



Tides Subject Review

The following questions are based on information from the Tutorial on Tides and Water Levels (http://oceanservice.noaa.gov/education/kits/tides/tides01_intro.html). As you read through the Tutorial, answer the questions that correspond to each section of the tutorial.

What are Tides?

1. What is a basic definition of a tide? Where do tidal waves originate, and where do they end?
2. What is a high tide? What is a low tide?
3. What is tidal range? What is a tidal current?
4. Compare and contrast a flood and ebb current. When are they strong? When are they weak?
5. How do tidal currents perform in the open ocean? How do they perform near the entrances to estuaries?

What Causes Tides?

6. Tides are caused by the gravitational attraction of what two celestial bodies?
7. What does Newton's law of universal gravitational state?
8. Which parameter has a greater effect on tidal forces on Earth?
9. Which celestial body has a greater effect on tidal forces on Earth? How is this possible? Compare and contrast the masses and distance of the Earth to the moon and sun.

Gravity, Inertia, and the Two Bulges

10. What is inertia?
11. How does the moon create a bulge?
12. What causes a bulge to be created on the opposite side of the Earth or the "far side" from the moon?

Changing Angles and Changing Tides

13. Describe how changes in the relative positions of the moon and sun change in relation to the Earth?
14. At what point is the sun at its minimum declination and its maximum declination?

Frequency of Tides - The Lunar Day

15. Compare and contrast a solar and lunar day. How long is a lunar day?
16. Why do most coastal areas experience two high tides and two low tides?
17. How long does it take for high tide to occur? How long is the time between low and high tide?

Tidal Variations - The Influence of Position and Distance

18. What is the magnitude of solar tides and how are they expressed?
19. What causes spring tides? What causes neap tides? How many spring and neap tides occur in a lunar month?
20. How are tide-generating forces affected when the moon is closest to the Earth (or perigee)? when the moon is farthest away from the Earth (or apogee)? How does this affect the tides that are produced?
21. How are tide generating forces affected when the Earth is closest to the sun (or perihelion)? when the Earth is farthest from the sun (or aphelion)? How does this affect the tides that are produced?

Types and Causes of Tidal Cycles: Diurnal, Semidiurnal, Mixed Semidiurnal; Continental Interference

22. If the Earth were perfect, how many high and low tides would all points on the earth experience in one day? What causes tidal patterns to change? Why is the water unable to move freely?
23. Describe a semidiurnal tide. How do the tidal heights compare in a lunar day? Where might you experience a semidiurnal tide in the continental United States?
24. Describe a mixed semidiurnal tide. How do the tidal heights compare? Where might you experience a mixed semidiurnal tide in the continental United States?
25. Describe a diurnal tide. Where might you experience a diurnal tide?

What Affects Tides in Addition to the Sun and Moon?

26. How are the magnitudes of tides affected by shorelines? by mid-ocean islands?
27. How does a funnel-shaped bay compare to a narrow inlet and shallow water?

28. What is the affect of strong tidal rivers on tides in estuaries?
29. What other abiotic factors affect tides? Compare and contrast wind and weather patterns that affect tides.

The Importance of Monitoring the Tides and Their Currents

30. Explain why commercial fisherman would be interested in tidal shifts. How do tides affect their livelihood?
31. Explain the importance of monitoring tides to maneuver sailing ships. How are today's ships different from old sailing ships?
32. Explain why coastal engineers are required to monitor tides. How do tides affect their planning?
33. Describe why scientists would be interested in monitoring tides? What could an ecologist learn from tides? an oceanographer? an atmospheric scientist?

How are Tides Measured? - The Old System

34. What United States governmental agency is responsible for monitoring tides in the United States? How long have they been monitoring tides?
35. Describe the function and process of a "stilling" well.
36. Before computers, how was water level data recorded? How was the data processed? (Click on the images in the tutorial for further explanation.)
37. How did processing water level data change in the 1960s?
38. What were the limitations of measuring water level using "stilling" wells, pen and ink strip charts and mechanical punch recorders?

How are Tides Measured? - The New System

39. How has microprocessor based technologies improved water level monitoring today?
40. How do today's monitoring stations used acoustics and electronics to function?
41. What other oceanographic and meteorological parameters are measured by the new stations?
42. How are geostationary operational environmental satellites used in conjunction with monitoring stations? How often are the data recorded? How often are the data transmitted?
43. In the event of storms or foul weather, how can the stations be monitored?