Replies to certain questions submitted to the Monthly Meeting of the Franklin Institute. By CHARLES POTTS, read October 22, 1829.

Reply to the question "What is the absolute centrifugal force of a body revolving in a circle of a given diameter, d , with a given velocity, v .

The periodic time of a body revolving in a circle, by means of its own gravity at the circumference of the earth, is ordinarily determined to be equal $C \sqrt{\frac{2R}{g}}$; where R is assumed equal the radius of the earth, $g = 16\frac{1}{2}$ feet, and $c = 3.14159$, &c.

As the correctness of this expression depends upon the accuracy with which the terms are assigned in the following theorem, viz. that the central force of a body moving in the periphery of a circle is as the square of the arc divided by the diameter; it may be of use to give the usual manner in which this theorem is demonstrated.

Thus, let the arc AE (Fig. 1,) be described by a body revolving in a circle in a given moment of time; then, from the nature of a circle (the arc AE being very small, and, consequently, nearly equal to its chord) $AE^2 = AB \times AD$, and, therefore, $AD = \frac{AE^2}{AB}$. Now

Fig. 1.

AD is the space through which the body is drawn from the tangent in the given time; and though $2 AD$ is the proper measure of the central force, yet when the forces compared are all computed in the same manner, the ratio in both cases will still remain to be the same. Hence, if g (= the space through which a heavy body descends at the surface of the earth in one second of time,) be represented by AD , and AC be put equal R = the radius of the earth, then the space described by the body revolving at the circumference of the earth in one second of time, will be represented by $AE = \sqrt{AB \times AD} = \sqrt{2gR}$ and the circumference of the earth being $2CR$, we have

the following analogy; as $\sqrt{2gR} : 2CR :: 1'' : C \sqrt{\frac{2R}{g}}$ = the time in which the body would pass around the entire circumference of the earth, as above stated.

I have adverted to the foregoing theorem because it might be urged that however near the arc AE may be supposed to approach to its chord, it can never be considered as absolutely equal to it; and hence the deductions for the centrifugal force which are predicated upon this supposition, as will be the case in the following remarks, are not such as the question demands: it may not, therefore, be amiss, if greater accuracy is required, to give the following series expressing the arc in terms of the diameter and versed sine, viz. putting $2R = D$; the arc.