

Name _____

Date _____

Period _____

Shield Volcanoes & Tuff Cones



Mauna Loa, Shield Volcano
(http://spider.ipac.caltech.edu/staff/cd/Pictures/mauna_loa.jpeg)



Lē`ahi (Diamond Head), Tuff Cone
(<http://diamondheadphotos.com/images/diamondheadphotosphoto5.jpg>)

3 Points

1. What is a shield volcano?
2. What is a tuff cone?
3. Which volcano type appears to have a steeper slope?

3 Points

4. We will now use topographic maps to calculate volcano slopes. Obtain a topographic map of a shield volcano, choose 2 points at the top & bottom of the volcano to measure between, and record the following information:

Name of volcano _____ Scale: 1: _____

Contour Interval: _____ (remember units!)

Rise (change in elevation) = _____ (remember units!)

Run (horizontal distance) = _____ (remember units!)

Rise/Run X 100% = _____ % Grade

Please double-check that your units are correct

List results obtained from two other students in the table below. If you believe all three results are correct, calculate the average.

| Your result | Result #2 | Result #3 | Average |
|-------------|-----------|-----------|---------|
| 1. | | | |

3 Points

5. We will now use topographic maps to calculate volcano slopes. Obtain a topographic map of a tuff cone, choose 2 points at the top & bottom of the volcano to measure between, and record the following information:

Name of volcano _____ Scale: 1: _____

Contour Interval: _____ (remember units!)

Rise (change in elevation) = _____ (remember units!)

Run (horizontal distance) = _____ (remember units!)

Rise/Run X 100% = _____ % Grade

Please double-check that your units are correct

List results obtained from two other students in the table below. If you believe all three results are correct, calculate the average.

| Your result | Result #2 | Result #3 | Average |
|-------------|-----------|-----------|---------|
| 1. | | | |

3 Points

6. Error Analysis. List two possible reasons why your results may have been different from the other students.

7. Which volcano did you calculate to have a steeper slope?
Does this match your answer to #3?

8. Explain why you think these volcanoes have such different slopes. (Why is one steeper?)

_____/12 Total

Answers to Shield Volcanoes & Tuff Cones Handout

3 Points

1. What is a shield volcano?
A large volcano with shallow sloping sides, shaped somewhat like a shield. **1 pt**
2. What is a tuff cone?
A steep-sided volcano made of volcanic consolidated ash or tuff **1 pt**
3. Which volcano type appears to have a steeper slope?
A tuff cone **1 pt**

3 Points

Note: each map below shows different contour intervals. Also, Capulin Mountain has no scale, but gives the information (1 inch = 2000 feet) which matches the lecture example above.

4. We will now use topographic maps to calculate volcano slopes. Obtain a topographic map of a shield volcano and record the following information:

Results will vary depending on points chosen. Deduct ½ pt for each error

Name of volcano _____ Scale: 1: _____
 Contour Interval: _____ (remember units!)
 Rise (change in elevation) = _____ (remember units!)
 Run (horizontal distance) = _____ (remember units!)
 Rise/Run X 100% = _____ % Grade

List results obtained from two other students in the table below. If you believe all three results are correct, calculate the average.

| Your result | Result #2 | Result #3 | Average |
|-------------|-----------|-----------|---------|
| 1. | | | |

3 Points

5. Same as question 4.

3 Points

6. Error Analysis. List two possible reasons why your results may have been different from the other students.
Students may choose different points to measure between and/or may make errors in their calculations. **1 pt**

7. Which volcano did you calculate to have a steeper slope?
Does this match your answer to #3? **1 pt**
Averages of tuff cones should have steeper slopes (higher % grades).

