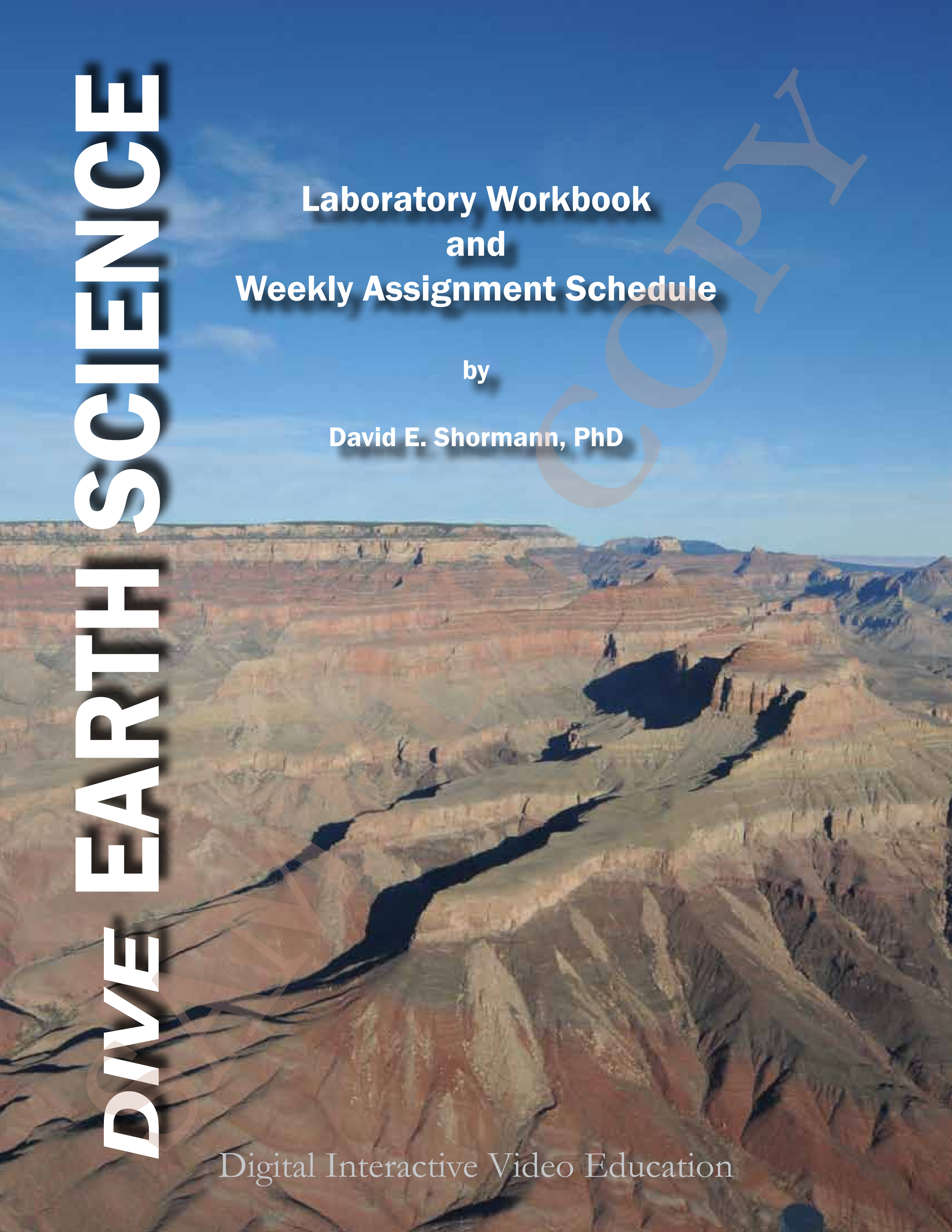

DIVE EARTH SCIENCE

Laboratory Workbook and Weekly Assignment Schedule

by

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Digital Interactive Video Education

D.I.V.E. Earth Science Laboratory Workbook

ISBN 978-0-9819010-8-4

Published By Digital Interactive Video Education
P.O. Box 1324
Magnolia, TX 77353

Printed in the United States of America

Table of Contents

DIVE Earth Science consists of the following four sections:
Week 1-8: Earth Science Basics
Weeks 9-16: Flood Geology
Weeks 17-24: Limnology and Oceanography
Weeks 25-32: Meteorology and Astronomy

Laboratory Activity 1.1

The Scientific Method

Introduction

Welcome to Earth Science Laboratory! In today's lab, you will become familiar with the Scientific Method, and how you can use it to answer questions you have about God's creation.

