    - Deep-water waves - depth greater than half the wavelength. Speed of deep-water waves depends on their wavelength. longer the wave, the faster it goes
    - shallow-water waves - depth less that half wave length. For shallow-water waves, the ocean bottom interferes with circular orbital motion, flattening them; the wave begins to "feel bottom". The speed of shallow-water waves is influenced only by gravity and water depth. Since gravitational acceleration is constant, the formula for wave speed (in meters per second) is now 3.13x(sqrt. of water depth)
- Wind blowing over the ocean generates wind waves
    - Capillary waves (ripples) are almost always present
    - They form as wind creates pressure and stress, deforming the ocean surface
    - Capillary waves become gravity waves when wavelength exceeds about 2 centimeters
    - Gravity waves (wind waves) continue to grow as long as the wind above them exceeds their speed
    - Wind waves continue to grow until they reach an equilibrium condition, called "fully developed sea" (depends on wind speed)
- The size of wind waves depends on fetch, wind speed, and duration
    - ***fetch*** is the uninterrupted distance over which the wind blows without significant change in direction
    - A strong wind must blow continuously in one direction for nearly three days for the largest waves to develop fully
- Wave dispersion: waves with longest wavelength move the fastest and leave the area of wave formation first (waves are being sorted according to speed)
- Swell: smooth, undulating homogenous waves caused by wave dispersion
- Swell can come ashore with no wind, as waves propagate outside of the area where they formed
- Interference patterns: when swells from different storms come together, the waves interfere with each other leading to complex patterns
- Observed wave patterns are usually the results of mixed interference of many different overlapping wave sets
- When do waves break?
    - When the ratio of wave height:wavelength is greater than 1:7, the wave will break
    - Whitecaps are a way to dissipate excess wind energy as turbulence
- Physical changes of a wave in the surf zone
    - As wave feels bottom, water movement at base of wave is retarded
    - As wavelength shortens, wave height increases to conserve mass
    - Wave breaks when height:length ratio exceeds 1:7
- Tsunami (harbor wave)
    - Tsunami are long-wavelength, shallow water progressive waves caused by rapid displacement of seawater
    - Most often this displacement is due to sudden *vertical* movement of underwater faults that change the volume of the ocean basin, affecting the entire water column to create ***seismic sea waves***
    - All seismic sea waves are tsunami, but not all tsunami are seismic sea waves
    - Landslides, calving icebergs, underwater volcanic eruptions, or meteorite impacts can also create tsunami
    - Wind waves come and go without flooding higher areas
    - Tsunami run quickly over land as a wall of water
    - Long wavelengths, typically exceed 200 kilometers (125 miles)
    - Therefore, tsunami are shallow-water waves and always "feel bottom"