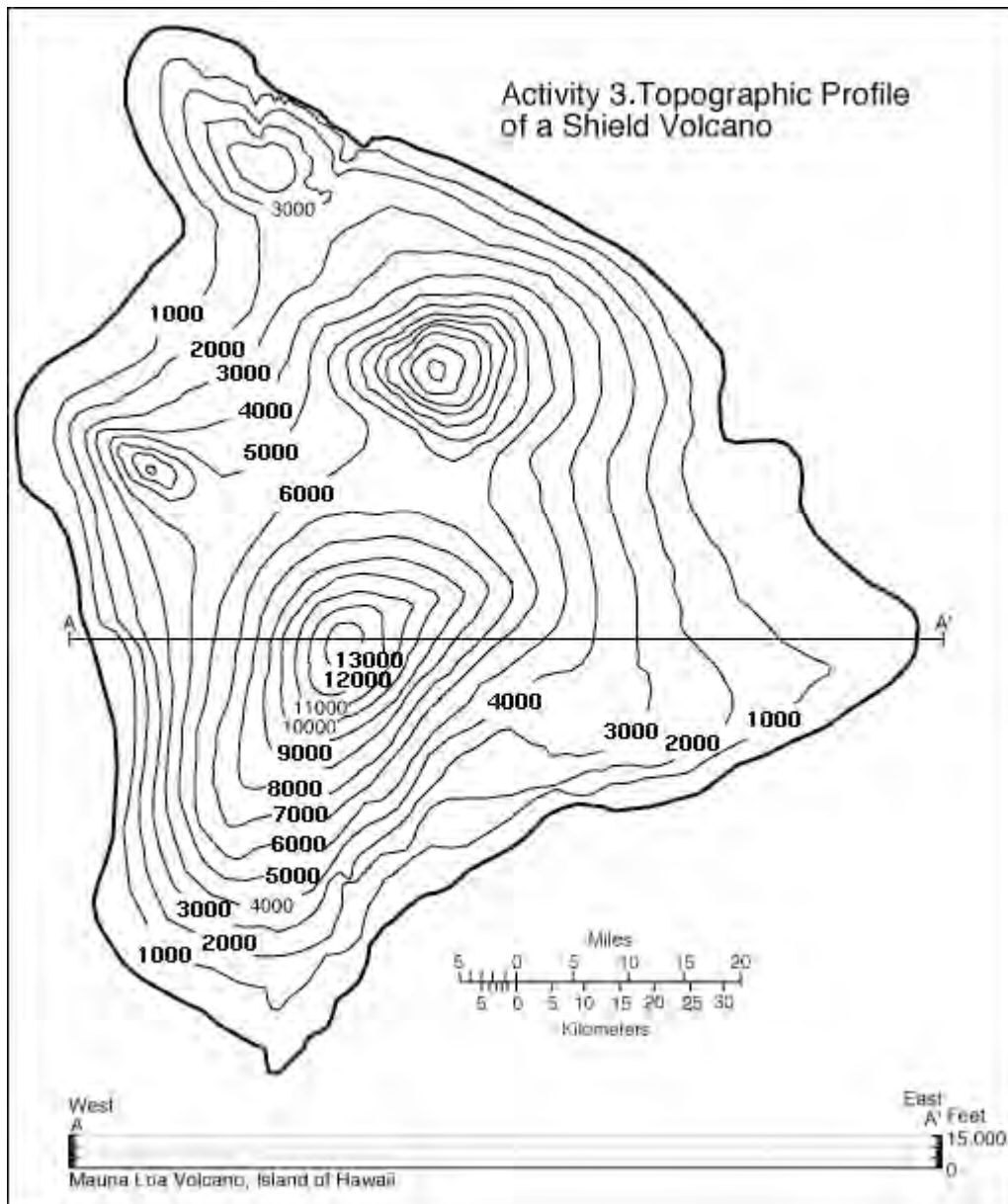
8. Explain why you think these volcanoes have such different slopes. (Why is one steeper?) **1 pt**

Shield volcanoes are formed by lava which creates sloping sides, while tuff are formed by ash which create steep sides.

