Tide Me Over

What are two kinds of tidal ranges?

Active Reading

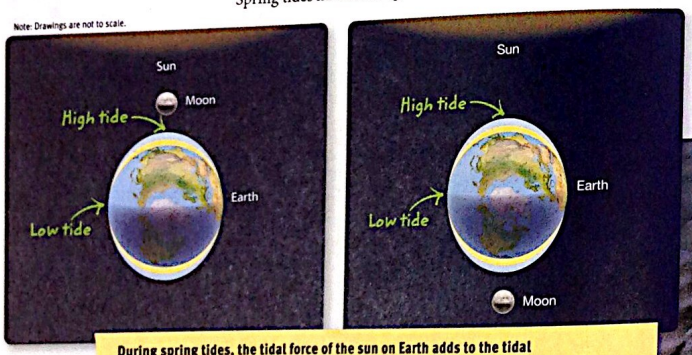
8 Identify As you read, underline the two kinds of tidal range.

Tides are due to the *tidal force*, the difference between the force of gravity on one side of Earth and the other side of Earth. Because the moon is so much closer to Earth than the sun is, the moon's tidal force is greater than the sun's tidal force. The moon's effect on tides is twice as strong as the sun's effect. The combined gravitational effects of the sun and the moon on Earth result in different tidal ranges. A **tidal range** is the difference between the levels of ocean water at high tide and low tide. Tidal range depends on the positions of the sun and the moon relative to Earth.

Spring Tides: The Largest Tidal Range

Tides that have the largest daily tidal range are **spring tides**. Spring tides happen when the sun, the moon, and Earth form a straight line. So, spring tides happen when the moon is between the sun and Earth and when the moon is on the opposite side of Earth, as shown in the illustrations below. In other words, spring tides happen during the new moon and full moon phases, or every 14 days. During these times, the gravitational effects of the sun and moon add together, causing one pair of very large tidal bulges. Spring tides have nothing to do with the season.

Note: Drawings are not to scale.



During spring tides, the tidal force of the sun on Earth adds to the tidal force of the moon. The tidal range increases.

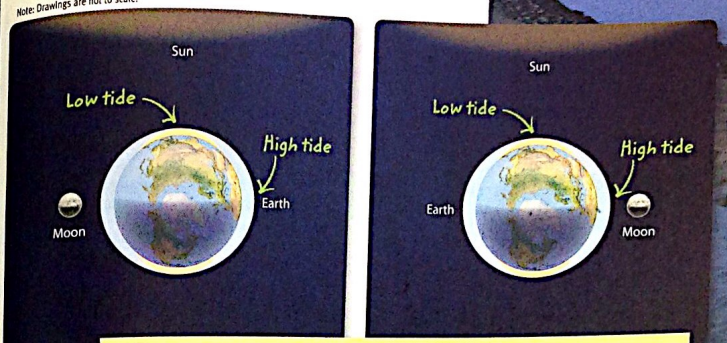
Inquiry

9 Inquire Explain why spring tides happen twice a month.

Neap Tides: The Smallest Tidal Range

Tides that have the smallest daily tidal range are **neap tides**. Neap tides happen when the sun, Earth, and the moon form a 90° angle, as shown in the illustrations below. During a neap tide, the gravitational effects of the sun and the moon on Earth do not add together as they do during spring tides. Neap tides occur halfway between spring tides, during the first quarter and third quarter phases of the moon. At these times, the sun and the moon cause two pairs of smaller tidal bulges.

Note: Drawings are not to scale.



During neap tides, the gravitational effects of the sun and the moon on Earth do not add together. The tidal range decreases.

10 Compare Fill in the Venn diagram to compare and contrast spring tides and neap tides.