

Oceans 11 (1) - Structure and Motion - Part II Test Outline

Format: Total (pts)

Section 1: Definitions (pts)

Section 2: Multiple Choice & True/False (pts)

Section 3: Visuals (pts)

Section 4: Short Answer (pts)

1) Properties of Water & Ocean Facts

- Two thirds of the Earth's landmasses are north of the equator (southern hemisphere - the "ocean" hemisphere).
- Over half of the world's oxygen supply is made in the ocean
- 90% of life in the seas lives in the upper 30 metres of the ocean
- Water Properties
 - High specific heat capacity
 - Universal Solvent
 - Expands when it freezes
 - Flows very easily
 - Freezes from the top down
 - High freezing point and boiling point

2) Salinity

- the amount of dissolved solids in the water
- factors affecting salinity
 - temperature, evaporation, freezing, melting, precipitation
- freshwater, brackish water, seawater, brine water (increasing salinity levels)
- reverse osmosis - common method of desalinating water
- salt lowers freezing point of water (salt on winter roads in the winter)
- where the salt comes from
 - weathering of rocks on land
 - volcanic gases

- halocline - the zone of the ocean in which salinity increases rapidly with depth

3) Ocean Currents

- circulate earth's moisture, weather, nutrients, and water pollution

- **Surface currents (horizontal)** - affect 10% of ocean water

- wind driven

- clockwise (N. Hemisphere)

- Factors: Uneven heating of atmosphere, Coriolis effect (rotation of the earth) - deflects currents to the right in N.Hemisphere, Continents

- Importance: mixing of oceans, move nutrients, method of transport for less active organisms

- **Thermohaline currents (vertical)** - affects 90% of ocean water

- driven by temperature, salinity (density)

- known as the ocean's conveyor belt

- Importance: upwelling of nutrients (most common along coastlines where strong winds blow offshore) ex: California coast

- **Gyres** - large current loops driven by surface winds and deflected by continents

- **El Nino** - a phenomenon where waters off the western coast of South America become warmer than usually and as a result have a negative impact on the marine wildlife in the area, and creates more weather extremes across different parts of the world. (La Nina has the opposite effect)

4) Waves

- transfer of energy through a material (water particles do not move with energy, but rather move back and forth in an orbital pattern like a wave at a baseball game)

- Progressive waves

- traveling somewhere

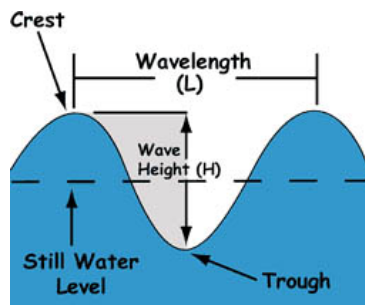
- Causes: wind, sudden events (earthquakes)

- Standing waves

- become trapped in a bay or basin

- cause increase in the amplitude of a wave

$$\text{Speed} = \text{Wavelength} / \text{Period}$$



amplitude: half of wave height

frequency: the number of wave lengths passing by a point during a given time

period: the amount of time for one wavelength to pass

wave speed: measures how quickly a wave moves

Swell - are rolling waves that usually move in groups outward from a storm's center

Rogue wave - a very large wave which seems to appear out of nowhere (out to sea - very noticeably unlike a tsunami wave)

Causes of Large Waves

- High wind speed
- One direction winds
- Large fetch (winds moving over a large area)

Breaking Waves (lose their shape and speed due to decreasing depth, wavelength decreases and gets taller - becomes unstable, and then breaks)

1) Spilling Waves (most common)

- flat beach slope
- roll in evenly over long distances

2) Plunging Waves

- steep beach slope
- crest curls, forms tunnel (surfer waves)

