

equally *increasing* the velocity of a descending body,—will become clear by a little attention; but it undoubtedly presents difficulty at first. Accordingly, we find that Descartes did not accept it. “It is certain,” he says, “that a stone is not equally disposed to receive a new motion or increase of velocity when it is already moving very quickly, and when it is moving slowly.”

Descartes showed, by other expressions, that he had not caught hold of the true notion of accelerating force. Thus, he says in a letter to Mersenne, “I am astonished at what you tell me, of having found, by experiment, that bodies thrown up in the air take neither more nor less time to rise than to fall again; and you will excuse me if I say that I look upon the experiment as a very difficult one to make accurately.” Yet it is clear from the Notion of a Constant Force that (omitting the resistance of the air) this equality must take place; for the Force which will gradually destroy the whole velocity in a certain time in ascending, will, in the same time, generate again the same velocity by the same gradations inverted; and therefore the same space will be passed over in the same time in the descent and in the ascent.

Another difficulty arose from a necessary consequence of the Laws of Falling Bodies thus established;—the proposition, namely, that in acquiring its motion, a body passes through every intermediate degree of velocity, from the smallest conceivable, up to that which it at last acquires. When a body falls from rest, it begins to fall with *no* velocity; the velocity increases with the time; and in one-thousandth part of a second, the body has only acquired one-thousandth part of the velocity which it has at the end of one second.

This is certain, and manifest on consideration; yet there was at first much difficulty raised on the subject of this assertion; and disputes took place concerning the velocity with which a body *begins* to fall. On this subject also Descartes did not form clear notions. He writes to a correspondent, “I have been revising my notes on Galileo, in which I have not said expressly that falling bodies do not pass through every degree of slowness, but I said that this cannot be known without knowing what Weight is, which comes to the same thing; as to your example, I grant that it proves that every degree of velocity is infinitely divisible, but not that a falling body actually passes through all these divisions.”

The Principles of the Motion of Falling Bodies being thus established by Galileo, the Deduction of the principal mathematical consequences was, as is usual, effected with great rapidity, and is to be found