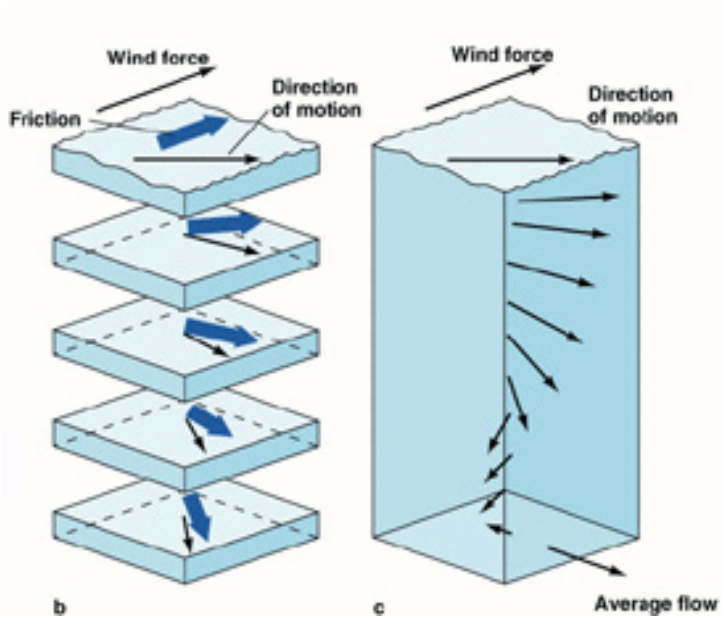
PENNSYLVANIA CENTRAL REGIONAL SCIENCE OLYMPIAD 2007

OCEANOGRAPHY C DIVISION

MARCH 31, 2007

STATE COLLEGE HIGH SCHOOL



SCHOOL NAME_____ **SCHOOL CODE**_____

INSTRUCTIONS

1. Turn in all exam materials at the end of this event. *Missing exam materials will result in immediate disqualification of the team in question*. There is an exam packet and a blank answer sheet.

2. You may separate the exam pages. Re-staple them as you submit your materials to the supervisor. Keep the answer sheet separate.

3. *Only* the answers provided on the answer page will be considered. Do not write outside the designated spaces for each answer.

4. Include school name and school code in the appropriate locations on the answer sheet as well as on the title page. Indicate the names of both participants at the bottom of the answer sheet. Write LEGIBLY, please.

5. Each question is worth one point. Tiebreaker questions are indicated as such with a "T" and a number indicating the first, second, third, etc. There are 6 tiebreaker questions. *Tiebreaker questions count toward the overall grade, and are only used as tiebreakers in the event of a tie.*

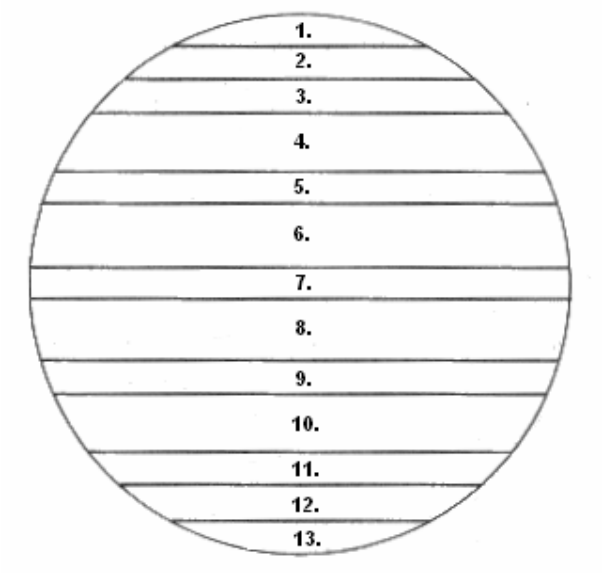
6. When the time is up, *the time is up*. Continuing to write after the time is up risks immediate disqualification.

7. NON-PROGRAMMABLE CALCULATORS ONLY. All resources must fit in the confines of an area no larger than 12" x 12" x 3" as per the Science Olympiad Student Manual.

8. Your 2-point bonus question is this: What does the diagram show on the cover page? Put your answer in the bonus box on the answer sheet.

9. Nonsensical, mocking, and/or inappropriate answers WILL RESULT IN IMMEDIATE DISQUALIFICATION.

Below is a diagram of the earth, divided into regions by approximate latitude. For each region indicated by a number, select the letter from the list that corresponds with the region. Specific letters can and will be used more than once. North is at the top of the image.