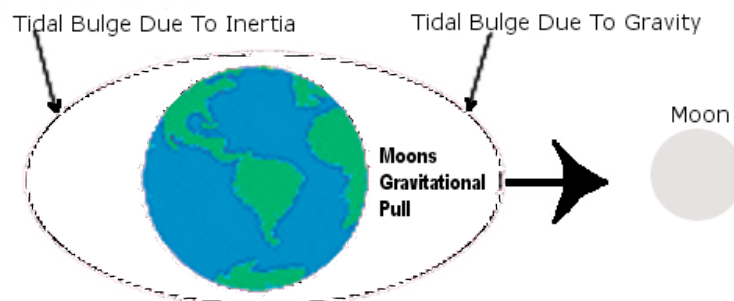
3) Surging Waves

- very steep beach slope
- do not break
- known for erosive nature

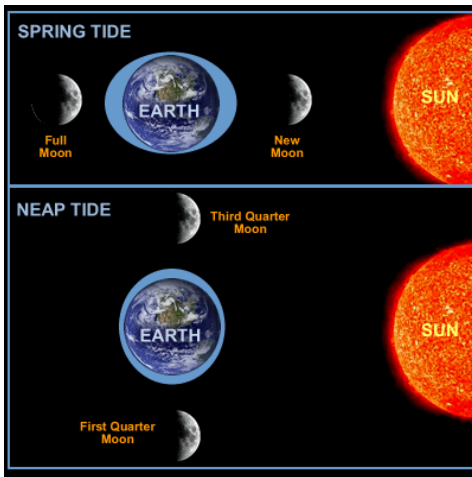
5) Tides

- the alternate rising and falling of the water level occurring at regular intervals which are slightly more than 12 hours apart. (caused by moon's orbital position)

- the earth and moon are in perfect balance with respect to each other's orbital path



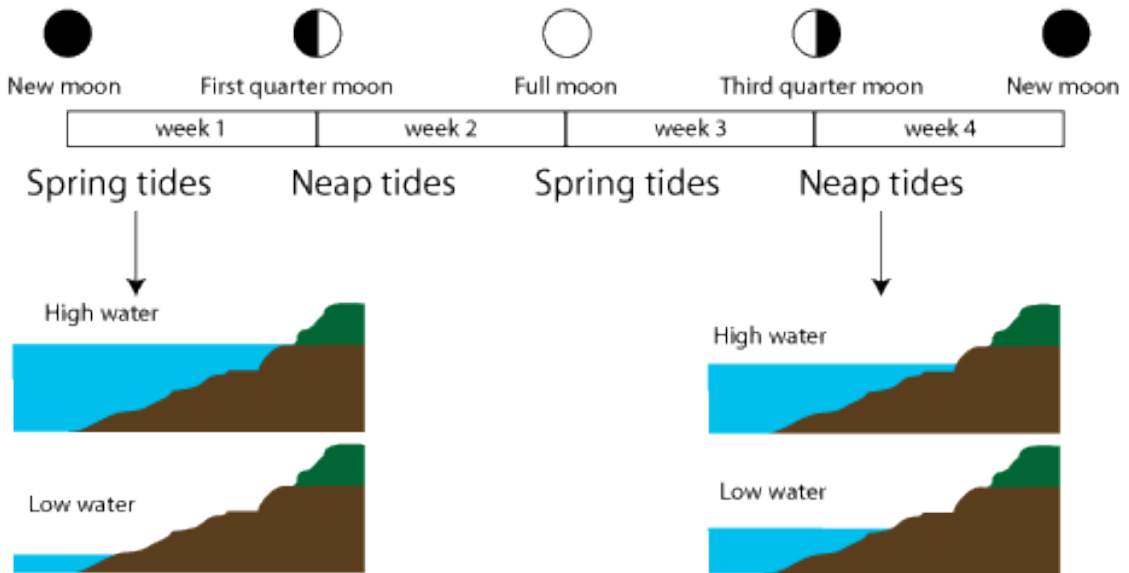
- **tidal range**: the difference in water level between high and low tides



Large Tidal Ranges
 (Sun and moon working together)
 - New Moon and Full Moon

Small Tidal Ranges
 (Sun and moon working against each other)
 - Quarter Moon phases

Figure 4



Factors affecting height of tides

- phase of moon, distance from moon, position of moon and sun, continental shelf, size and shape of the ocean basin, configuration of coastline

The Bay of Fundy - highest tides in the world (size and shape of ocean basin, configuration of coastline)

Apogee - time of the month when the moon is furthest away from the Earth

Perigee - time of the month when the moon is closest to the Earth