_____/12 Total

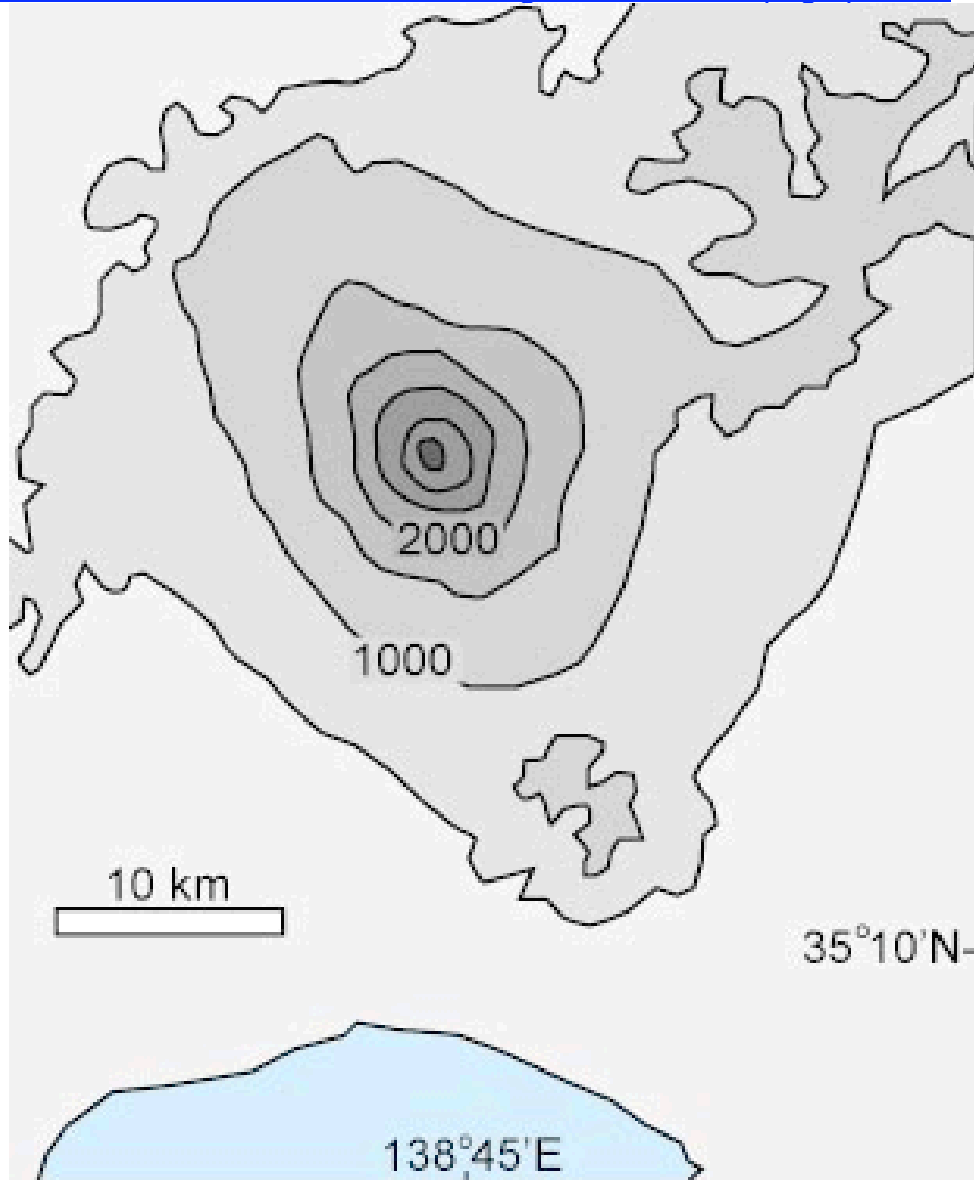
TOPOGRAPHIC MAPS ONLINE: SHIELD VOLCANO – MAUNA LOA

➤ http://volcano.oregonstate.edu/vwdocs/vwlessons/land_pics/a6.3.gif



