



$$VE = \frac{VS}{HS}$$

VS: 1cm = 20m
1cm = 2 000cm

VS = 1 : 2 000

HS = 1 : 50 000

$$VE = \frac{VS}{HS}$$

$$\frac{1}{2\,000} \times \frac{50\,000}{1}$$

= 25 times