Name _____ Date _____ Class _____

Key Concept Summary

Tides

What Are Tides?

The force of gravity pulls the moon and Earth (including the water on Earth's surface) toward each other. **Tides are caused mainly by differences in how much gravity from the moon and the sun pulls on different parts of Earth.**

At any one time on Earth, there are two places with high tides and two places with low tides. As Earth rotates, one high tide occurs on the side of Earth that faces the moon. The second high tide occurs on the opposite side of Earth. Halfway between the high tides, water flows toward the high tides, causing low tides.

The moon's gravity pulls a little more strongly on the water on the side of Earth closest to the moon than on Earth as a whole. This difference causes a bulge of water on the side of Earth closest to the moon. The bulge causes high tide.

The moon's gravity pulls more weakly on the water on the far side of Earth than on Earth as a whole. Since Earth is pulled more strongly, the water is "left behind." Water flows toward the far side, causing high tide.

The sun is so massive that, even though it is about 150 million kilometers from Earth, its gravity also affects the tides. The sun pulls the water on Earth's surface toward it. **Changes in the positions of Earth, the moon, and the sun affect the heights of the tides during a month.**

The sun, the moon, and Earth are nearly in a line during a new moon. The gravity of the sun and moon pull in the same direction. Their combined forces produce a tide with the greatest difference between consecutive low and high tides, called a **spring tide.**

During the moon's first-quarter phase, the line between Earth and the sun is at right angles to the line between Earth and the moon. The sun's pull is at right angles to the moon's pull. This arrangement produces a **neap tide,** a tide with the least difference between consecutive low and high tides. Neap tides occur twice a month.

At full moon, the moon and the sun are on opposite side of Earth. Since there are high tides on both sides of Earth, a spring tide is also produced. It doesn't matter in which order the sun, Earth, and the moon line up.

On a separate sheet of paper, draw two diagrams showing the relative positions of Earth, the sun, and the moon during a spring tide. Show the phase of the moon in each diagram.