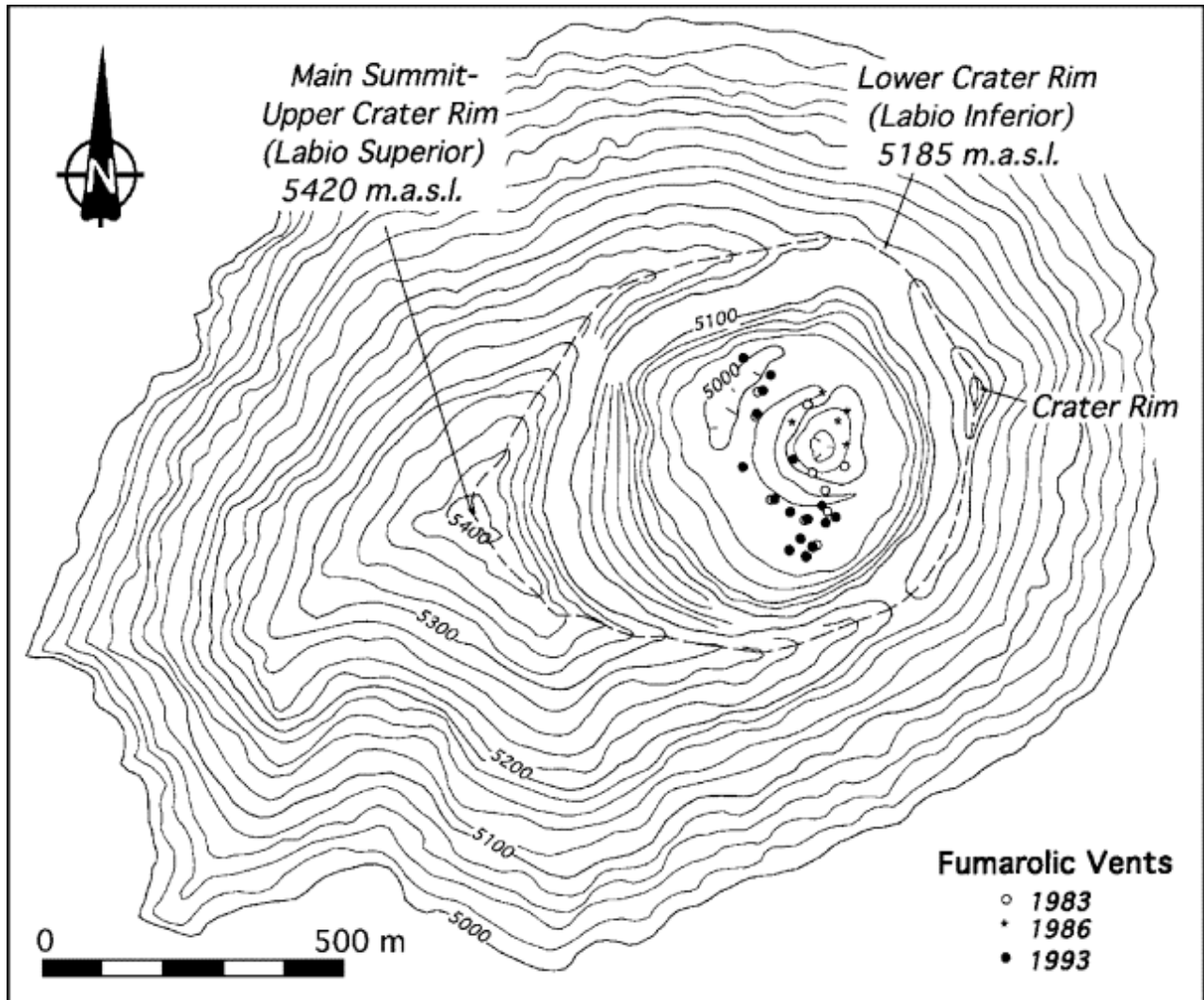
TOPOGRAPHIC MAPS ONLINE: SHIELD VOLCANO – MOUNT FUJI

- http://volcano.und.edu/vwdocs/volc_images/north_asia/topograph.html