How to Complete a DIVE Earth Science Laboratory Activity

1. Open your workbook to the appropriate page. Have a pencil and calculator ready.
2. Turn on your DIVE Video Lab and begin watching.
3. Watch the activity, pausing and rewinding as necessary. Fill in the activity book as you go.
4. Optional: Use your own equipment to complete the actvity! You don't have to do this for every lab, but it is recommended that you try at least a few.

Steps of the Scientific Method

Describe each of the five parts of the scientific method:

Introduction

Hypothesis

Methods

Results

Discussion

Laboratory Equipment

Equipment used for containing substances____

____

Equipment used for measuring____

____

____

Miscellaneous equipment____

____

Laboratory Safety

What is the most dangerous chemical you will use?_______________________________________.

Where can you purchase / borrow it?____

____

How do you mix acid and water?____

What do you do if you get acid on you?____

How can you protect yourself from acid spills during lab?___________________________________

____

A very effective method for preventing accidents during lab is to ______________the experiment before performing it.

Doing a science experiment.

Introduction

Anything that takes up space and has mass is called matter. We can weigh an object to get an idea of how much mass it has. We can measure its volume to get an idea of how much space it takes up. Scientists measure masses and volumes of materials to determine their densities. The density, or mass per unit volume, of a material is helpful way for scientists to distinguish between two materials. It is one of the main measurements used to describe a material. For example, pure water (H_2O)at room temperature has a density of about 1.0 g/mL. This is very different from pure lead (Pb), which has a density of about 11.3 g/mL. If you had 1 mL of each substance, the water would weight 1.0 g, and the lead would weight 11.3 g. Lead is probably the most dense substance in your rock collection.

In Laboratory Activity 1 you will attempt to answer the following question about rocks in your collection:

Which ore is the most dense?

Hypothesis: Determine the ores in your rock and mineral set. You should have a list that tells you which numbered specimens are ores. Based on what you learned in the introduction, together with any experience you have with ores, make an educated guess:____.

Methods

Materials

Equipment: Ores from your rock and mineral kit (#30-45 if you have the same kit used in the video lab), digital balance, 100 mL graduated cylinder, cup, tweezers or pliers, calculator.
Chemicals: Tap water

Procedure

For detailed explanation of procedure, please watch video lab. Record all measurements in the following table, or make a spreadsheet on your computer to automatically calculate density.

FIND MASS FIRST, THEN VOLUME

Ore	Mass (g)	Volume (mL)	Density (g/mL)

Results: Calculate the density and record in the table on page 4. Round each answer to 2 decimal places.

Discussion:

1. Was your hypothesis correct? Why or why not?

2. Which ore had the second-highest density?

3. List at least three sources of error.

4. Considering the question answered in this experiment, list some similar questions that could be answered about density by doing a science experiment.

5. Why would a geologist be interested in knowing a rock's density?

Laboratory Activity 1.2

Using a Compass and Map

Introduction

In this lab activity you will learn to use a magnetic compass to determine the orientation of your home or school. You will then learn about maps and map scale, and combine your knowledge of compasses and maps to plot courses. You will check your work using Google Earth.

Methods

Materials

Equipment: Brunton Classic magnetic compass, drawing compass, ruler, computer with Google Earth, calculator

Procedure

For detailed explanation of procedure, please watch video lab. Record all measurements in the workbook.

Part 1: Using a compass

Direction Name	Angle
North	0°
Northeast	45°
East	90°
Southeast	135°
South	180°
Southwest	225°
West	270°
Northwest	315°

Record a direction name and angle for questions 1-4.

