

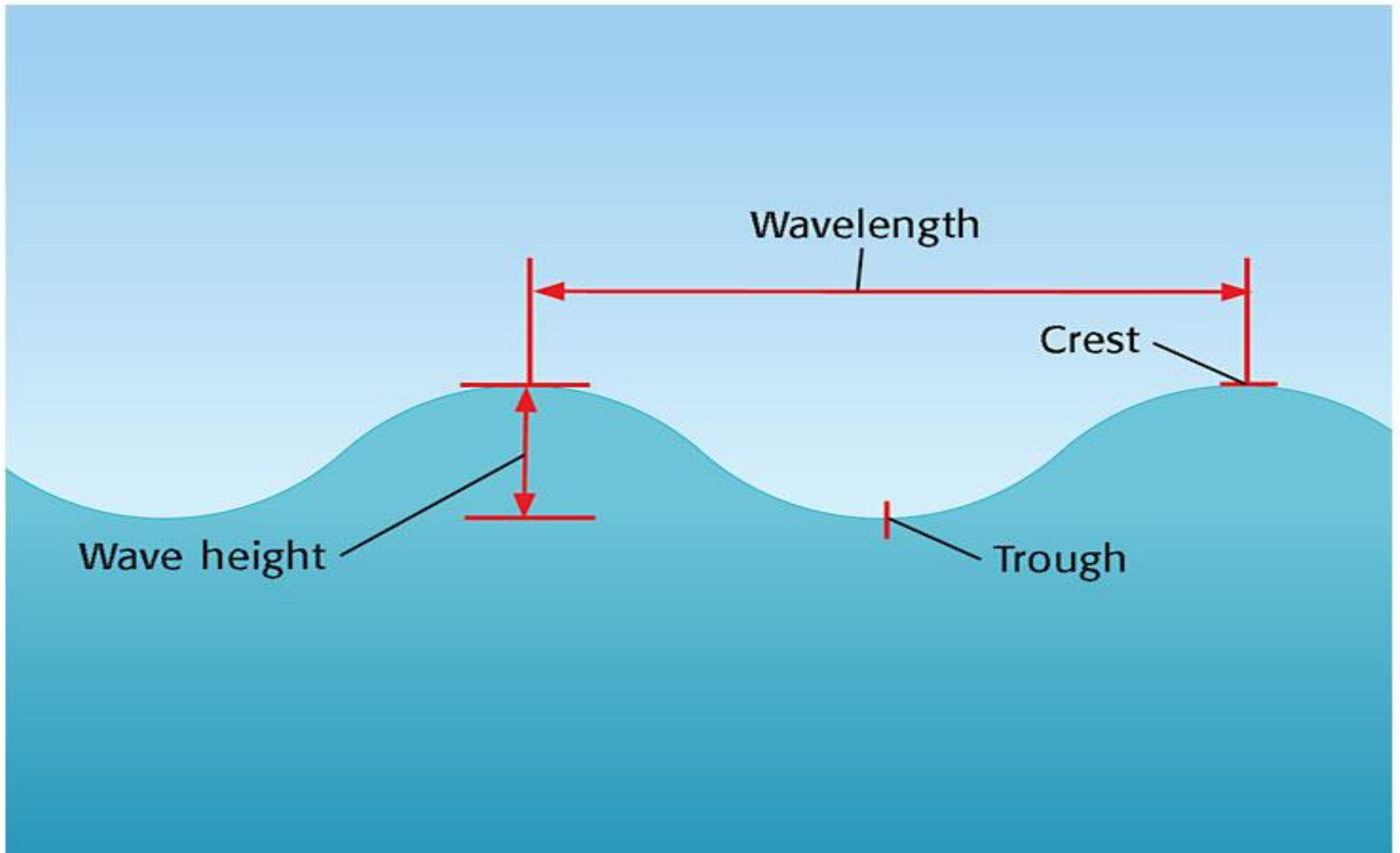
Ch 14, sections 3-4

Waves and Tides

Waves

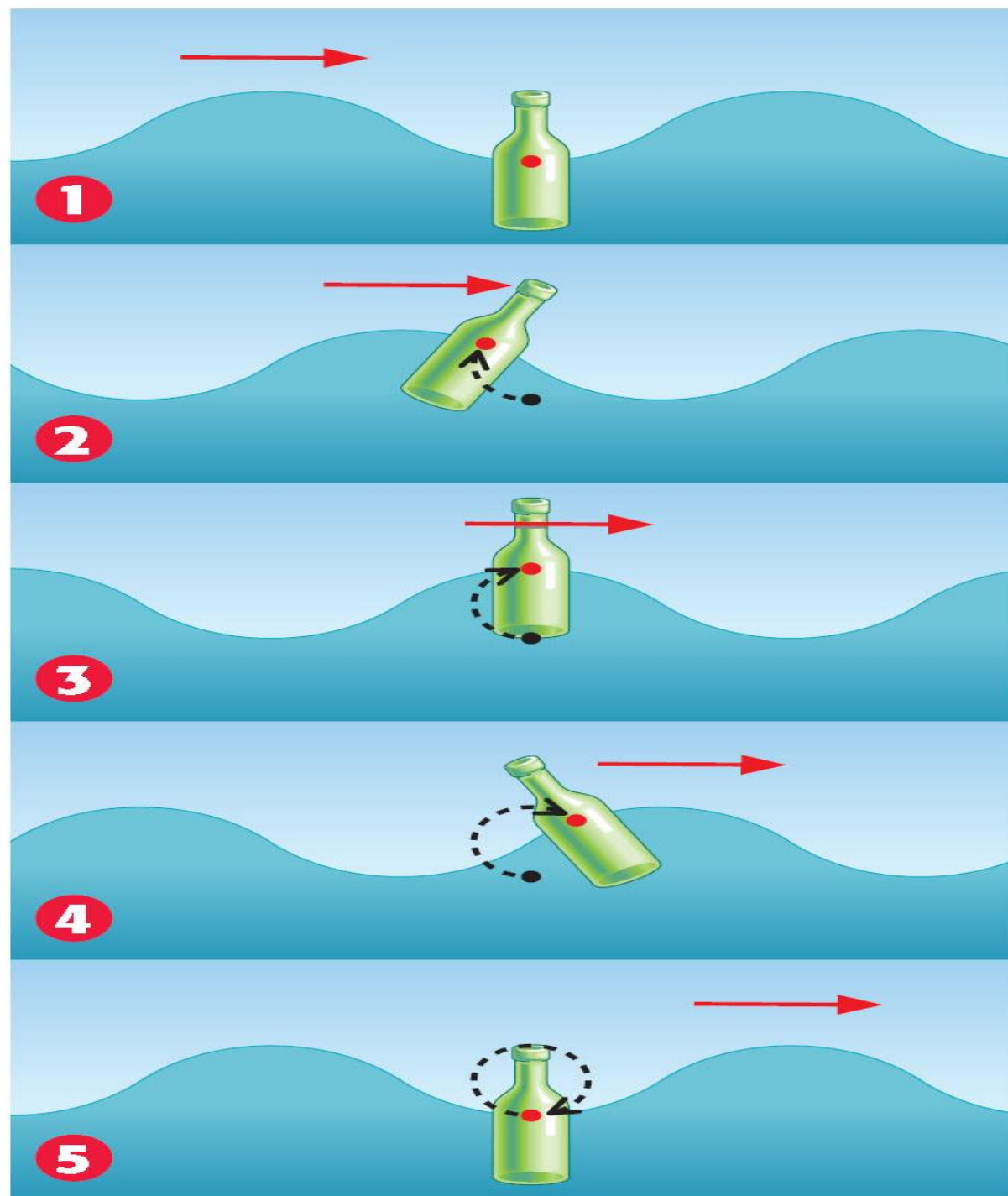
- most caused by **WINDS**
- but can also be caused by earthquakes or landslides
- wave size depends on
 - 1. wind speed
 - 2. length of time the wind blows
 - 3. the distance over which the wind blows

Parts of a Wave



Wave movement

- energy moves forward
- But water molecules move in a **small circle**



A wave will get bigger (higher) when the distance over which the wind blows over the sea

- A. increases (blows over a longer distance).
- B. decreases (blows over a shorter distance).
- C. stays the same.
- D. is 0 kilometers (the wind does not blow).