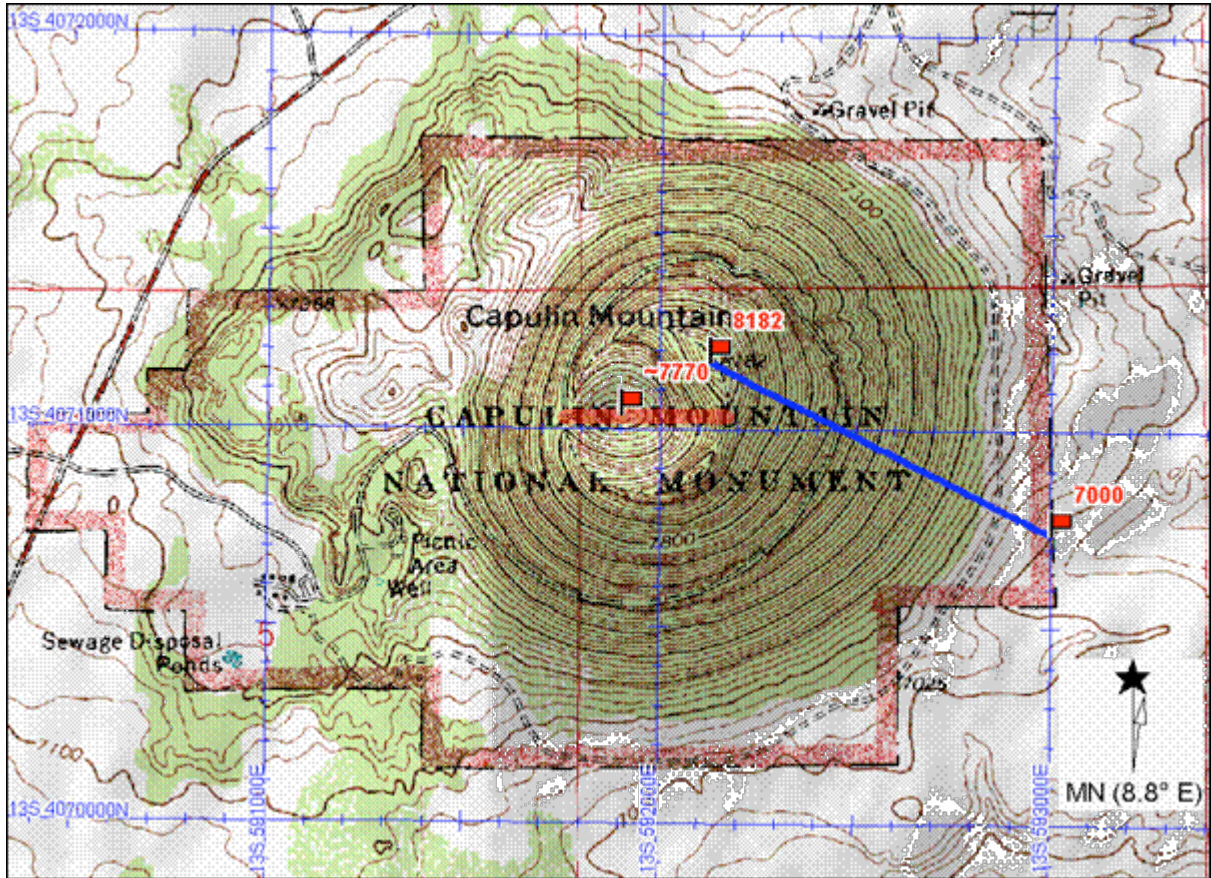
TOPOGRAPHIC MAPS ONLINE: SHIELD VOLCANO – POPOCATÉPETL, MEXICO

➤ www.volcano.si.edu/world/volcano.cfm?vnum=1401-09=&volpage=var



