

OCEANOGRAPHY LABORATORY MIDTERM PRACTICE TEST

PLEASE DO NOT WRITE ON THIS TEST

Section I. True or False: Questions 1 through 10

Directions: Answer true or false to the following statements. Mark "a" for True and "b" for False.

1. Continental crust extends deeper into the mantle than does oceanic crust because continental crust is less dense than oceanic crust.

- a. True
- b. False

2. Long-term building upwards of a massive mountain chain will cause that part of the Earth's crust to develop a deep crustal root due to crustal thickening.

- a. True
- b. False

3. The units for soundings and isobath lines on a nautical chart are in minutes and degrees.

- a. True
- b. False

4. A "V"-shaped bathymetric contour pattern that points towards shallower water indicates a submarine canyon.

- a. True
- b. False

5. The outer ring of a compass rose gives you the magnetic bearing.

- a. True
- b. False

6. Lines of latitude run east-west and lines of longitude run north-south.

- a. True
- b. False

7. The *opposite* direction of an azimuth heading of 120 is an azimuth heading of 300.

- a. True
- b. False

8. Your corrected heading (bearing) for a leg with a current will point towards the down-current direction.

- a. True
- b. False

9. Two seawater samples that have two totally different salinities and temperatures can still have the identical densities.

- a. True
- b. False

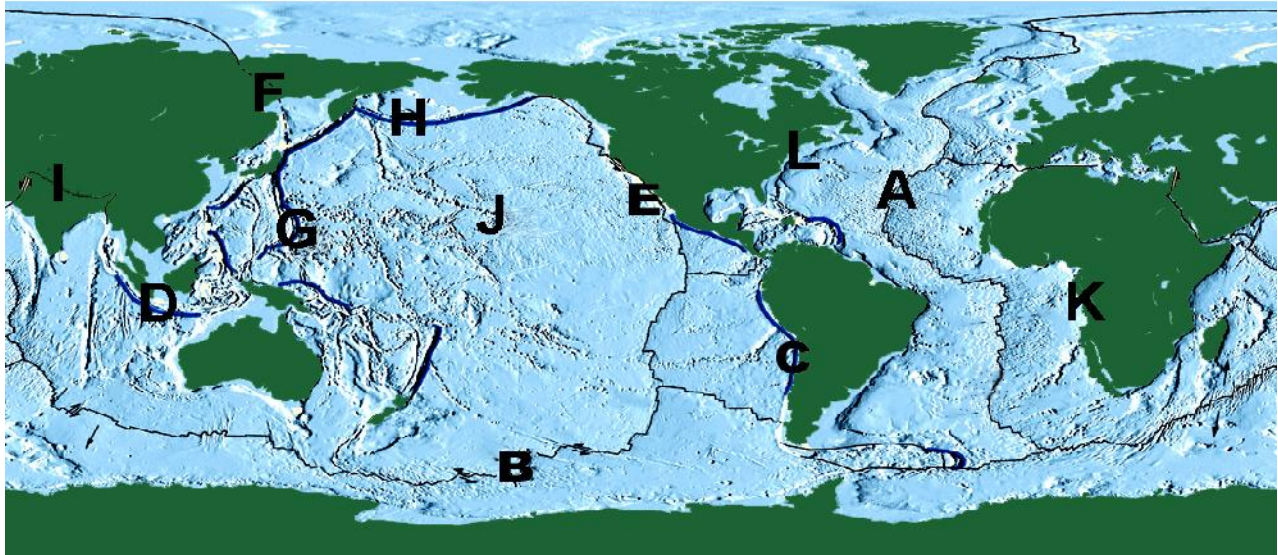
10. Conductivity in seawater decreases with increasing salinity.

- a. True
- b. False

Section II. PLATE TECTONICS AND THE SEAFLOOR

Matching: Questions 11 through 14. **Directions:** Match the **geographic location** (*Capital Letter*) with its associated **tectonic feature or setting** (*small case letter(s)*). **Note:** For answers with two letters, bubble in two letters on a single line as an answer.