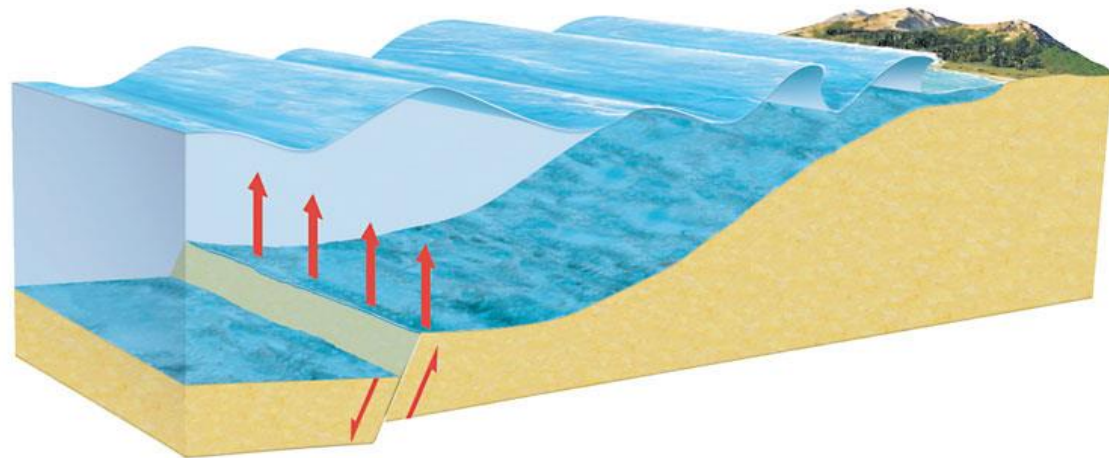
- Wave motion (animated website)

AC: Wave Speed (in m/s)

- Wave period (sec)—**time** it takes for the next wave to pass
- Wave speed= $\frac{\text{wavelength (m)}}{\text{wave period (s)}}$

Tsunami (NOT tidal wave!)

- GIANT WAVE----Japanese for “harbor wave”
- caused by **underwater earthquakes** (6.5 or above on the Richter Scale), volcanoes, landslides, underwater explosions, or even the impact of a meteor or comet
- most occur in the Pacific ocean (more earthquakes)
- moves at about 500 km/h



- **On a clear day, a tsunami suddenly hits the beach of an island in the South Pacific. What was the likely cause of the wave?**
 - **A.**offshore hurricane
 - **B.**undersea earthquake
 - **C.**continental deflection
 - **D.**wind in the open ocean

Name 5 things that can cause a tsunami...

- Underwater earthquake
- Underwater volcanic eruption
- Underwater landslide
- Underwater explosion
- Impact of a meteorite or comet