A. Equatorial low

B. Polar cap

C. Polar easterlies

D. Polar front

E. Horse latitudes

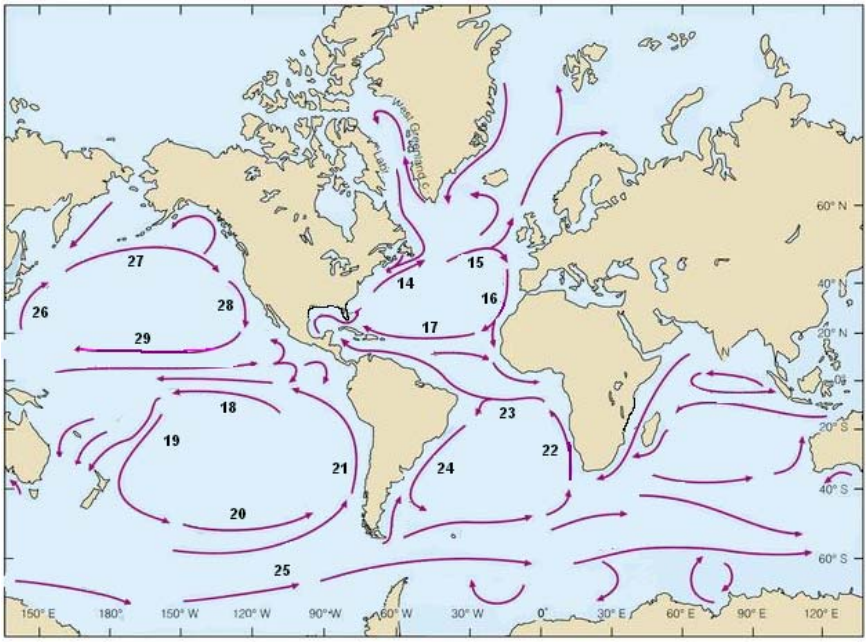
F. Prevailing northwesterlies

G. Prevailing southwesterlies

H. Southeast trade winds

I. Northeast trade winds

Below is a map showing major currents in the world ocean. Specific currents are indicated by numbers 14-29. Select the letter that corresponds with the current indicated on the map for each number. Specific letters may be used more than once, and some letters are not used at all.



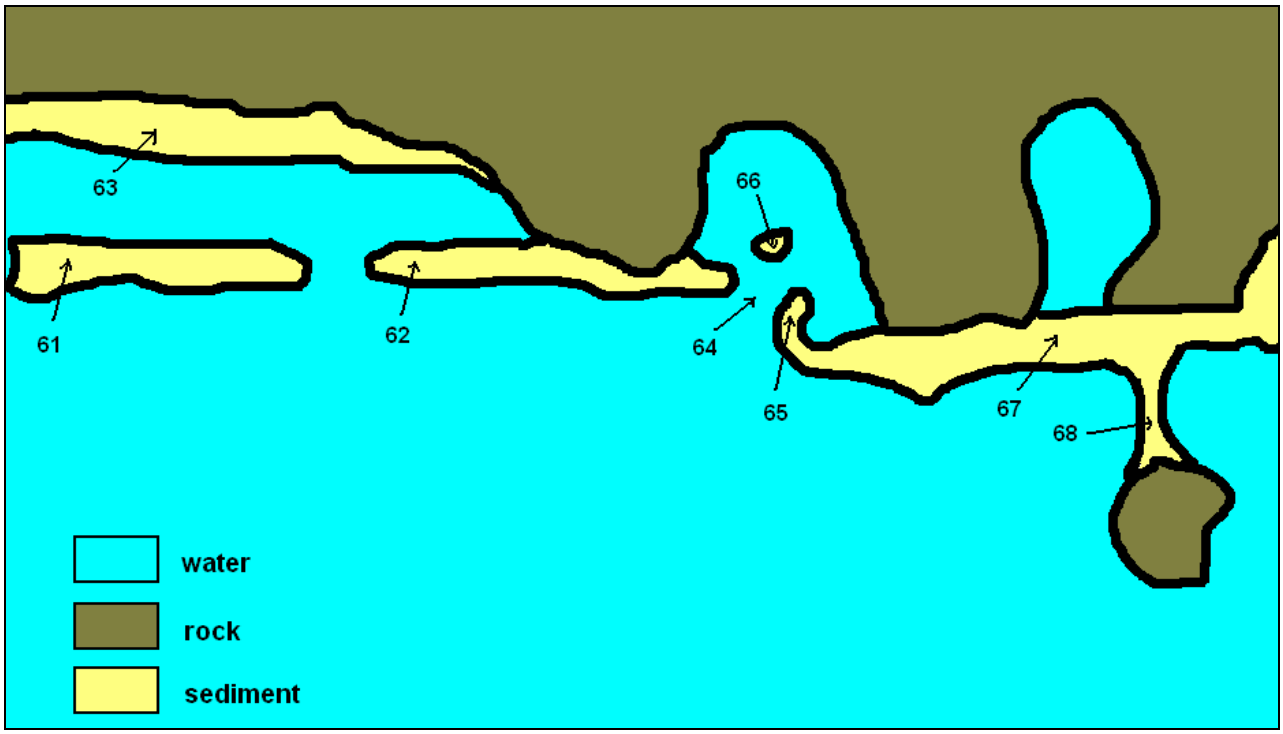
A. West Wind Drift
B. North Equatorial Current
C. South Equatorial Current
D. East Australia Current
E. West Australia Current
F. Labrador Current
G. California Current
H. Canary Current
I. Benguela Current
J. Guinea Current
K. Peru Current
L. Alaska Current
M. Kuroshio Current
N. Brazil Current
O. North Atlantic Current
P. North Pacific Current
Q. Gulf Stream
R. Aguinas Current
S. Falkland Current