- | | |
|--|--|
| a. Transform plate boundary | e. Hot spot volcanic center |
| b. Divergent plate boundary with oceanic seafloor spreading | a. + b. Convergent plate boundary with <i>oceanic-oceanic</i> subduction |
| c. Divergent plate boundary with continental rifting | b. + c. Convergent plate boundary with <i>oceanic-continental</i> subduction |
| d. Convergent plate boundary with <i>continent-continent</i> collision | c. + d. Passive margin |



- ___ 11. Tectonic setting for both localities "A" and "B"?
- ___ 12. Tectonic setting for both localities "C" and "D"?
- ___ 13. Tectonic setting for both localities "E" and "F"?
- ___ 14. Tectonic setting for locality "I"

Section III. ISOSTASY: *MODELING CRUSTAL BUOYANCY WITH THE MANTLE*

Multiple Choice: Questions 15 through 20. **Directions:** The following set of questions pertains to the wood blocks floating in the water bath. Use the principles of isostasy and the density of pure water to answer the questions below. *Identify the letter of choice that BEST completes the statement or answers the question.*

15. Wood block "R" has a mass of 360 grams and a volume of 600 cubic centimeters. What is the density of wood block "R"?

- a. 0.8 g/cm³
- b. 0.6 g/cm³
- c. 0.4 g/cm³
- d. 0.2 g/cm³

16. Wood block "O" has a thickness of 25 centimeters. When the wood block is floated in a tub of water, 15 centimeter of the block sits out of the water, 10 centimeters is submerged underwater. What is the density of wood block "O"?

- a. 0.8 g/cm³
- b. 0.6 g/cm³
- c. 0.4 g/cm³
- d. 0.2 g/cm³

17. Based on the calculated wood densities for Questions 15 and 16 above, if wood block “R” had the same thickness as wood block “O”, then wood block “R” would _____

- a. sit *higher* in the water than Block “O”,
- b. sit *lower* in the water than Block “O”,
- c. sit about the same in the water as Block “O”,.
- d. There is no way to tell which block would sit higher or lower in the water.

18. If wood block “O”’s thickness was only 10 centimeters thick instead of 25 centimeters thick, how would the thickness change affect the block’s density compared to that of the original thicker block?

- a. The thinner wood block would be less dense.
- b. The thinner wood block would be denser.
- c. The thinner wood block would still have the same density as the thicker block.

19. If a large, tall ice sheet builds up atop a continent, then the crust beneath the ice sheet would respond by _____.

- a. rising up out of the mantle
- b. sinking lower and extending deeper into the mantle
- c. just sitting there - neither rising nor sinking in the mantle.
- d. becoming denser.

20. If a massive, tall mountain range were to start eroding down rapidly, then the underlying continent would respond by _____.

- a. rising up out of the mantle
- b. sinking lower and extending deeper into the mantle
- c. just sitting there - neither rising nor sinking in the mantle.
- d. becoming denser.

Section IV. NAUTICAL CHART STATION: *GULF OF MIRACOSTA ISLAND MAP*

Multiple Choice: Questions 21 through 33. **Directions:** The following set of questions pertains to the nautical chart on your desk. Use the appropriate navigational tools provided to answer the questions below. *Identify the letter of choice that BEST completes the statement or answers the question.*

21. What is the map scale ratio?

- a. 1:24,000
- b. 1:100,000
- c. 1:234,270
- d. 1:1,000,000

22. One minute of longitude is equal to how many nautical miles of real ground distance?

- a. 1 nautical mile
- b. 2 nautical miles
- c. 3 nautical miles
- d. Hey, wait!! – it’s one minute of *latitude* to a nautical mile, *not longitude*!

23. One inch of map distance roughly equals how many nautical miles of real ground distance?

- a. Roughly 1.0 nautical mile
- b. Roughly 1.4 nautical miles
- c. Roughly 2.0 nautical miles
- d. Roughly 2.4 nautical miles

24. What is the magnetic declination for the region represented by this map?

- a. 10E
- b. 10W
- c. 15E
- d. 15 W
- e. Not shown on this map.

25. What is the geographic location name listed on the map with the following coordinates:

Lat: 37° 59' 45"N Long: 123° 1' 30"W? NOTE: This is **Location "A"** for use in later questions.

- a. Cordell Bank
- b. Double Point
- c. Rittenburg Bank
- d. West tip of Point Reyes
- e. Southern Middle MiraCosta Island

26. What are the latitude-longitude coordinates for western tip of northern MiraCosta Island? NOTE: This is **Location "B"**

for use in later questions.

