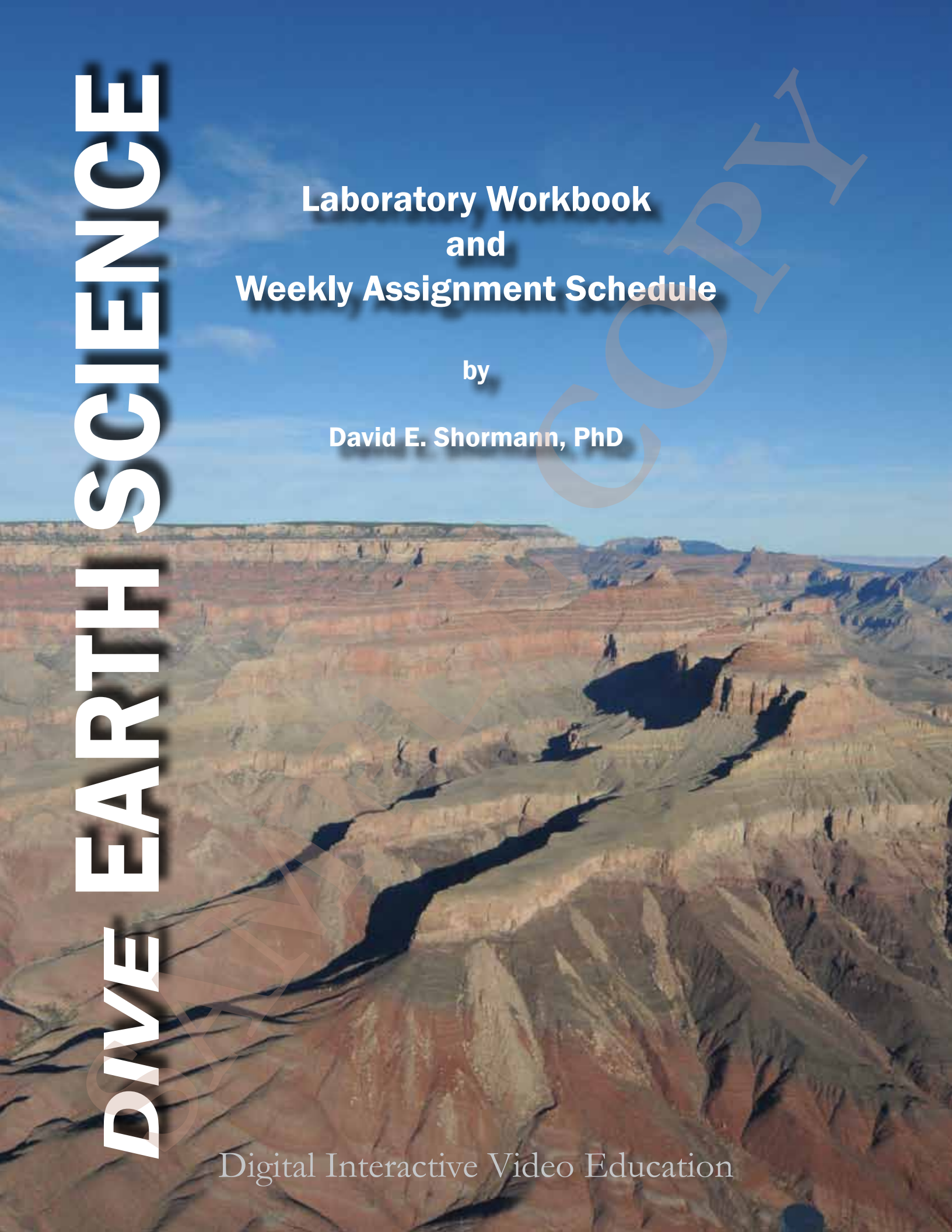

DIVE EARTH SCIENCE

Laboratory Workbook and Weekly Assignment Schedule

by

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Digital Interactive Video Education

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

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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

Using DIVE Earth Science

The goal of DIVE Earth Science is to teach you about God's creation through definitions, lectures, facts practice, laboratory activities and review. We recommend the following weekly schedule, which should take about 1 hour per day to complete:

Day 1: Watch the "Rules and Definitions" at the beginning of the assigned "A" lecture. Write down all assigned rules and definitions. Complete definitions using the DIVE Earth Science glossary. Work on Facts Practice.
Day 2: Watch lecture A and take notes, complete Review Questions, work on Facts Practice.
Day 3: Watch lecture B and take notes, complete Review Questions, work on Facts Practice.
Day 4: Complete Lab Activity.

