

An underwater photograph showing the ocean floor. The top half of the image shows the water surface with gentle ripples. The bottom half shows the seabed with distinct, rhythmic sand ripples. The lighting is soft and blue, creating a serene underwater atmosphere.

Tides

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Images/PictureQuest

Tides

- The rhythmic pattern of rising and falling sea surfaces is known as tides.
- Tides do not affect the middle of the ocean basins.
- Tides have a pronounced effect on nearshore marine life.
- Tides drive the circulation of bays and estuaries, trigger spawning, and influence the lives of marine organisms in many other ways.



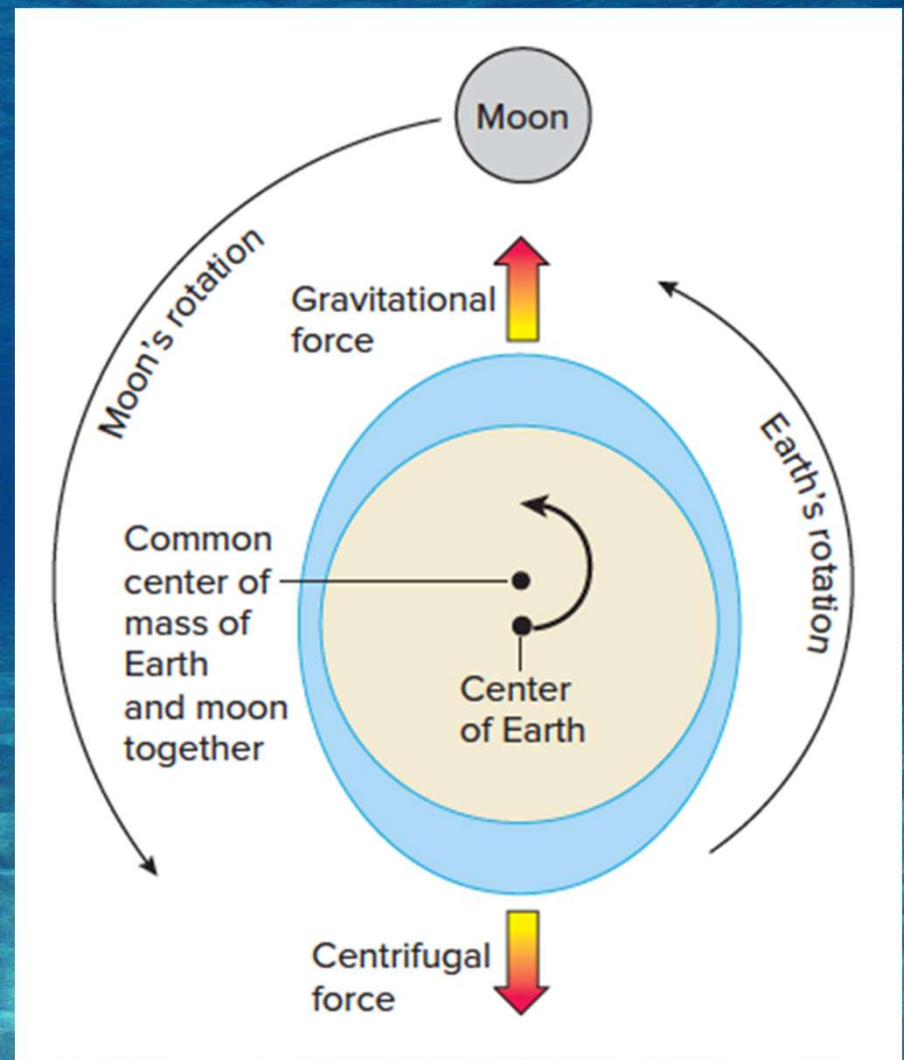
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What causes tides?