TOPOGRAPHIC MAPS ONLINE: TUFF CONE VOLCANO - CAPULIN MOUNTAIN, NEW MEXICO

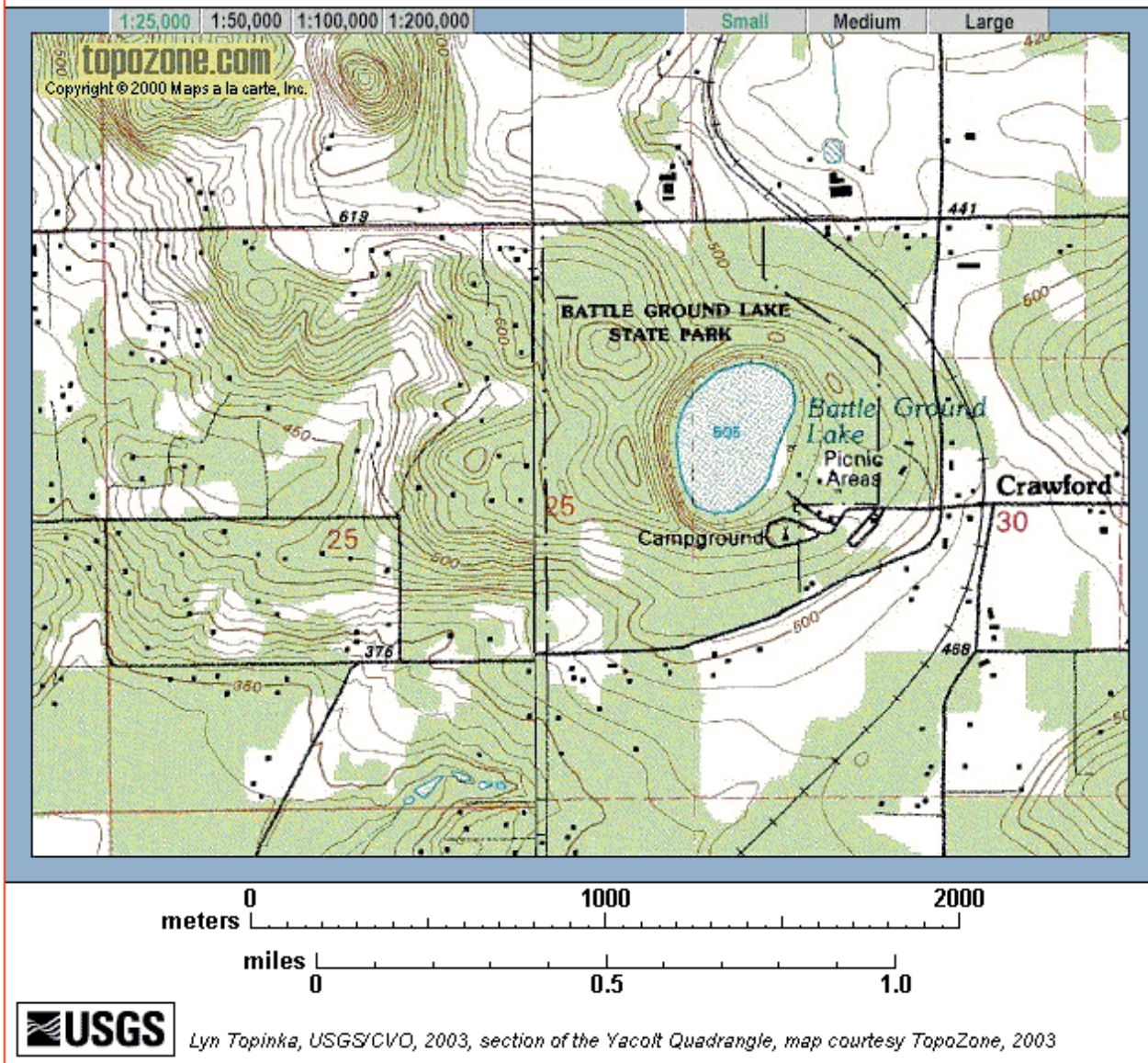
➤ www.uwsp.edu/geo/faculty/heywood/GEOG101/labs/Vulcanism/VulcanismOLD.htm