DIVE Earth Science is designed to get you ready for DIVE's High School science courses, where note-taking is an important skill. You will take notes on each DIVE lecture, then complete review questions based on the lecture. If you completed your definitions, and took good notes on the lecture, you should be able to do well on the review questions. Then, every 8 weeks you will have a review of topics covered over the previous 7 weeks. Treat this quarterly review as a regular homework assignment, where you are allowed to use your lecture notes and definitions to answer the questions. You can add an extra challenge by not allowing the use of any notes or definitions, and limiting your time to 30 minutes.

Supplies required: A computer with Internet, a 1 inch, 3-ring binder with dividers, college rule notebook paper, 3-hole punch(or 3-hole printer paper), scientific calculator. I recommend that you print the DIVE Earth Science Workbook and place it in a 3-ring binder, and then add 100 pages of college rule paper (or 3-hole copy paper) for taking notes and writng definitions. Because the lectures, review questions, and facts practice use Adobe Flash technology, DIVE Earth Science will not currently work on an iPad or iPhone.

> **Laboratory Supplies**: All lab supplies can be purchased at local stores and/or Internet sites. A pdf document is included on the DIVE CD that lists all supplies and costs. Read it carefully. Many supplies you will already have. DO AS MANY HANDS-ON LABS AS YOU CAN AFFORD. Total cost is around $200.
>
> **Google Earth**: We will use Google Earth for several activites. Download it now for free at earth.google.com. You do not need the "Pro" version.

Special Note on Facts Practice: DIVE Earth Science Facts Practice is basically a computerized "flashcard" tool designed to help you memorize important Earth Science facts. God knew what he was doing when he assigned animal-naming duties as one of mankind's first jobs (Genesis 2:19-20). Knowing something's name is the first step in understanding it better and enjoying it more, and if you know the names of all kinds of rocks, clouds, lakes, canyons, etc., it is more likely that you will investigate these things further. Each Facts Practice IS NOT A TEST, it is a memory tool that you are supposed to do multiple times until you achieve a perfect score.

Scheduling your year: The Table of Contents is set up as a weekly schedule consisting of weekly Assignments, Facts Practice, and Laboratory activities. It is designed to be broken up into two, 16-week semesters. I recommend beginning around mid-August, allowing for a break at Thanksgiving, and concluding one to two weeks before Christmas. Continue after New Year's, taking another break after completing Week 24.
When you begin a week, first read your table of contents and determine what will be covered.

Be flexible! If your child needs an extra week or two in a semester, don't be afraid to give it to them.

Grading: A grading calculator is provided. Watch the Getting Started lesson to familiarize yourself with it.

Notes and definitions (Worth 25%): Grade these based on completion. If your child completed all definitions and took a thorough set of notes, give them a 100%. Deciding what "thorough" means is sometimes difficult. At the very least, briefly review the DIVE Video Lectures assigned for that week, which will give you a good indication of whether your child has a thorough set of notes. Some things your child should take notes on include titles and subtitles, definitions and important concepts, diagrams and tables with notes explaining them, and ALL practice problems. If you have more than one child working on the same DIVE Science course, give the better grade to the one with the more thoroughly completed set of notes.

Review questions (25%): Review questions are computer-generated, and correct answers are given upon completion. Watch the Getting Started lesson to learn how to work with the computer-generated review questions. If you need a more detailed answer, Video Solutions to review questions are provided at the end of each DIVE Lecture.

Laboratory Assignments (20%): Grade these based on completion. If your child completes all topics covered on the DIVE Video Lab, then give them a 100%. I do not recommend basing the grade on whether or not the student performed a flawless execution of the lab activity, but instead on completion, effort, and attitude. Give lower scores for incomplete, sloppy or lazy work. For most students, lab is their favorite part of science, and lab should be an "easy A" for them.

Facts Practice (10%): As mentioned on p. ii, the goal of the facts practice is to complete each set as many times as necessary until you get a perfect score (100%). If one of the facts practice sets is particularly challenging to you, then just record your best score. NOTE: some weeks do not have a scheduled Facts Practice. Use those weeks to review any of the Facts, especially the ones that are more challenging for you.