- Tides are caused by the gravitational pull of the Moon and the Sun and by the rotation of Earth, the Moon, and the Sun.
- The Earth-Moon system has two bulges—one bulge toward the Moon where the Moon's gravity dominates and the other bulge away from the Moon

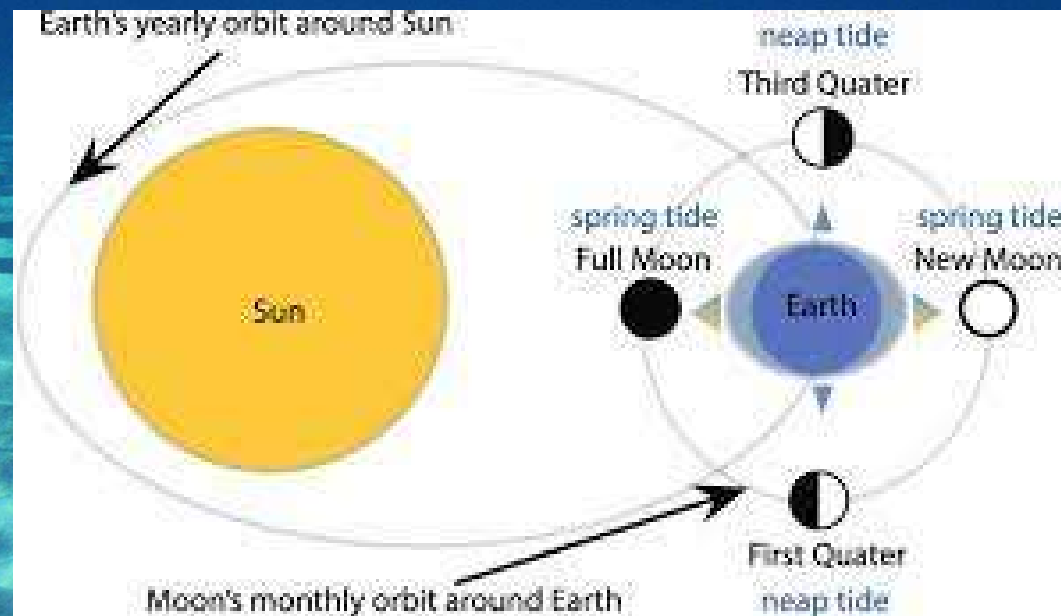
Tides

- A full tidal cycle takes 24 hours and 50 minutes causing the high and low tides in an area to vary daily.
- The effect of the gravitational pull of the Sun on Earth is only about half as strong as the Moon's.



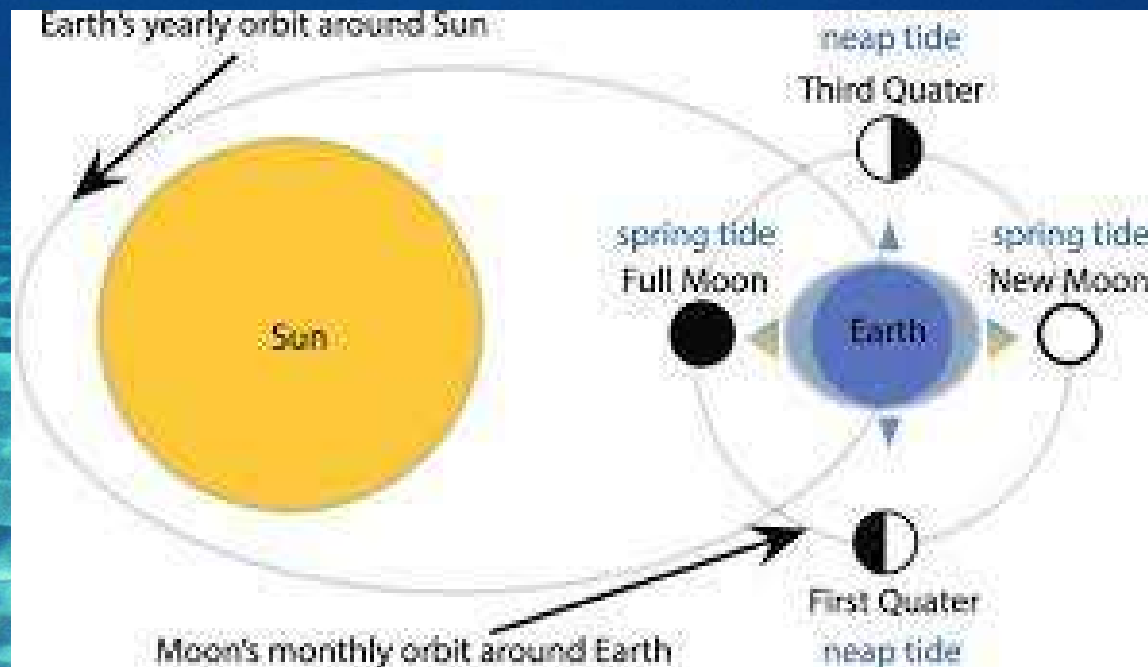
Spring Tides

- When the Sun and the Moon are in line with each other, which happens at the full and new moons, their gravitational effects add together; the difference between high and low tides is large. These tides are called spring tides.

