molecule in the apple for any molecule in the earth is equal to the attraction of any molecule in the earth for any molecule in the apple. That is, if the earth and the apple consisted each of a single like molecule, their attraction for each other would be equal. Now, suppose that the apple contains two and the earth five such molecules. Let the force with which one molecule attracts another be represented by n. Now each molecule of the apple attracts the five molecules in the earth with a force of $5\,n$; the two molecules in the apple would attract the earth with a force of $10\,n$. On the other hand, each molecule of the earth attracts the molecules of the apple with a force of $2\,n$, and the five molecules in the earth would attract the apple with a force of $10\,n$. It is obvious that the same course of reasoning will apply in case the attraction is between two molecules whose masses differ, and consequently between all bodies of whatever mass or substance. Hence does it appear that a body of small mass attracts a body of large mass as strongly as the latter attracts the former?

If the apple attracts the earth as strongly as the earth attracts the apple, why does not the earth rise to meet the apple? Let us examine a similar case. Suppose that a man in a boat pulls on a rope attached to a ship. His pulling draws the boat to the ship; but the ship does not appear to move. But if five hundred men, in as many boats, pulled together, the ship would be seen to move. Did one man produce no motion? If so, then would the five hundred men produce no motion, since five hundred times nothing is nothing?

You will learn, in the next chapter, that the space through which a given force moves a body in a given time varies inversely as the mass of the body. Does this fact explain the foregoing phenomena?

§ 21. The force of gravity varies with the distance from the center. — Observations made in various ways show that the force of gravity varies over the surface of the earth. It can be proved by geometrical methods that a sphere or a spheroid acts upon a molecule without it as though all its attractive force were concentrated at its center. Now it is found that the nearer an object *without the earth's surface* is to the center of the earth the greater is the force of gravity. The polar diameter of the earth is about 26 miles less than its equatorial diameter, and, consequently, the distance from the center to the surface at the