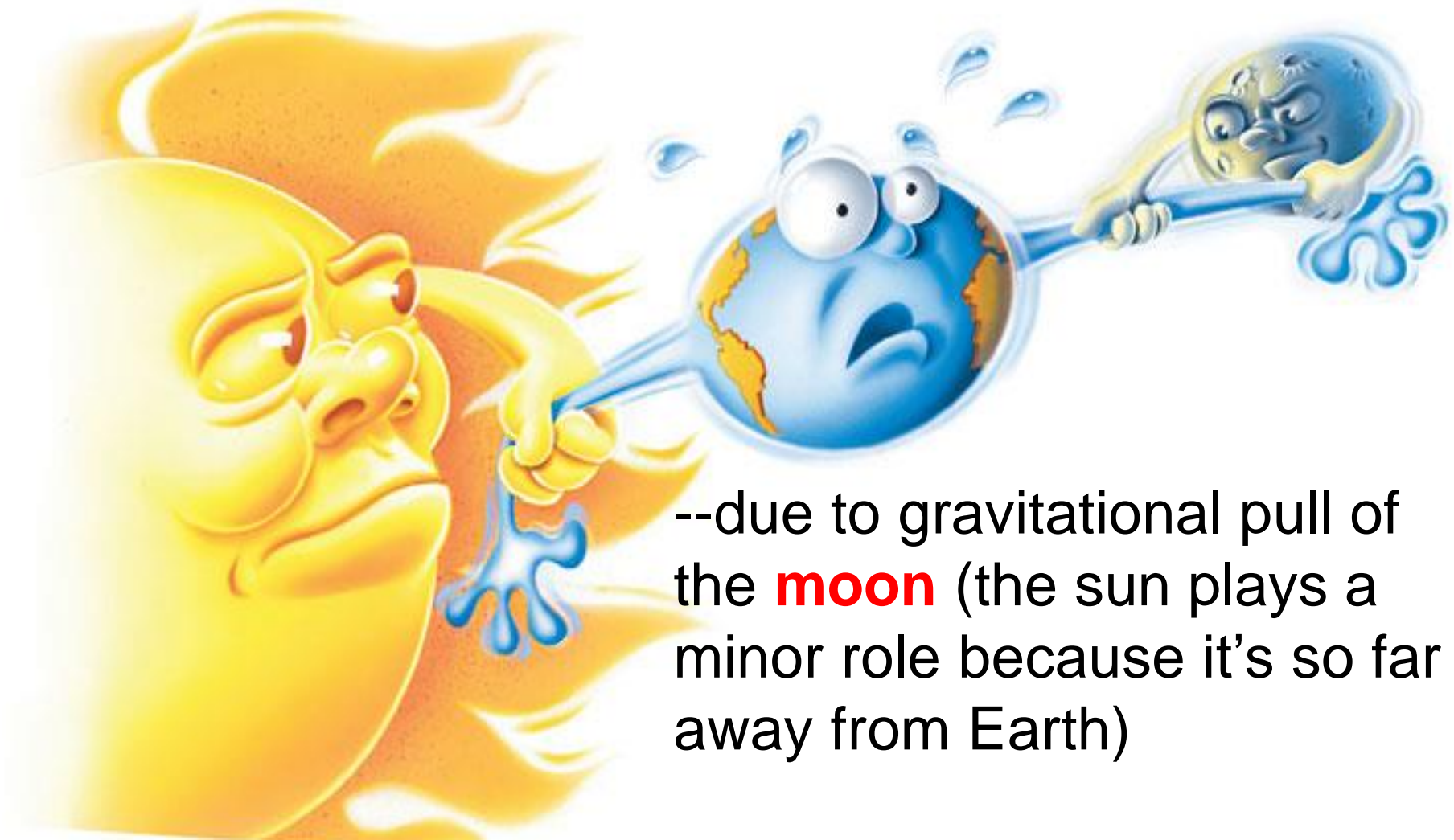
Hurricane Storm Surge

- sea level rises as a hurricane approaches
- mainly caused by high winds
- worse if hurricane hits at high tide