Quarterly review (20%). Students who took good notes and studied their definitions and review questions will do the best on the quarterly reviews. Most questions will be similar to the weekly DIVE review questions. If your child can correctly answer all the weekly review questions, then they should do fine on the quarterly review. Remember, you can treat the quarterly review like a test by not allowing the use of notes or definitions. If you do this, give your child time to study their notes, definitions and weekly review questions beforehand.

Did I pass? Here is my recommended grading system for DIVE Earth Science:

90-100 = A 85-90 = B 80-85 = C 75-80 = D Below 75 = F

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.

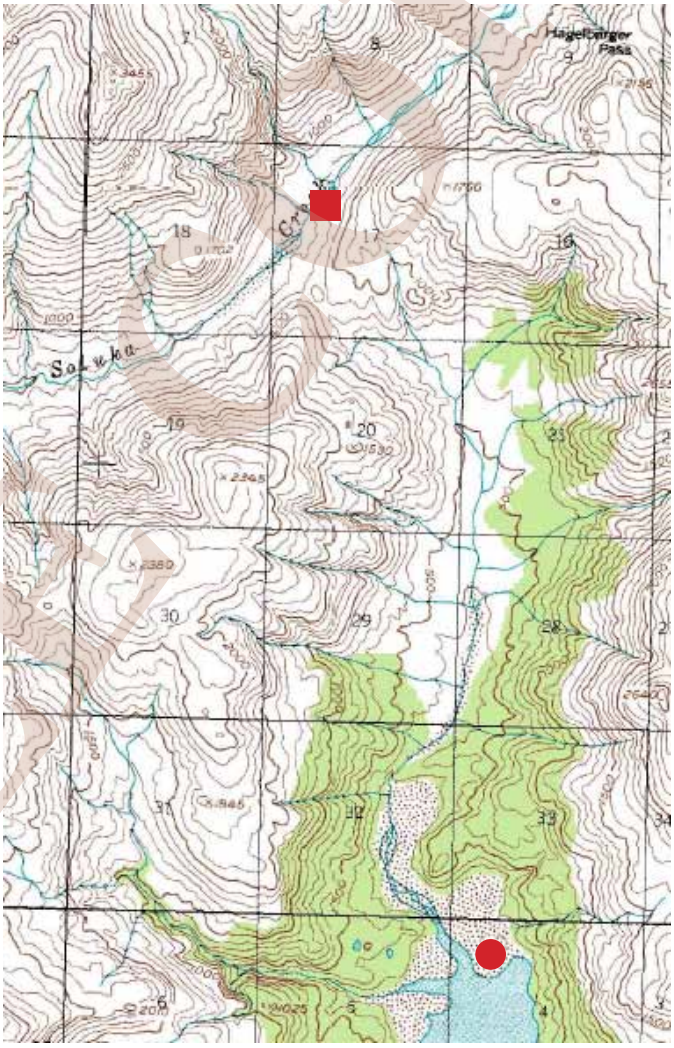
1. The front of my home faces _____.
2. The back of my home faces_____.
3. If I am facing my home, and I turn left (90°) and start walking, I will head_____.
4. If I am facing my home, and I turn right (90°) and start walking, I will head_____.

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.