1. The front of my home faces ________________________________.

2. The back of my home faces________________________________.

3. If I am facing my home, and I turn left (90°) and start walking, I will head______________________________.

4. If I am facing my home, and I turn right (90°) and start walking, I will head______________________________.

Part 2: Map scale

1. What are some of the common map scales?____

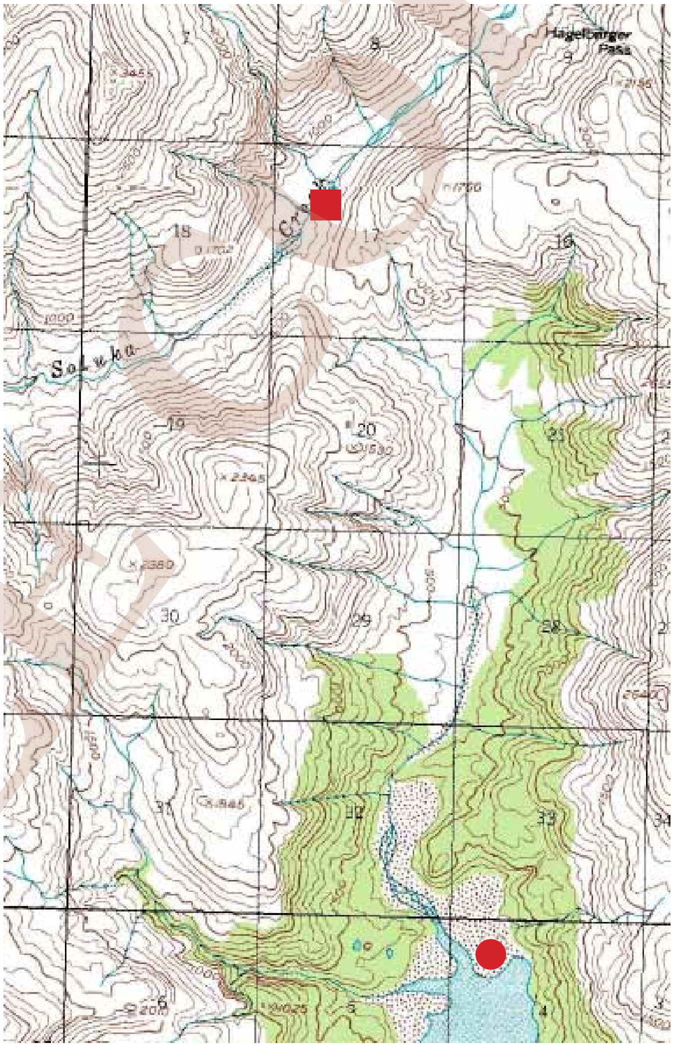
2. How many cm are in 1 km?________________________

3. Why do you think there is a 1:100,000 map scale?____

4. How many inches are in a mile?________________________

5. Why do you think there is a 1:63,360 map scale?____

Part 3: Compass and Map



To the right is a section of the USGS 1:63,360 Katmai A-3 Quadrangle Map, published with revisions in 1977. The red square is where a hot spring was discovered by Dr. Robert F. Griggs, who explored the area after the eruption of Novarupta volcano in 1912. Estimate the distance between the red dot and the red square.

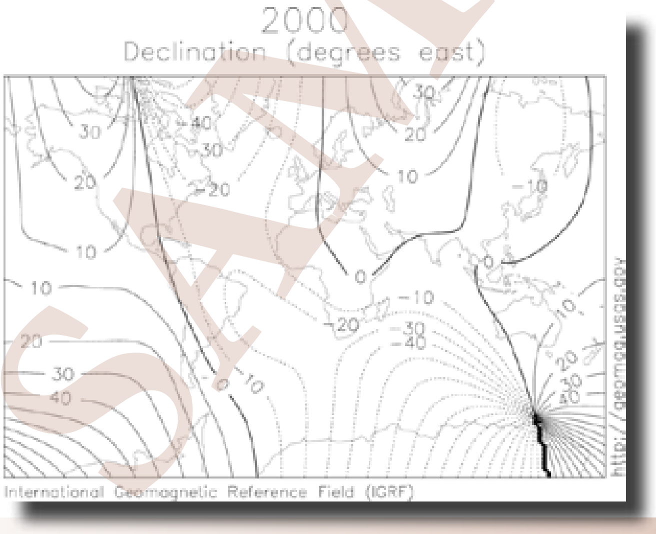
____________________mi

If a group started at the red dot and walked in a straight line to the red square, what would their heading need to be?

_____________________°

Assuming a declination of 21.5° East, recalculate their heading to get a magnetic bearing.

______________________°



Part 4: Using Google Earth

1. If you have not downloaded Google Earth, click here and download it now.

2. Type your home address into the Google Earth toolbar and press Enter. Record the latitutde, longitude, and elevation of your home.

Latitude: ________________________________

Longitude: ________________________________

Elevation: ________________________________

3. Type in "Dakavak Lake" and press Enter. Watch video lab to learn how to find distances using Google Earth.

distance = _____________mi

heading = ____________°

Compare your distance measured using Google Earth with your distance in Part 3. Calculate a percent difference.

% Difference = ((larger - smaller) / larger) x 100% = ________________%

Subtract the declination from the Google Earth heading to get the magnetic bearing:_____________°

How does this bearing compare to the magnetic bearing calculated on p. 8?

Part 5 (Optional): TerraGo plugin for Acrobat Reader and GEOpdf files

Find store.usgs.gov on the Internet. Select "Map Locator" and download the free TerraGo plugin. This allows you to use GEOpdf files.

Go back to "Map Locator" and under "SEARCH," type in Katmai A-3, then under "Search Type" select "USGS Map Name" and click "Go."

Click on the red balloon on the map, and download the smaller of the two files. Watch video lab and measure the distance you estimated in Parts 3 and 4 above.

TerraGo distance = ___________________________ mi.

