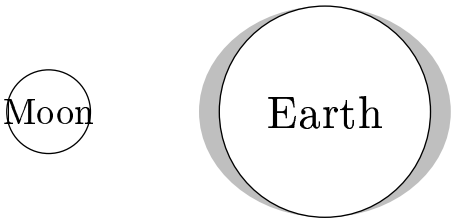
Assume: The only relevant force which causes the tides is the Moon's gravitational force on the ocean.

Hint: The diagrams show an exaggerated amount of water on the surface of the Earth (shown in gray) and make the assumption that the whole Earth is covered with water.

Select the diagram which best describes the effect of the tides on the oceans on Earth.

A)



The surface of the water is shaped like an oblate ellipsoid and the center of mass of the water and Earth is nearly the same.

B)

The surface of the water is spherically shaped and the center of mass of the water is closer to the Moon than that of the Earth.

The side of the Earth closest to the Moon will feel a stronger attraction since it is closer to the Moon and *vice versa*; the side farthest from the Moon will feel a weaker attraction. The shape of the water on the Earth's surface will be an oblate ellipsoid (similar to an egg shape).

The center of mass of the Earth and the water on the Earth will be at the same point (to first order), since the gravitational attraction of the water by the Earth is very much stronger than the gravitational attraction of the water (on the Earth's surface) by the Moon. That is, the spherical shape of the Earth and the oblate ellipsoidal shape of the water have the same center of mass.

This results in the ocean sticking out on either side of the Earth.

A small second order effect will result in the tide being very slightly higher on the side of the Earth facing the Moon.

Answer **A**.