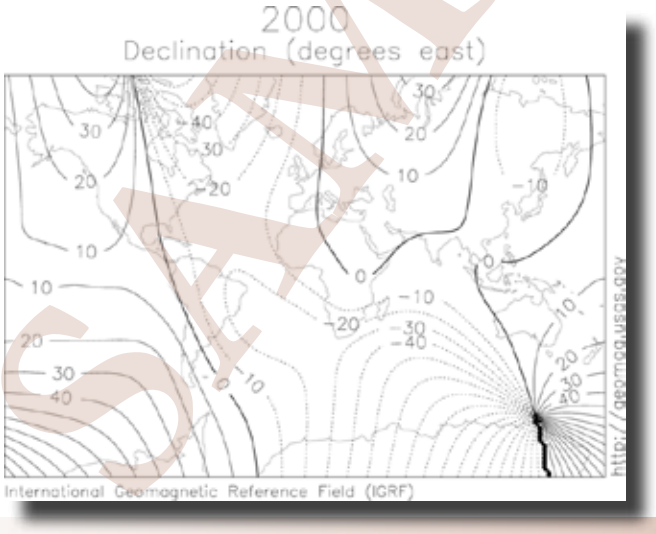
_____mi

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

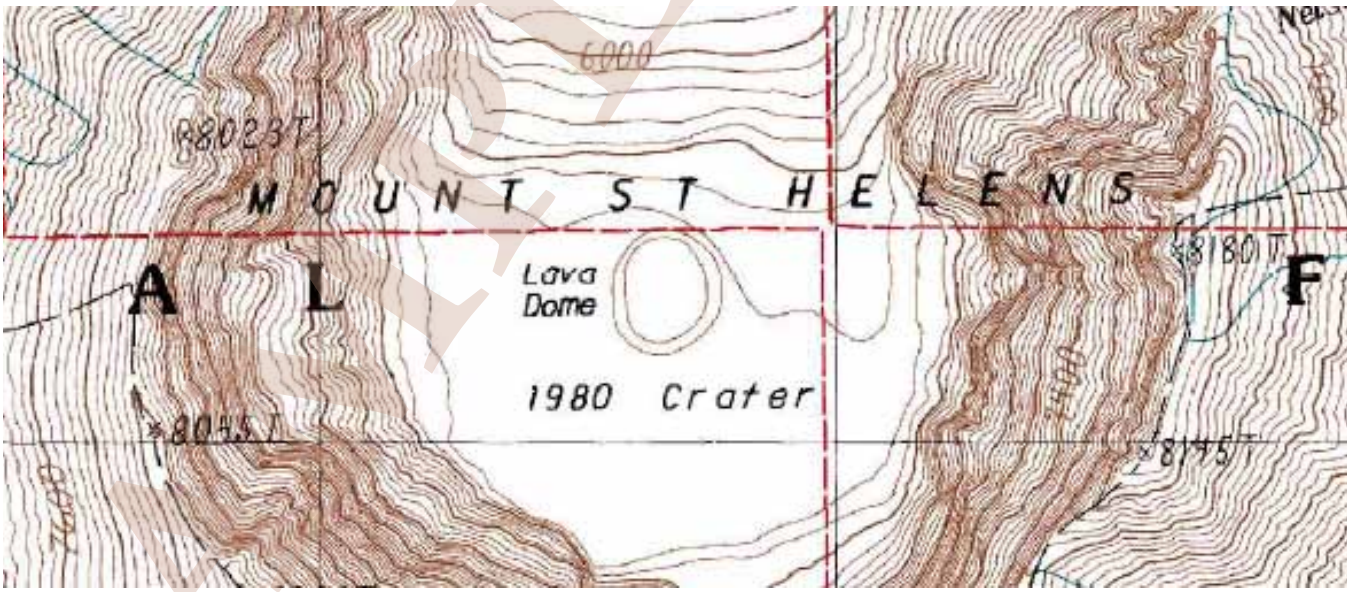
Each new water line is marking an isopleth. Mark its location with a crayon.

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.

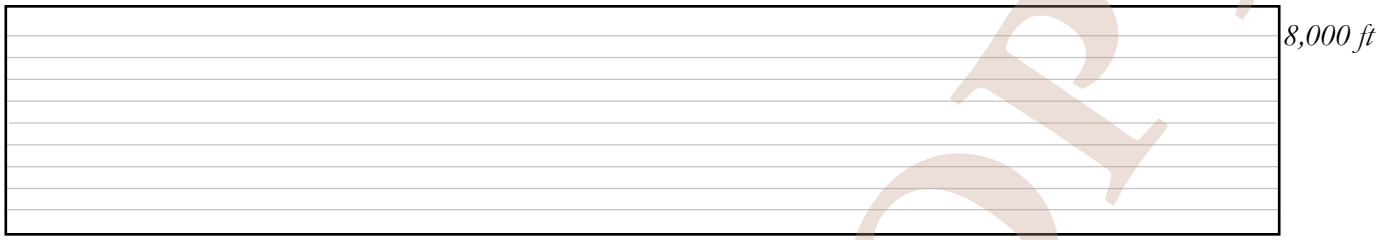
Part 2: Making a profile from a real 1983 USGS topographic map. Draw the 200 ft. intervals only.



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.



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?