30. (T1) What is the name for the roughly circular current made up of currents 14 through 17 on the map?

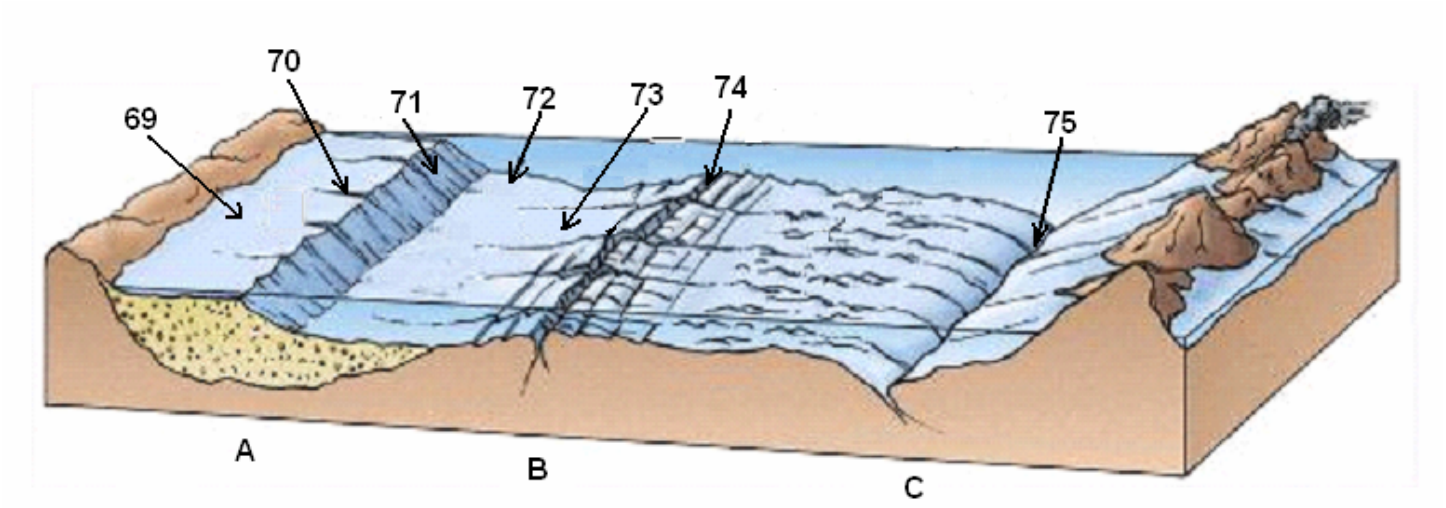
Supply the word or phrase that best represents the definition. Each is worth 1 point.

