

## GEOL 103 Writing Assignment 7: Coastal Processes

Name \_\_\_\_\_ Lab section: Monday or Tuesday (circle one)  
 To be counted, must be turned in by Friday November 22.

1) Label the sketch below with:  
 wavelength                      wave height (amplitude)                      crest                      trough

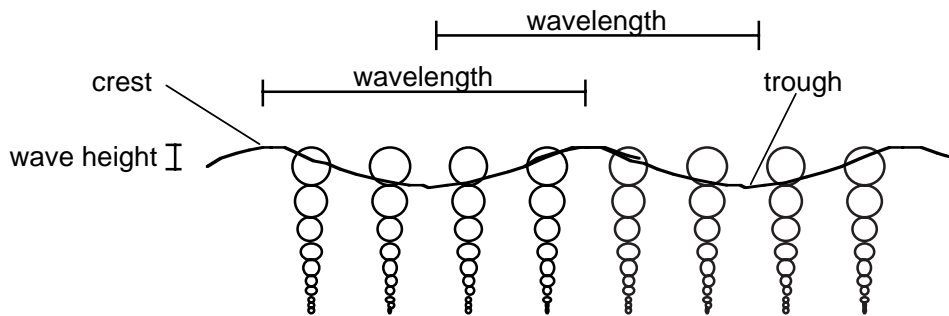
Explain the orbits.

**Orbits show the circular motion of water particles as a wave passes. The water particles themselves do not move in the direction of the wave.**

What happens to orbits when they encounter a shallowing sea floor near a beach?

**Orbits flatten out, especially near the sea floor, as they interact with the bottom. Eventually the wave becomes unstable and forms a breaking wave in the surf zone.**

What happens to orbits during a storm? **Orbits reach deeper, disturbing sediment on the sea floor that is not disturbed during normal conditions. Storm wave base is deeper than normal wave base.**



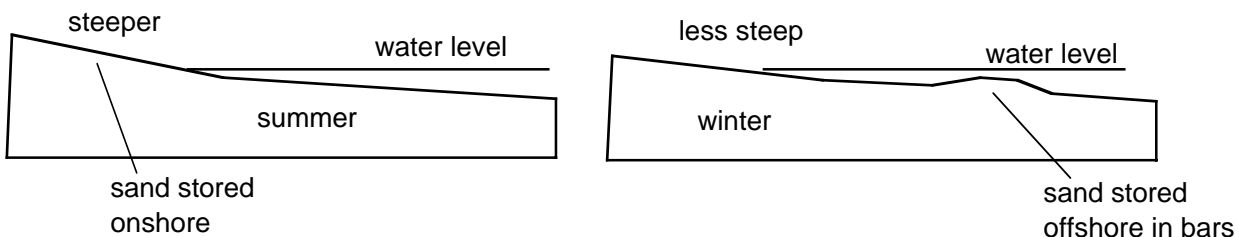
2) What is fetch, as applied to waves? Why do the Great Lakes have noticeable waves, but smaller lakes do not?  
**Distance wind blows across a body of water. The greater the fetch, the greater the wave height. The Great Lakes are large enough to have wind blow across them for a long distance, causing larger waves than smaller lakes.**

3) What happens to wave height, length, and velocity as they approach shore? Why do waves bend as they approach shore?

Height increases. Length and velocity decreases.

**Wave bend because they 1) usually approach beaches at an angle, and the part of the wave nearest shore slows down more than parts farther offshore due to interaction with the bottom.**

4) Sketch a) a summer beach, and b) a winter beach. What happens to beach sand during the winter and why? What happens to beach sand in summer and why?



**Small summer waves push sand onto the beach, storing sand in a steeper beach front. Larger winter storm waves pull sand offshore, storing it in sandbars.**

5) Explain where and why longshore current (movement of water) occurs. What does longshore current cause beach sand to do?

**Waves usually strike the shore at an angle because they are generated by storm winds at sea, and the storm winds are rarely perpendicular to the shore. Thus the waves generate a longshore current which cause longshore transport of sand up or down the beach. The net transport of sand is in the direction of the longshore current.**

6) How do humans interfere with longshore transport? What are some results of this interference?

**Groins (perpendicular to shore) cause up-current deposition and down-erosion around beaches. Jetties (located at inlets; perpendicular to shore) cause the same effect. Breakwaters prevent waves from reaching shore, slowing longshore current and causing deposition of sand between beach and breakwater.**

7) What evidence is there that North Carolina barrier islands have migrated inland for several thousand years? What is the reason for this migration?

**Old sound-dwelling oysters (they need protected environment) and organic-rich salt marsh sediment are found on the beach fronts of barrier islands. The islands migrated landward due to rising sea levels following the retreat of Pleistocene glaciation.**

8) What allowed for relative stabilization of North Carolina barrier islands? Why will these islands continue to migrate inland in the near future?

**The post- Pleistocene sea level rise slowed, allowing islands to become vegetated, which stabilized them.**

9) What is "hard stabilization" of beaches? What is the end result of hard stabilization of beaches?

**Use of rock, metal, or wooden bulkheads to attempt to prevent beach erosion. As sea level slowly rises, sand is lost from the recreational beach, being transported offshore. The recreational beach get narrow and may be underwater at high tides. Houses may be protected, but the beach is lost.**

10) What is beach replenishment? Why is beach replenishment not a long-term solution to coastline retreat?

**Adding sand to the beach. Replenishment projects are very costly, and they only last an average of two to four years. It will be harder to keep pace with rising sea level due to global warming and melting of glaciers.**

11) How are beach groins constructed? Why does construction of one tend to cause construction of additional groins?

**see #6**

12) Why would even a two-foot sea level increase change some coastlines dramatically?

**The gradient of the land near the the coast is very low.**

13) Why do the sun and moon influence tides? What are spring and neap tides? Why do they result? Why can hurricanes cause greater damage if they occur during a spring tide?

Gravitational attraction between the sun and earth and moon and earth cause the oceans to bulge the side of greatest attraction. As the earth rotates on its axis, the bulge appears to move. Spring tides are very high tides due to the constructive interference of the sun/earth and moon/earth attraction. Neap tides are very low tides due to the destructive interference of the sun/earth and moon/earth attraction. Spring tides allow storm waves to reach farther onto the shore, causing greater damage.