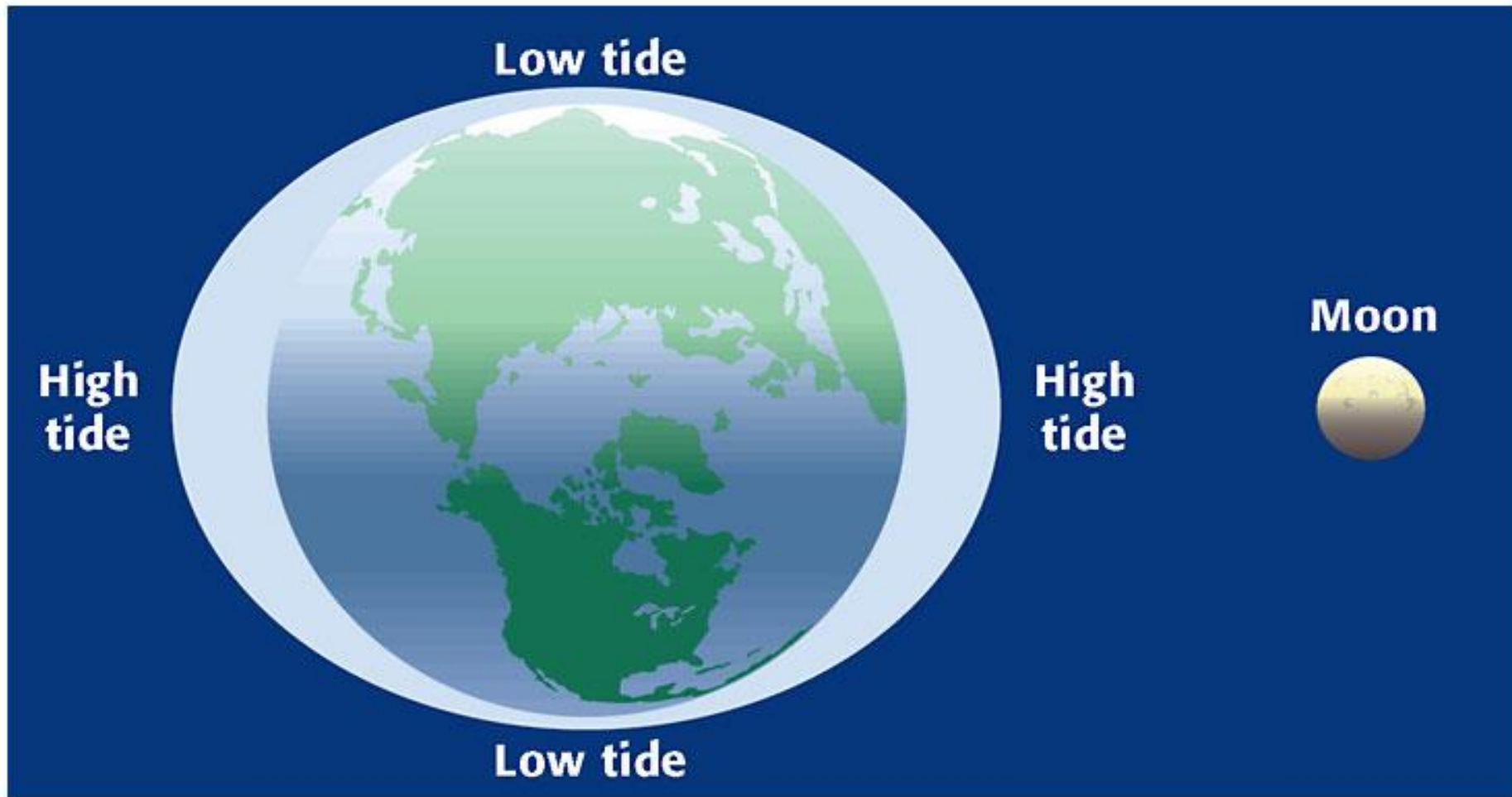
Tides

DYK: Even the Great Lakes have small tides?



--due to gravitational pull of the **moon** (the sun plays a minor role because it's so far away from Earth)

High and Low Tide



usually 2 high tides (if in line with the moon) a day and 2 low tides (if earth perpendicular to the moon) each day

- [Tidal Range](#) (animated website)

Spring and Neap Tides

- **Spring tides**

- *largest tidal range*
- sun, earth, moon in line
- happens twice a month
 - full
 - new moon



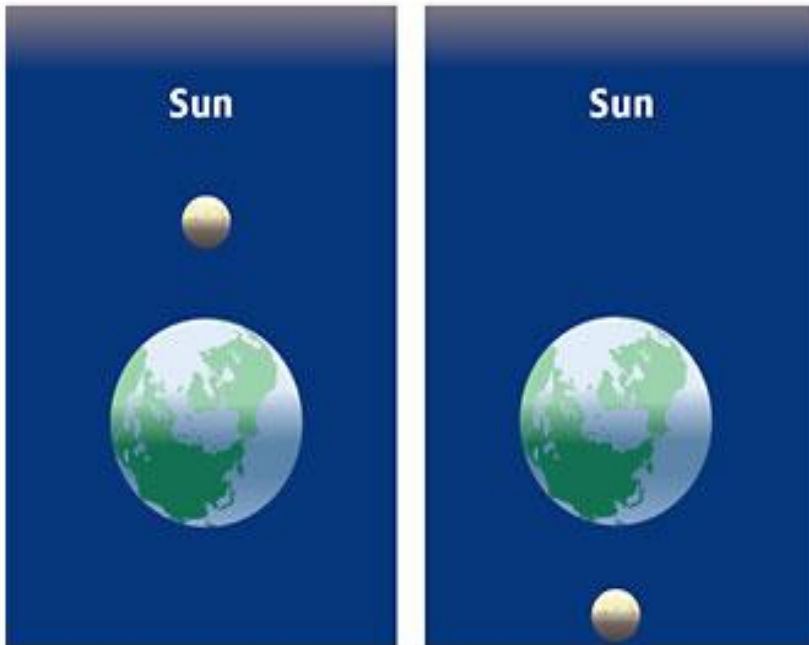
- **Neap tides**

- *smallest tidal range*
- sun, earth, moon perpendicular
- happens twice a month
 - first quarter
 - last quarter