31. **Fine-grained, deep sea organic sediment**
32. **Flooded edge of the continent**
33. **This process rapidly transports large amounts of sediment from the shelf to the sea floor**
34. **Deepest part of the sea floor**
35. **Rock type that composes most of the ocean floor**
36. **Flat and largely featureless part of the ocean floor**
37. **Submerged, deeply eroded valley that extends across the continental shelf and continental slope**
38. **Flat-topped seamount**
39. **Areas of a coast that project seaward**
40. **Flooded river valley**
41. **(T4) Flooded glacial valley**
42. **Area over which a wave-generating wind blows**
43. **The complete set of ocean currents that flows in a circular path around an ocean basin**
44. **When deep water is pulled to the surface by offshore winds**
45. **(T6) Layer of water where density changes rapidly with depth**
46. **Layer of water where temperature changes rapidly with depth**
47. **Layer of water where salinity changes rapidly with depth**
48. **Part of the water column that is devoid of light**
49. **Smallest of all wind-generated waves**
50. **Small, relatively circular, turbulent current that can get separated from the main Western boundary current**
51. **Water confined in a relatively small basin that sloshes with a specific resonant frequency**
52. **Tsunami caused by undersea earthquakes**
53. **Deflection caused by earth's rotation**
54. **Movement of sediment along the coast, driven by wave action**
55. **(T5) A no-tide point in the ocean around which the tidal crest rotates**
56. **Tides formed when the moon, sun, and earth are arranged at right angles**
57. **A change in atmospheric pressure in the tropical Pacific that causes El Niño**
58. **Where the two Hadley cells converge**
59. **Volcanic projections from the seafloor that do not break the surface**
60. **A bridge of sediment that connects an island to the mainland**

Label the features shown and numbered on the diagram below. Each is worth 1 point.



Label the features seen below on the ocean cross-section. Each is worth 1 point.



For numbers 76 – 80, select one of the letters across the bottom of the image (A, B, or C).

76. Which letter is located near a divergent plate boundary?

77. Which letter is located near a convergent plate boundary?

78. Which letter is located near a subduction zone?

79. (T2) Which letter is located near a passive continental margin?

80. Which letter is located near the *youngest* oceanic crust in the diagram?

For numbers 81-90, select one of the following answers and write its associated letter on the answer sheet:

A) increases B) decreases C) remains the same

81. At constant temperature, as the salinity of seawater increases, density _____.

82. As depth of seawater increases, temperature _____.

83. As depth of seawater increases, salinity _____.

84. As a wave approaches the shoreline, its wavelength typically _____.

85. As water cools from 20°C to 4°C, its density _____.

86. As water cools from 4°C to 0°C, its density _____.

87. As a block of sea ice melts, its temperature _____.

88. From the equator, as latitude increases, the Coriolis deflection _____.

89. During a La Niña year, the surface water temperature in the equatorial Pacific _____.

90. During a Spring tide, the height of high tide _____.

91. Which of the following would NOT be associated with continental-oceanic plate convergence?

A) subduction B) island arc C) volcanic mountains D) trench E) ridge

92. Which of the following would NOT be associated with a passive continental margin?

A) depositional coasts B) large continental shelf C) trench D) continental rise E) sediments

93. Which of the following refers to the global, density-driven motion of the Earth's oceans?

A) Thermohaline Circulation B) Turbidity Current C) Ekman Spiral D) Longshore Current E) Rip Current

94. Which of the following would NOT cause a tsunami?

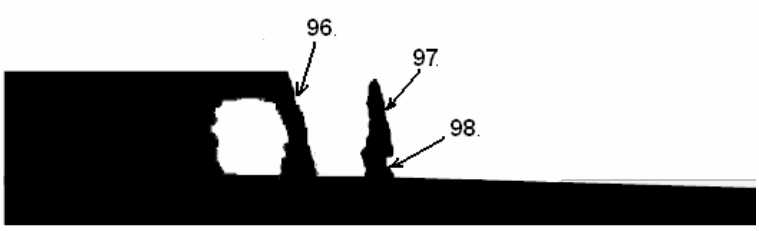
A) strong winds B) undersea earthquake C) landslide D) volcanic eruption E) huge meteorite

95. Place the following four stages in the proper sequential order.

1. volcanic island 2. barrier reef 3. atoll 4. fringing reef

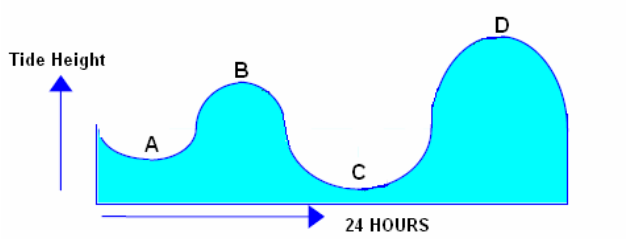
A) 1, 2, 3, 4 B) 1, 4, 2, 3 C) 1, 2, 4, 3 D) 3, 2, 4, 1 E) 4, 3, 2, 1

Identify the numbered features on the coastal area shown at right.



99. On the tidal diagram at right, which of the following represents an ebb tide?

A) A to B B) B to C C) C to D



100. (T3) What is the term for the difference between the heights of points B and D?