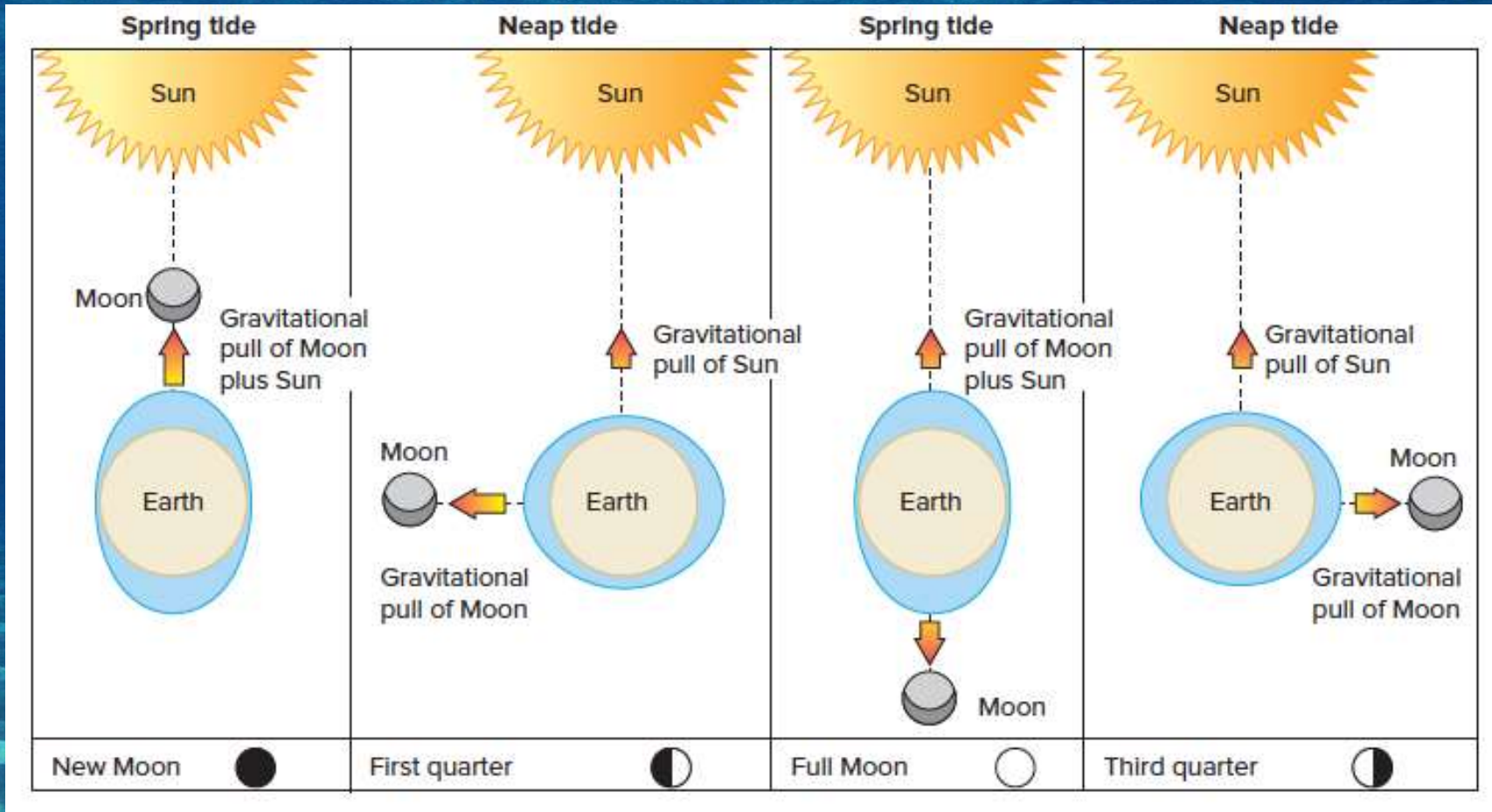


Neap Tides

- When the Sun and the Moon are at right angles, their effects partially cancel each other; the difference between high and low tide is small. These tides are called neap tides.



