## ES473 Environmental Geology Diagnostic Skills Assessment

ES473 includes a diverse group of WOU students from a variety of academic backgrounds across campus. To start things off, students are instructed to complete a low-stakes, no grade Diagnostic Skills Assessment for the instructor to get a snapshot of the group, and to help with designing the course for the term, the goal of which is to maximize student success.

The objectives of this exercise include:

- (1) A low-stake, no grade, pre-test assessment of existing student knowledge and skills related to a variety of topics associated with the class,
- (2) An evaluation of existing mathematical and algebraic problem solving skills, to assist the instructor with targeted skill development,
- (3) An evaluation of technology skills related to remote learning, including hardware / software operation, and basic remote facilities available for students to work independently away from campus laboratories.

Instructions:

- (1) Print out the diagnostic skills assessment.
- (2) Include your name and answer the questions and problems in the spaces provided below.
- (3) Scan your completed document, save as an Acrobat PDF file, and upload to Moodle using the appropriate assignment tool located in the Week 1 topic block.
- (4) Use the following file naming convention for your PDF file: lastname\_ES473\_Diagnostic.pdf

**NOTE:** you may use available "open-book" internet resources to solve the Part 1. quantitative style problems, but please avoid using the wide variety of internet search tools to answer the Part 2. knowledge-base questions. This assessment is ungraded, the goal is for the instructor to evaluate your current / existing knowledge base, so that I can properly scale the course in terms of content and background materials that I need to cover. The goal here is to get a snapshot of where you are at present, not to get the correct answer by internet searching. That is a valuable skill in some cases, but will not be helpful for me to properly design the class content and maximize student success for all participants. Give Part 2. an honest try, without searching online for answers.

## Part 1 Open Book – Quantitative Style Problem Solving. SHOW ALL OF YOUR MATH WORK.

1. A cylindrical sample of rock has a length of 20 cm and a diameter of 4.5 cm. The mass of the sample is 3500 g.

- A. Draw a sketch and show dimensions
- B. Determine the volume of the same in cubic centimeters and cubic meters. Show all of your math work.
- C. Given that the acceleration due to gravity  $g = 9.8 \text{ m}^3/\text{sec}$ , determine the unit weight of the rock mass in N/m<sup>3</sup>. (newtons per cubic meter). Show all of your math work.

2. A 25.6  $\text{m}^3$  block of rock has a porosity of 23.45%. What is the volume of ground water that could be stored in this rock material. Answer in cubic meters and gallons. Show all of your math work.

- 3. A rectangular shaped swimming pool has a surface area of 5000 square feet, and a uniform depth of 10 ft.
  - A. Draw a sketch with dimensions labeled.
  - B. Determine the total maximum volume of water stored in the swimming pool in cubic meters and gallons. Show all of your math work.
  - C. A pump has a flow rate of 5 gal/min, how long would it take to pump out all the water in the pool? Show all of your math work, answer in hours and minutes. (5 pts)

4. Examine the topographic map below, and answer the questions that follow. Show all of your math work, and answer in the slots provided to the left of the item letter.



## **Elevations in feet**

- \_\_\_\_\_A. What is the contour interval of the map?
- \_\_\_\_\_B. Which direction is stream "A" flowing, assume standard map orientation relative to north.
- C. If one inch on the map is equivalent to 2000 feet on the ground, determine the fractional scale of the map in standard ratio. Show all of your math work.
- \_\_\_\_\_ D. what is the elevation of point "Y" in feet
  - E. Using a protractor, determine the azimuth compass direction traveling from Pt. G to Pt. Y
- F. True or False: the topographic features labeled "D" are upland ridges. Explain your answer.
  - G. True or False: if you were standing at the circle inscribing the letter "C", you would be able to visually see Pt. "F" from your vantage point. Explain your answer.

Answer in the spaces to left of question no.

1. What is the major end product of the weathering process, at the modern Earth's surface? A. regolith B. leaching C. B horizon D. sandstone E. Sedimentary Rocks
2. Carbon dioxide dissolved in water reacts to from what substance, that is especially important for rock
weathering? A. sulfuric acid B. acid dioxide C. carbonic acid D. acidic water E. carbon dioxide can not dissolve in water, it's a gas (man)
3. If a map has a scale of 1:24000 then 5 inches on the map equals:A. 100 ftB. 100 MilesC. 24000 inchesD. 10,000 FtE. None
4. The Earth is estimated to be 3.9 billion years old. A. True B. False
5. Convergent tectonic margins are associated with subduction zones and development of a volcanic arc on top of the over-riding plate. A. True B. False
6. List the three ultimate driving forces of geologic processes.
7. How high will the level of water in wells drilled into an unconfined aquifer rise?A. 10 feet above the water tableC. 20 feet below the potentiometric surfaceB. level with the water tableD. to the surface of the EarthE. the well will be dry
8. You are floating in a raft on a river. At point A you are at 5373 feet elevation, at point B you are at 2457 feet elevation. The two points are separated by 3.6 miles. What is the gradient of the river between the two points in ft/ft? (hint: $1 \text{ mi} = 5280 \text{ ft}$ )
A. 810 B. 1023 C. 0.15 D. 0.789 E. None of the above
9. List the three types of plate tectonic boundaries.
10. Replenishment of infiltrated groundwater into an aquifer is termed
11. The measure of the ease with which water flows through and earth material is referred to as
12. True or False: the lower Willamette Valley was extensively glaciated 20,000 years ago.
13. True or False: a slump is a type of landslide that occurs on a curved failure surface.
14. True or False: anadromous salmonid fish spend the majority of their adult lives in mountain streams of the Pacific Northwest.
15. Which sedimentary rock is generally the best aquitard? A. sandstone B. shale C. dissolved limestone D. fractured siltstone E. All of the above