

## Of the General affections of Motion

The interval of time elapsed between the beginning and the end of a M<sup>n</sup> is called its Duration. The ~~sp~~ line passed over is called its path, and may vary in position, form and magnitude. The position of the path is called the Direction of the motion, and it is estimated from the point where the M<sup>n</sup> is begun to that where it ends.

If the path is a straight line the direction remains the same, and the motion is rectilinear. If the path is a curve the ~~motion~~ direction continually changes, and the motion is curvilinear. In this case the direction at any instant is estimated by the position of the tangent to the curve at the point where the body is then found. (Simple Motion)

Motion are deemed swift or slow according as much or little space is passed over in a g<sup>iv</sup> time.

The term velocity expresses the rate or that quality of motion by which a certain space



is made to correspond to a certain time  
 Uniform motion is that when the Velocity  
 is constant. - Accelerated motion is that w<sup>ch</sup>  
 the Velocity increases. Retarded M<sup>o</sup> is that  
 when the Velocity is diminished

16. In M<sup>o</sup> continually varying we are obliged  
 in order to obtain a measure of Velocity at any  
 instant, to suppose the motion for some time  
 uniform, and in order to avoid error the time  
 must be supposed extremely small

17. In uniform motions the spaces passed over in  
 the same or equal times are proportional to  
 the velocities

18. In Uniform M<sup>o</sup> with the same velocity  
 the spaces are proportional to the time

19. In any uniform motions, the spaces are  
 proportional to the rectangle of time or the  
 product of number which measures the V<sup>o</sup>  
 and time. These proportions are consequen-  
 tly expressed by the following formula

$$\begin{array}{l}
 20. \sim S = VT \quad \left. \begin{array}{l} S = T \\ S = V \end{array} \right\} \\
 21. T = \frac{S}{V} \quad \left. \begin{array}{l} T = \frac{1}{V} \\ V = \frac{1}{T} \end{array} \right\} \\
 22. V = \frac{S}{T} \quad \left. \begin{array}{l} V = \frac{1}{T} \\ T = \frac{1}{V} \end{array} \right\}
 \end{array}$$

23. If an effect E change at the rate with  
 which each of the several causes which cooperate  
 in its production it will be directly as the product  
 several causes M<sup>o</sup>C which increase it while they  
 increase; and inversely as the product of the causes  
 Q<sup>o</sup>F which increase it while they <sup>decrease</sup>  
 This is expressed by the following formula

$$E = \frac{M^o C}{Q^o F} \text{ - Example A Loaded waggon -}$$

24. The Velocity of a <sup>particle</sup> quantity of matter  
 is the proper measure of its quantity  
 of motion

25. Therefore the quantity of matter in any  
 body is properly expressed by multiplying the  
 number of particles or the quantity of matter  
 by its velocity, which may be expressed by  
 the formula



$$\begin{array}{l}
 26. \quad Q \doteq MV \\
 \quad \quad M \doteq \frac{Q}{V} \\
 27. \quad V \doteq \frac{Q}{M}
 \end{array}
 \left. \begin{array}{l}
 Q = \text{quantity of Motion} \\
 M = \text{Quantity of Matter} \\
 V = \text{Velocity}
 \end{array} \right\}$$

Of Dynamics

Sect. 1<sup>st</sup> of Matter and the Laws of Motion.

28. Matter is an abstract term expressing that substance of which all other bodies are composed. Philos<sup>ophers</sup> have long endeavored to find out the essence of matter, or that principle from which all its properties flow. These endeavors must be unsuccessfull till we can discover the connection between cause and effect and we must be contented with the knowledge of such ~~beats~~ properties of Matter as manifest themselves to our senses

29. Now which are the most general are probably the nearest to the essential properties of Matter.

30. Some place the essential essence of Matter in extension, but inaccurately, for extension is a property and perhaps the essential property of space. and all that is taught in the Systems concerning the divisibility of Matter is only applicable to space.

Thus a sume Probely as the essence of Matter, but inaccurately, for it is not incompetent ~~to~~ to mind.

Thou appear to Judge more accurately who a sume as the distinguishing property of Matter that by which its particles are by their place to the extension of all other matter.

Def: 1<sup>st</sup> of Solidity

of Solidity

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