

To: Melanie and Priscilla

7-9-86

From: Grandpa - Dad

Subject: Fundamental Physics - Definitions Expanded.

Question: What is Inertia ?

Answer: Through virtually a lifetime of study of this area of Fundamental Physics, I have never found a completely satisfactory explanation of what Inertia actually is.

Text books invariably describe it as " That property of matter that resists any change in its state of motion or its state of rest". This is based on Isaac Newton's Laws of Motion and is entirely correct but incomplete , since describing its behavior sheds no light on its exact nature.

Text books do make it perfectly clear that Gravitational Attraction , Mass and Inertia are closely inter-related and perhaps someday, when the precise nature of any one of these three properties of matter is known, we will find that they are , in fact, one and the same.

Question: What is Centrifugal Force?

Answer: Again, no textbook description, that I have ever read, provides a clear explanation of what it actually is.

It invariably describes its behavior without describing its exact nature.

My long and intensive study, of this peculiar characteristic of matter in circular motion, has forced me to conclude that it is, in fact, a function of Inertia. However, since we don't know precisely what Inertia is, we also cannot describe the exact nature of Centrifugal Force, in precise physical terms.

We can, however , effectively describe its origin and function as follows:

" Centrifugal Force is a product of Rotation itself and is not derived from energy expended to establish, or sustain , rotation. Centrifugal Force is always radially directed and rotation sustaining energy is always tangentially directed and this perpendicular relationship prevents one from effecting the other, in accordance with the principles of the Resolution of Forces. Rotation sustaining energy imparts tangentially directed Kinetic Energy (E_k) to the moving

Fundamental Physics - Expanded Definitions - Continued:7-9-86

matter, which can only be extracted, or utilized, by opposing the matter's forward motion. Any such opposition ultimately destroys rotation and subsequently destroys the production of Centrifugal Force. Any such opposition must always be applied tangentially in a direction 180° opposite to that of the moving matter.

The Kinetic Energy (E_k), imparted to the moving matter, by the rotation sustaining energy, is defined by the equation:

$$(E_k) = \frac{mv^2}{2} = \frac{Wv^2}{2g} = \frac{Wv^2}{64.32}, \quad \text{in which}$$

- (E_k) = tangentially directed kinetic energy in foot-pounds.
 m = the mass of the moving matter in pounds.
 W = the earth gravity weight of the moving matter in pounds.
 v = the forward velocity of the moving matter in feet per second.
 g = the acceleration of earth gravity, as applied to a free falling object, in feet per second per second
= 32.16, a constant.

In contrast, Centrifugal Force is defined by the equations:

$$\begin{aligned} (F_c) &= \frac{mv^2}{r} \quad (\text{radius in feet}) \\ &= .00034 W r N^2 \quad (\text{radius in feet}) \\ &= .000028416 W r N^2 \quad (\text{radius in inches}), \quad \text{in which,} \end{aligned}$$

- (F_c) = Centrifugal force in pounds.
 m = the mass of the moving matter in pounds.
 W = the earth gravity weight of the moving matter in pounds.
 v = the tangential forward velocity of the matter in feet per second.
 r = the radius from center of rotation to center of gravity of the matter, in feet or inches, as indicated.

.00034 = a constant

.000028416 = a constant

Fundamental Physics - Expanded Definitions - Continued:7-9-86

Centrifugal Force is the Inertia , of matter in circular motion, resisting the constant change , from a natural straight line tangential path, to an unnatural circular path of motion, forced upon it by the Restraining Agent.

Centrifugal Force is , more specifically, a product of equal and opposite Action and Reaction , as matter moves in a circular path. Action, by the Restraining Agent, radially inward, is opposed, radially outward , by matter Inertia, in precise equilibrium, in Reaction.

The word " Centrifugal" is composed of two Latin words , basically. "Centri", meaning center and "fugit" , meaning fly or fly away. Thus the two , put together and literally translated, mean " fly away from the center" . This is technically incorrect, since matter in circular motion does not tend to fly away from the center, along a radius, but rather tends to fly away at a tangent to the circular path of motion.

For the above reasons, I prefer to call the Reaction Force " Inertial Resistance", for that is exactly what it is. It is a more technically correct descriptive title and I find it much easier to incorporate, phonetically, into technical descriptions and calculations.