

2008 UAH REGIONAL SCIENCE OLYMPIAD

OCEANOGRAPHY

INSTRUCTIONS

WRITE YOUR GROUP NUMBER ON THE ANSWER SHEET NOW!

Write your answers ONLY on the answer sheet.

If you are writing more than what fits in the space you are given, you are either writing too large or writing too much.

High School groups: make sure you complete the additional five (5) questions on the last page.

For middle school groups, the test is worth 36 total points. For high school groups, the test is worth 57 total points.

The exam ends at 1 p.m. You may take the exam with you when you leave.

Our names are **Jessica** and **Cody**. Ask a question if you need to. Good luck!

Required words: "This event emphasizes the use of process skills to complete tasks related to physical oceanography." In the case of a tie, the following questions will be used, in order, to break the tie: 19, 12, 2, 11, 14. To appreciate the Earth's hydrosphere, students must understand basic geography, climatology, properties of water substance, and surface features and processes. A bit of all these will be tested on this exam.



**2008 UAH Regional Science Olympiad
OCEANOGRAPHY**

WRITE YOUR ANSWERS ON THE ANSWER SHEET.

You may take this exam with you when you leave; do not write your answers on it!

1. Water temperature is crucial to the ocean cycle. At what temperature do Fahrenheit and Celsius thermometers give the same reading? (1 point)

2. Which of these directly affect the density of ocean water? (1 point)
 - (a) pressure
 - (b) salinity
 - (c) temperature
 - (d) all of the above
 - (e) only temperature and salinity

3. Some of you may have traveled over the Tennessee River this morning. Which way does the river flow, *to the east* or *to the west*? How do you know? (1 point)

4. About what percentage of ocean water is salt (NaCl)? (1 point)

5. Daniel Gabriel Fahrenheit proposed his temperature scale in 1724. He estimated the boiling point of water at about 212°F. But how did he establish the temperature of 0°F? (2 points)

6. What is the distinguishing feature of an estuary? (2 points)

7. Where would you expect winds to blow faster, over land or ocean? Why? (2 points)

8. The greatest control on Earth's tides is the: (2 points)
- (a) Moon.
 - (b) Sun.
 - (c) seasons/time of year.
 - (d) rotation of Earth on its axis.
9. For this question, assume you are in the *Northern* Hemisphere. On the eastern shore of a continent, you should encounter a (northward, southward) ocean current; on the western shore of a continent, you should encounter a (northward, southward) ocean current. (2 points)
10. The hydrologic cycle is critically important to life on Earth. Identify three ways in which humans have influenced the hydrologic cycle. (3 points)
11. Why, after a "pipe freezes," is the result actually running water?! In other words, what property of *water* causes the pipe to explode? Be as specific as possible. (3 pts)
12. The Horse Latitudes, as legend has it, are named because ship captains had to throw horses overboard to reduce the weight of ships and conserve water on long journeys. Where are the Horse Latitudes, and what is the weather like there? (3 pts)
13. Explain how the Coriolis force relates to upwelling, and give two regional examples of their relationship in action. (4 pts)
14. You are out at sea, and it is noon (the sun is highest in the sky). You check your handy dandy chronometer to see what time it is in Greenwich, England. It is 5 p.m. there. What is your longitude? Explain how you got your answer. (4 pts)
15. Krakatau (1883) and Tambora (1815) are two of the great volcanic eruptions of recent record. What are the potential implications of volcanic activity on the ocean system? Make sure you use sound scientific reasoning in your answer. (5 pts)

**High School Groups: don't forget
Questions 16-20 on the next page!**

HIGH SCHOOL GROUPS ONLY

16. What produces dissolved oxygen in ocean salt water? (4 pts)

17. Suppose you have a 1.5 acre (65,536 sq. ft.) fish pond on your farm. You want to improve the looks of your pond and the habitat for your trout, so you plant a 1 square foot patch of pond lily. A year later you notice that the area of the pond lily has doubled. At this rate, how long will it be until the pond is covered with lily pads? (4 pts)

18. Briefly describe two methods of desalinization. (4 pts)

19. What percentage of the Earth's surface lies within the tropics (between 30°S and 30°N)? (4 pts)

20. Nitrogen input to farmland in the Mississippi River system has increased dramatically since 1950. An average of 1.6 million metric tons of nitrogen are pumped into the Gulf of Mexico each year. What impact do you think this might have on the ecosystem there? (5 pts)