deviating accuracy of the planets in pursuing their prescribed paths, as well as the cause of their accelerated motion when traversing those parts of their orbits nearest to the Sun, were not yet discovered. To the solution of these problems Newton bent his powerful intellect. The sagacity of Kepler had traced a connection between the tides and the Moon, and he held that a similar connection existed between the Sun and the planets, but he had not succeeded in adducing the necessary mathematical proof of his conjectures. The falling of an apple from a tree is said to have originated the train of thought which resulted in Newton's splendid discoveries. When Newton began his great work the figure of the earth was pretty accurately determined, as well as the distance of the Moon from the earth—these facts in connection with the ascertained rate at which bodies near the surface of the earth fall, being 16 feet in the first second, contributed materially to his success. The idea occurred to Newton that the Moon itself might be a falling body attracted by the earth just like the apple, but that it did not reach the earth because it had received an impulse in a straight line, and that the contending forces thus operating might retain it in its course in moving round the world. But how was the rate at which the tendency to fall to be determined? It was indeed conjectured that this force would decrease in proportion as the square of the distance increased—the square of any quantity resulting by multiplying it by itself. For example, were it possible to carry a body four thousand miles above the earth it would be then twice as far from the centre as when at the surface of the earth. If at this height the body was found in the first second of time to fall four feet, or one fourth of sixteen feet, the conjecture referred to would be established by unquestionable evidence. But it was impossible for Newton to ascend to the top of even the highest mountain, and were he able to do so the distance would be so trifling as compared with that by which the surface of the earth is separated from its centre as to be in such a calculation inappreciable. But an expedient occurred to Newton by which he could transport himself, as it were to the moon, and test the amount of her fall. The distance which in a given time she was deflected from the straight line in which she was constantly striving to move he regarded as the measure of her fall or attraction by the earth, and having ascertained *that*, he made a calculation as to its agreement with the theory of the diminution of force according to distance, and found, alas! that there was a difference of one-sixth between the two values. The calculation is laid aside, as not yielding an entirely satisfactory result, till at a meeting of the Royal Society in London having ascertained that Picard had made a more accurate measurement of the earth's diameter, he immediately assumed the new basis, and found the ultimate values to correspond! What a moment of intellectual triumph was that! and what a remarkable proof did it furnish of the infinite skill with which God has regulated the forces of the universe. Thus, was the grand law proved that every particle of matter in the universe attracts every other particle of matter with a force or power directly proportioned to the quantity of matter in each, and decreasing as the squares of the distances which separate the particles increase.

Newton subsequently demonstrated that in virtue of gravitation the curve in which the planets and comets must move can be no other than either a circle, an ellipse, a parabola, or a hyperbola, and hence the movements of all the heavenly bodies are found to correspond precisely in this respect with theory.

But would not a heavy body like the moon fall towards the earth much quicker than would a small body weighing, say 100 pounds, and if so, how can the law of decrease of attraction in proportion of distance hold good? This question was decided in an interesting and satisfactory manner by an experiment made when Galileo was a young man, in order to test the views he had promulgated on the subject. Galileo held that a ball of 100 lbs. would descend to the earth in the same time from a given altitude as one of 200 lbs. His opponents held that the latter would touch the earth in precisely half the time. The disputants were hot and confident, and it was resolved to try an