- a. Latitude = 37° 37' 45"N Longitude = 123° 00' 00"W
- b. Latitude = 37° 47' 45"N Longitude = 123° 10' 00"W
- c. Latitude = 37° 57' 45"N Longitude = 123° 20' 00"W
- d. Latitude = 38° 37' 45"N Longitude = 122° 10' 00"W
- e. Latitude = 38° 47' 45"N Longitude = 122° 20' 00"W

27. What is the distance from Location "A" (Question 26) to Location "B" (Question 27)?

- a. 14 nautical miles
- b. 20 nautical miles
- c. 26 nautical miles
- d. 32 nautical miles
- e. 38 nautical miles

28. What is the water depth to the sea bottom at the location exactly half way between locations "A" and "B"? NOTE: Use the nearest sounding values

- a. Water depth between 0 and 50 fathoms
- b. Water depth between 51 and 150 fathoms
- c. Water depth between 151 and 250 fathoms
- d. Water depth between 251 and 500 fathoms
- e. Hey, wait. The soundings are in feet!

29. What is the azimuth magnetic heading (bearing) from Location "A" to Location "B"?

- a. 14
- b. 30
- c. 194
- d. 210
- e. 310

30. While travelling from Location "A" to Location "B" you encounter a strong current coming from the 300 direction (NW). How will this current generally affect your ship track and speed?

- a. Pushed off course towards the east and increased travel time.
- b. Pushed off course towards the west and increased travel time.
- c. Pushed off course towards the east and decreased travel time.
- d. Pushed off course towards the west and decreased travel time.

31. What is the azimuth magnetic heading (bearing) from Location "B" back to Location "A"?

- a. 14
- b. 30
- c. 194
- d. 210
- e. 310

32. You embark on a back-and-forth, 2-leg research cruise from Location "A" to Location "B", and then back to Location "A". Your ship averages a cruise speed of 7 knots. Which of the choices below is closest to the calculated travel time for the combined 2 legs?

- a. 1 hour
- b. 2 hours
- c. 3 hours
- d. 4 hours

33. What is the seafloor *slope bathymetry* at the halfway point between locations "A" and "B"?

- a. Gradually-sloped toward west.
- b. Steeply-sloped toward west.
- c. Gradually-sloped toward east.
- d. Steeply-sloped toward east.
- e. Perfectly tabletop flat.

Section V. MARINE SEDIMENT STATION: *UNKNOWN SAMPLES: "A", AND "B"*

Multiple Choice: Questions 34 through 42. **Directions:** Observe and analyze the three marine sediment samples (by eye with dish sample and under microscope). Answer the questions based on your observations. *Identify the letter of choice that BEST completes the statement or answers the question.*

34. What is the predominant composition of Sample "A"?

- a. Lithogenous
- b. Biogenous
- c. Hydrogenous
- d. Anthropogenic

35. What is percentage of dark mineral in Sample "A"? Note: Use the grain % chart to estimate.

- a. 70% or greater
- b. Somewhere between 40% and 60% (close to 50/50)
- c. 30% or less

36. What is the dominant mineral in Sample "A"? Note: Grains are hard, and do not fizz with acid.

- a. Carbonate (calcite)
- b. Clay
- c. Quartz
- d. Magnetite
- e. Halite

37. What is average grain size of Sample "A"? Note: Use the grain size chart to estimate grain size.

- a. Gravel-size (off chart)
- b. Sand-size
- c. Silt-size
- d. Clay-size(off chart)

38. Where did Sample "A" sediment material most likely originate? It's source material/region?

- a. Weathered granitic rock.
- b. Weathered volcanic basaltic rock.
- c. Material generated by hard-shelled, bottom-dwelling, shallow-water marine invertebrate organisms.
- d. Material generated by hard-shelled, planktonic, marine invertebrate micro-organisms.
- e. Inorganic precipitated directly from seawater.

39. What is the predominant composition of Sample "B"?

- a. Lithogenous
- b. Biogenous
- c. Hydrogenous
- d. Anthropogenic

40. What is the dominant mineral in Sample "B"? Note: Use your lab worksheet for reference.

- a. Carbonate (calcite)
- b. Clay
- c. Quartz
- d. Magnetite
- e. Halite

41. What is average grain size of Sample "B"? Note: Use the grain size chart to estimate grain size.

- a. Gravel-size (off chart)
- b. Sand-size
- c. Silt-size

42. Where did Sample “B” sediment material most likely originate? It's source material/region?

- a. Weathered granitic rock.
- b. Weathered volcanic basaltic rock.
- c. Material generated by hard-shelled, bottom-dwelling, shallow-water marine invertebrate organisms.
- d. Material generated by hard-shelled, planktonic, marine invertebrate micro-organisms.
- e. Inorganic precipitated directly from seawater.