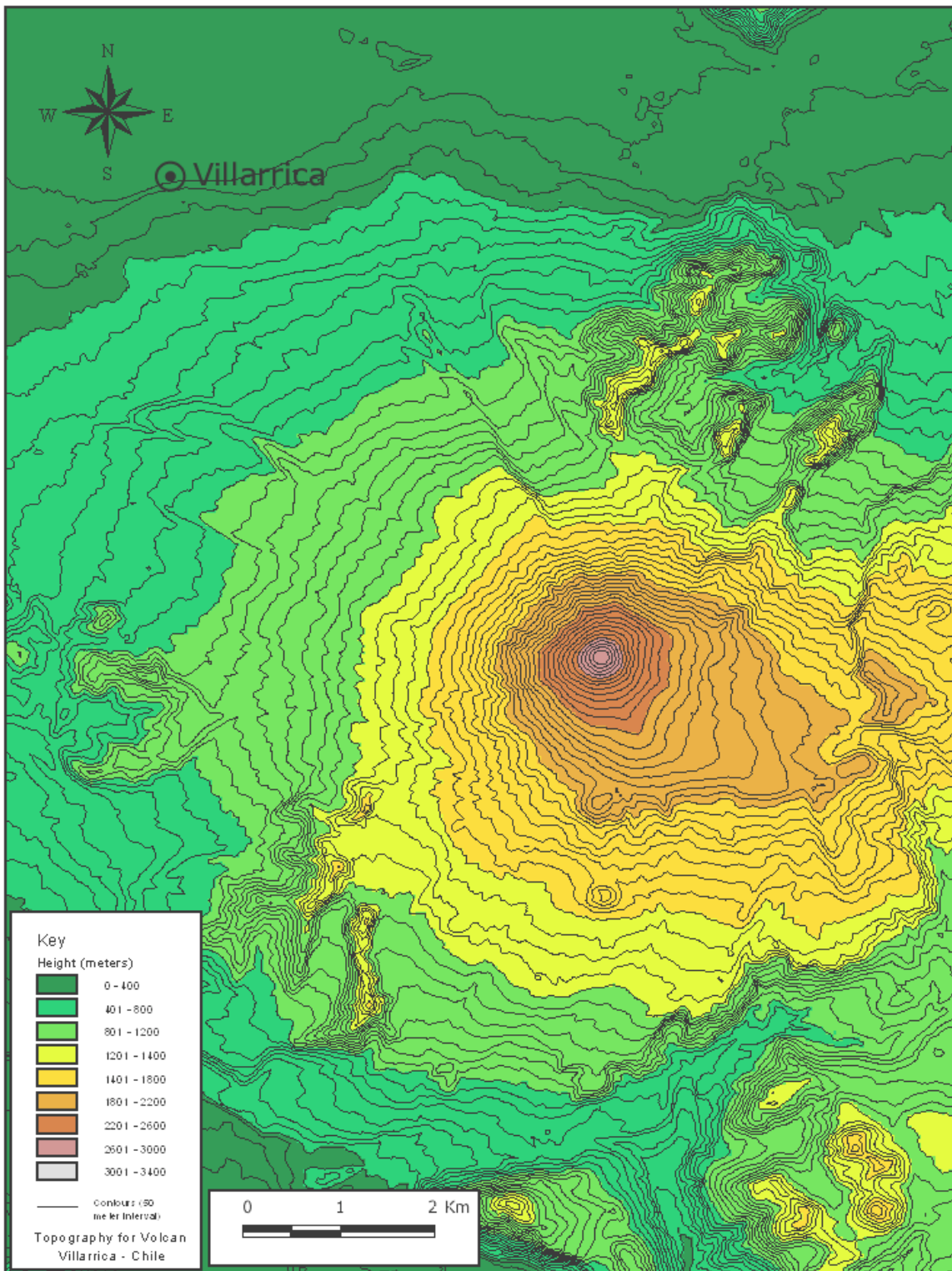
Original was 1:24,000

TOPOGRAPHIC MAPS ONLINE: TUFF CONE VOLCANO – BATTLE GROUND LAKE
➤ http://vulcan.wr.usgs.gov/Volcanoes/Washington/BattleGroundLake/Maps/map_top_o_battle_ground_lake.html