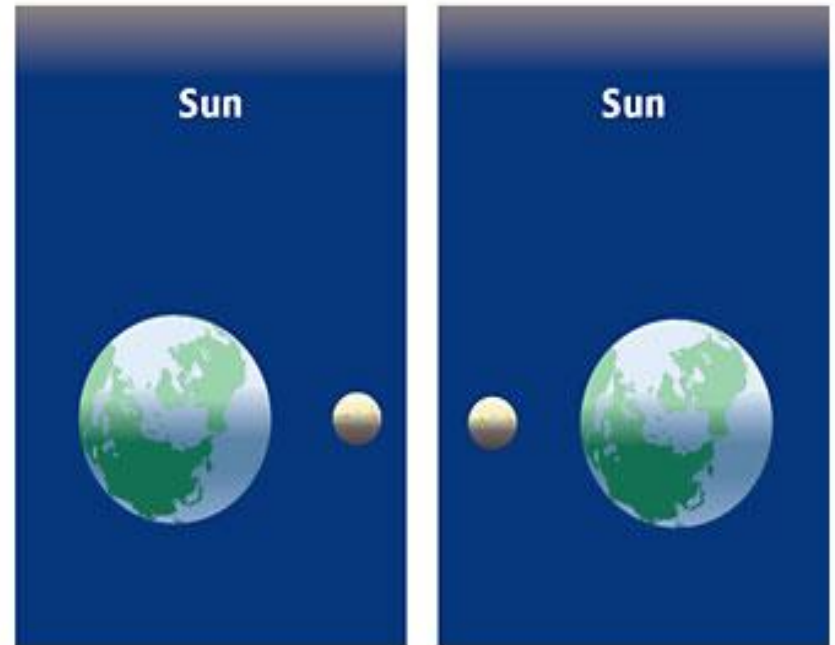


Spring and Neap Tide (each once a month)

Spring Tides During the full moon and the new moon, the sun, Earth, and the moon are aligned. The gravitational force of the sun reinforces the high tides created by the gravitational force of the moon.



Neap Tides The sun and the moon are at right angles to each other relative to Earth. In this arrangement, the gravitational forces of the sun and moon work against each other.



Tidal Range=difference between
high and low tide



Low Tide



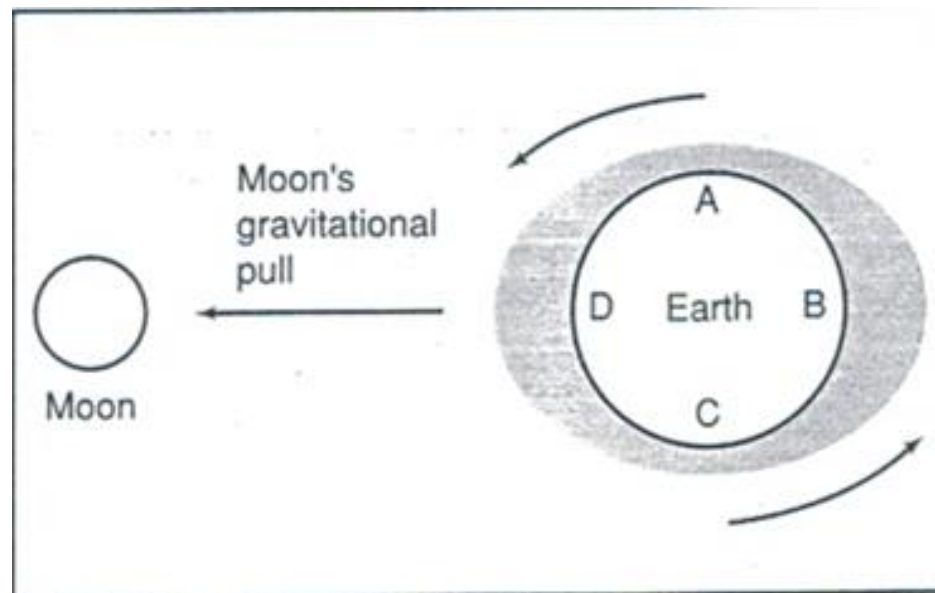
High Tide

- [Spring and Neap Tide](#) (animated website)

Questions

- What causes tides but NOT waves and currents?
- ...**moon's (sun's) gravity**
- A wave will increase in height when the distance over which the wind blows over the sea _____.
- **increases**

- If the first high tide of the day occurs at 1:00am, the next high tide will occur close to _____.
- **approximately 1:00pm** (1/2 day or 12 hours)
- What is the alignment of the moon and earth for a **high** tide to occur?
- **Points B & D will be having high tides**



- A wave will increase in height when the speed of the wind _____.
- **increases**
- What is a cause of waves and currents and NOT tides?
- **....wind**

- **Which of the following statements describes the relative positions of Earth, the sun, and the moon when the smallest difference between high tide and low tide occurs?**
 - **A.** The sun and Earth were at right angles to each other relative to the moon.
 - **B.** The sun and moon were at right angles to each other relative to Earth.
 - **C.** The sun, moon, and Earth were aligned, with the moon between the sun and Earth.
 - **D.** The sun, moon, and Earth were aligned, with the Earth between the sun and moon.

- **What combination of tides is occurring when you see the full moon directly overhead?**
 - **A.**high tide during a neap tide
 - **B.**low tide during a neap tide
 - **C.**high tide during a spring tide
 - **D.**low tide during a spring tide