Section VI. SEAWATER CHEMISTRY

43. What is the average salinity of seawater in the world ocean?

- a. Close to 41 ‰
- b. Close to 38 ‰
- c. Close to 35 ‰
- d. Close to 32 ‰
- e. Close to 30 ‰

44. What are the two main variables that control the density of seawater?

- a. Conductivity and pressure
- b. Pressure and salinity
- c. Salinity and conductivity
- d. Temperature and salinity

45. As water salinity decreases, conductivity will _____.

- a. increase
- b. decrease
- c. not be affected

VII. SEAWATER SALINITY STATION: UNKNOWN SAMPLES: “X” AND “Y”

Multiple Choice: Questions 46 and 47. **Directions:** Measure the salinity of Sample “X” using the **conductivity method**. Measure the salinity of Sample “Y” using the **refractometry method**. Answer the questions based on your observations. *Identify the letter of choice that BEST completes the statement or answers the question.* **Note:** For sample “X”, make sure that you read the temperature of the sample in order to use the C-T-S chart.

46. What is the salinity of seawater Sample “X”? Use the conductivity meter, thermometer, and Conductivity-Temperature-Salinity Chart to find the salinity.

- a. 40 ‰ or greater
- b. Closest to 38 ‰
- c. Closest to 36 ‰
- d. Closest to 34 ‰
- e. Closest to 32 ‰
- a+ b 30 ‰ or less

47. Using the refractometry method, what is the salinity of seawater Sample “Y”? Use the hand-held refractometer to find the salinity.

- a. 40 ‰ or greater
- b. Closest to 38 ‰
- c. Closest to 36 ‰
- d. Closest to 34 ‰
- e. Closest to 32 ‰
- a+ b 30 ‰ or less

Section VII. SEAWATER DISSOLVED OXYGEN ANALYSIS

Multiple Choice: Questions 48 through 50. **Directions:** Pretend that today you just "fixed" and titrated both a freshly-gathered seawater sample from the local harbor and a standard calibration sample, using the titration method - just like you did in the seawater lab. Below is your recorded data. Answer the following questions based on your calculations and analysis of the given data, using the information in your lab worksheet. *Identify the letter of choice that BEST completes the statement or answers the question.*

Recorded Data:

Temperature of the Standardization Calibration Sample at time of sample fixing: 19°

Average amount of thiosulfate titrant used for titrating the standard calibration sample: 16 mL

Amount of thiosulfate titrant used for titrating the unknown sample: 7 mL

FORMULA: Unknown sample O₂ (mL/L) =

$$\frac{[\text{theoretical saturation O}_2] \times [\text{ml thiosulfate used for unknown sample}]}{[\text{average ml thiosulfate used for calibration sample}]}$$

48. What is theoretical amount of dissolved oxygen in the standardization sample?

- a. 3.61 mL/L
- b. 4.75 mL/L
- c. 6.1 mL/L
- d. 7.6 mL/L
- e. 8.3 mL/L

49. Considering the general range of dissolved oxygen seen in various seawater samples taken from harbors worldwide, how would you evaluate this harbor sample's dissolved oxygen level?

- a. My harbor sample has a relatively high dissolved oxygen content – very well-mixed, healthy conditions!
- b. My harbor sample has a relatively moderate dissolved oxygen content – an "OK" situation
- c. My harbor sample has a relatively low dissolved oxygen content – fairly stagnant, not too healthy conditions.
- d. My harbor sample has a relatively very low dissolved oxygen content – very stagnant, unhealthy conditions.

50. How do changes in temperature and pressure affect seawater's ability to hold oxygen?

- a. More oxygen in seawater with decreasing temperature and decreasing pressure
- b. Less oxygen in seawater with decreasing temperature and decreasing pressure
- c. More oxygen in seawater with decreasing temperature and increasing pressure
- d. More oxygen in seawater with increasing temperature and increasing pressure
- e. Less oxygen in seawater with increasing temperature and increasing pressure

END of TEST :)