% difference between Parts 4 and 5_______________________________________%

% difference between Parts 3 and 5____%

Is the GEOpdf declination different than in Part 3?____

Laboratory Activity 1.3

Contour Lines

Introduction

As you learn more about topographic maps, you are probably wondering what all those curvy lines are! Those are contour lines, and they are very helpful because they give you an idea of how steep the terrain is. The closer contour lines are together, the steeper the terrain. Contour lines are isopleths, or lines of equal measure. On topographic maps, isopleths are measuring lines of equal altitude above sea level. On bathymetric (nautical) charts, isopleths are lines of equal depth. In this lab activity, you will use a plastic model to learn how to make contour lines and draw a profile. Then you will use an actual topographic map section to make a profile. You will learn to make a profile using Google Earth.

Methods

Materials

Equipment: Contour line kit, ruler, water, cup or pitcher, dark-colored crayon, cookie sheet to set experiment in and prevent spills (optional), computer with Google Earth

Procedure

For detailed explanation of procedure, please watch video lab. Record all measurements in the workbook.

Part 1: Making contour lines

Fill container in 0.5 cm increments

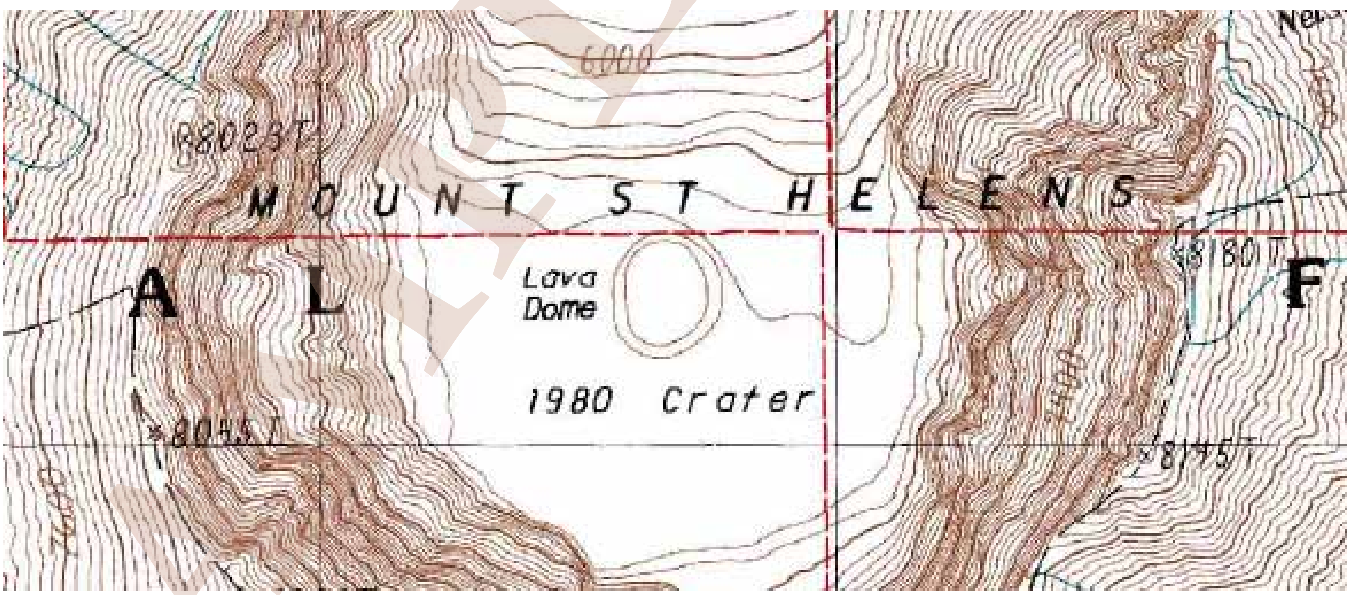
Each new water line is marking an isopleth. Mark its location with a crayon.

Measure highest point (last point submerged) and mark it with an "X"

DO NOT THROW AWAY THE CONTAINER! You need it for several other laboratory activities.

To the best of your ability, redraw a top view of your contour lines below. Then, make a profile through the highest point on your image. Use the grids as guides for placing your contour lines.

Part 2: Making a profile from a real 1983 USGS topographic map. Draw the 200 ft. intervals only.



8,000 ft

Part 3: Use Google Earth to make a profile

1.Fly to “Mount Saint Helens.” Watch video lab to learn how to make a profile. Sketch your profile below.

8,000 ft

2. In what ways is your Google Earth profile similar to your profile drawn in Part 2?

3. In what ways is your Google Earth profile different than your profile drawn in Part 2?

4. What might be some reasons for the similarities/differences in profiles between Part 2 and 3?