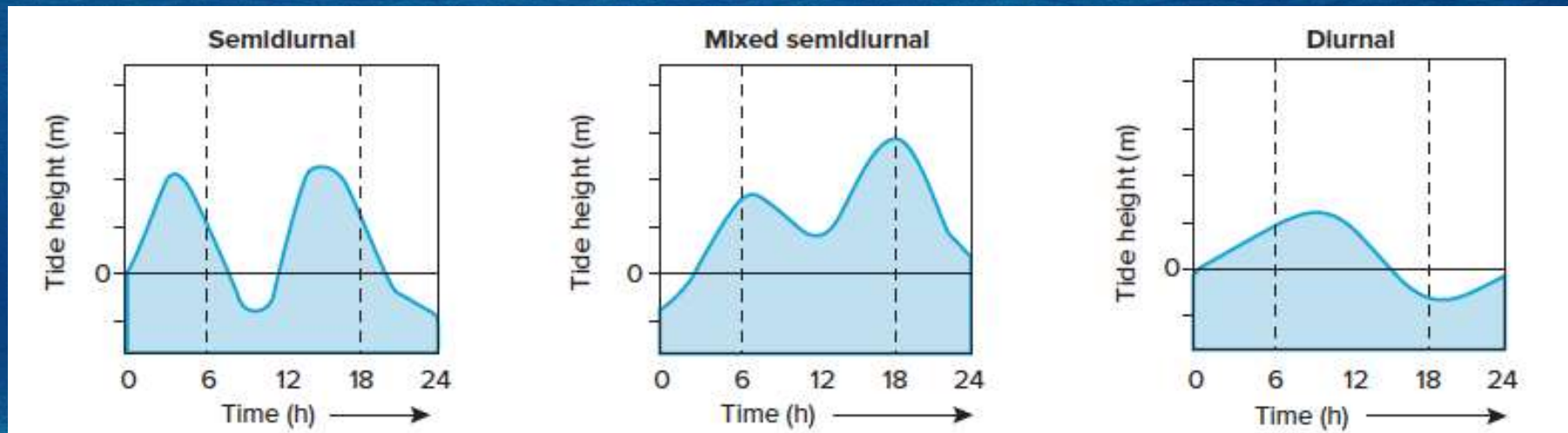
Spring and Neap Tides



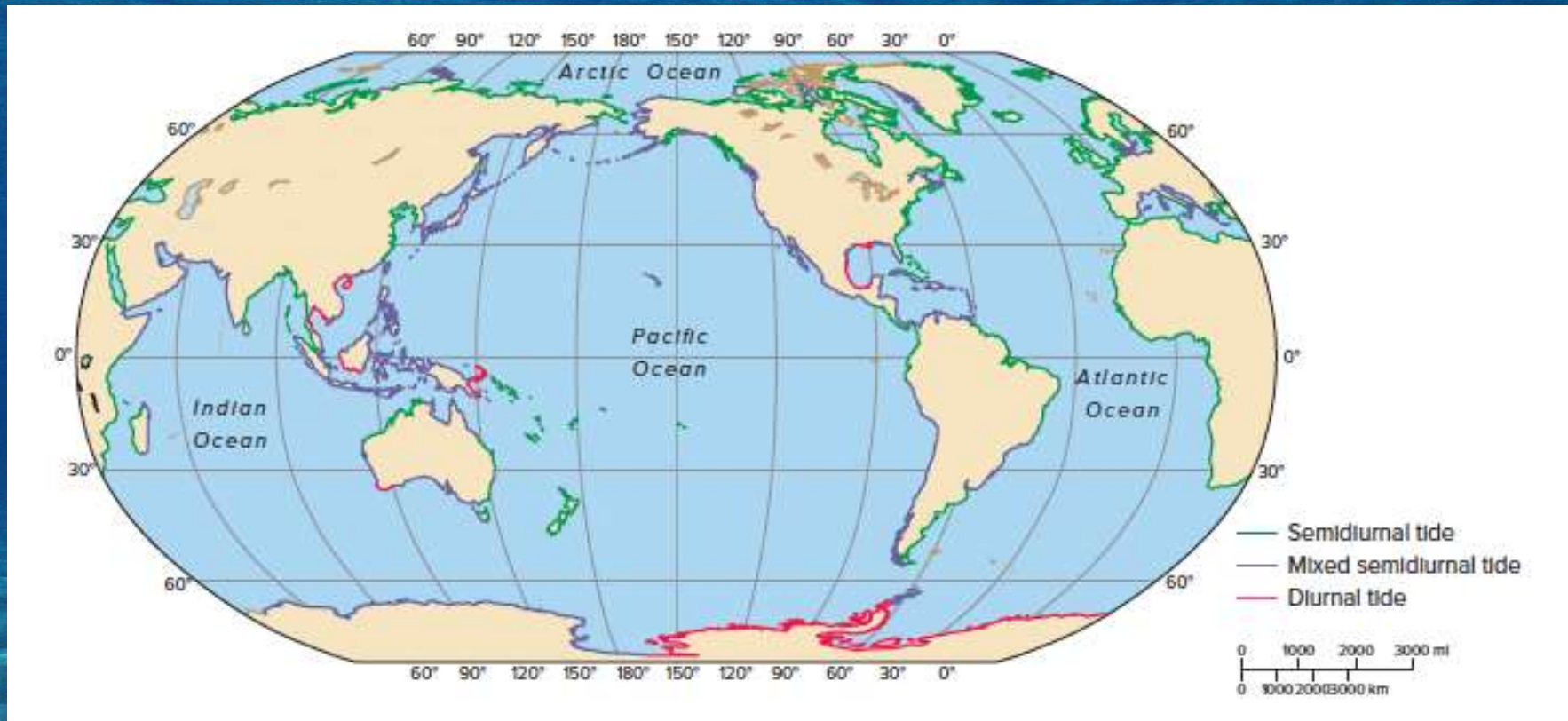
Tidal Patterns

- There are three main tidal patterns: semidiurnal, mixed semidiurnal, and diurnal.
- **Semidiurnal tides** have two high and two low tides of approximately the **same height** each day.
- **Mixed semidiurnal tides** occur when an area has two high tides and two low tides of **different heights** each day.
- **Diurnal tides** occur when there is only **one high and one low tide** each day.

Tidal Patterns



Tidal Pattern Distribution



Tide Patterns

- Tides vary from time to time and from place to place because of the effects of land and the seafloor.
 - affected by continents, islands, ridges, basins, canyons, reefs, and other features both on land and on the seafloor.
- Tides are affected by variations in the orbits of the Sun and Moon, planets, and weather.

Tide Levels

- The highest level that a tide rises in a day is called high water. The lowest point that a tide drops in a day is called low water.
- Flood tide occurs during a rising tide when water is moving toward the shore.
- Ebb tide is when the water is rushing back toward the sea.
- The period of time between flood and ebb tides is called slack water.

Tidal Range



- The largest tidal ranges, the difference in water level between successive high and low tides, are seen in narrow basins.
- Tides in long, narrow bays and estuaries produce a standing wave, or a wave that doesn't move forward and instead reflects on itself, oscillating within an enclosed basin. standing wave
- The Bay of Fundy in Canada has one of the highest tidal ranges in the world. Bay of Fundy

Tidal Bores

- Tides can produce waves that travel long distances, are very high, and can travel fast. These waves are called tidal bores.
- Tidal bores most commonly occur in shallow estuaries and river mouths that have very large tidal amplitudes.
- The world's largest tidal bore occurs in the Qiantang River in China. [Tidal Bore](#)

Tide Measurements and Tables

- Because so many factors determine when tides occur, they cannot be predicted by observing the Moon's location.
- There are 196 tidal stations in the United States where tides are measured and recorded in a large database.