Battle Ground Lake, Washington State

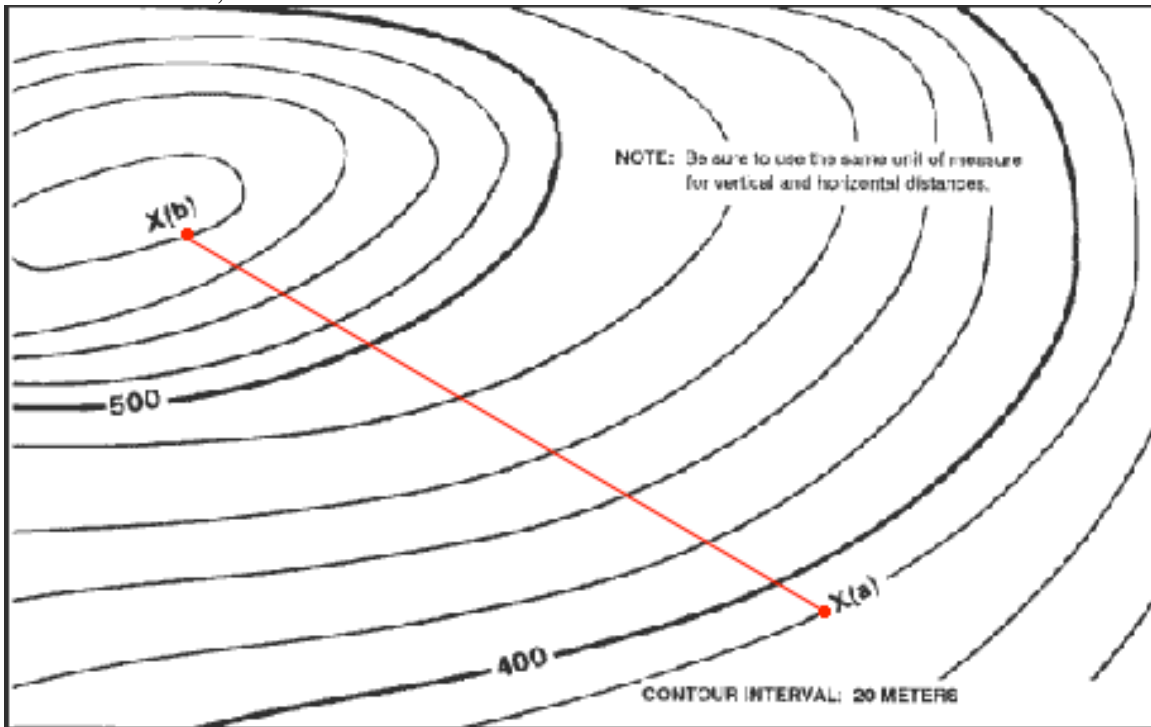


TOPOGRAPHIC MAPS ONLINE: TUFF CONE VOLCANO – VILLARRICA, CHILE
➤ pumas.jpl.nasa.gov/MSWord_Examples/10_04_04_1.doc



Example Of Calculating Slope From A Topographic Map

Scale is 1:24,000



First, read the following information from the example map shown above:

Scale: 1:24,000

- This means 1 inch on map = 24,000 inches on earth = 2000 feet = about 2/5 of a mile
- This also means 1cm on map = 24,000 cm on earth = 240 meters (or 240 m)

Contour Interval: 20 meters

- This is the elevation difference between contour lines in this example map

Second, measure slope between (for example) points X(a) and X(b)

Rise (change in elevation) = 200 meters (580 meters – 380 meters) on this map

Run (horizontal distance) = 6.5 cm on map = 6.5 X 24,000 cm on earth = 1560 meters (reduced from 156,000 cm)

$$\frac{\text{Rise}}{\text{Run}} \times 100 = \frac{200\text{m}}{1560\text{m}} \times 100 = 12.8 \% \text{ Grade}$$