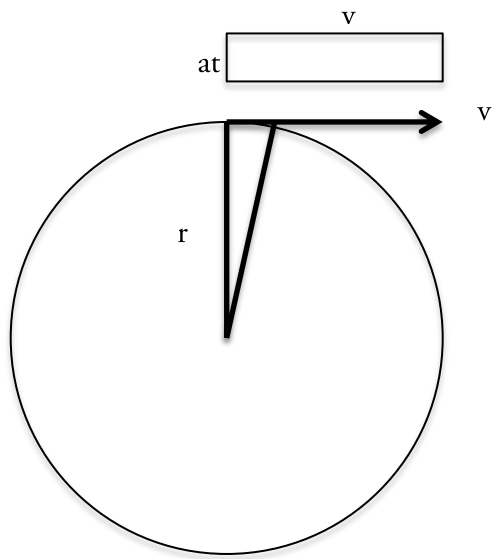
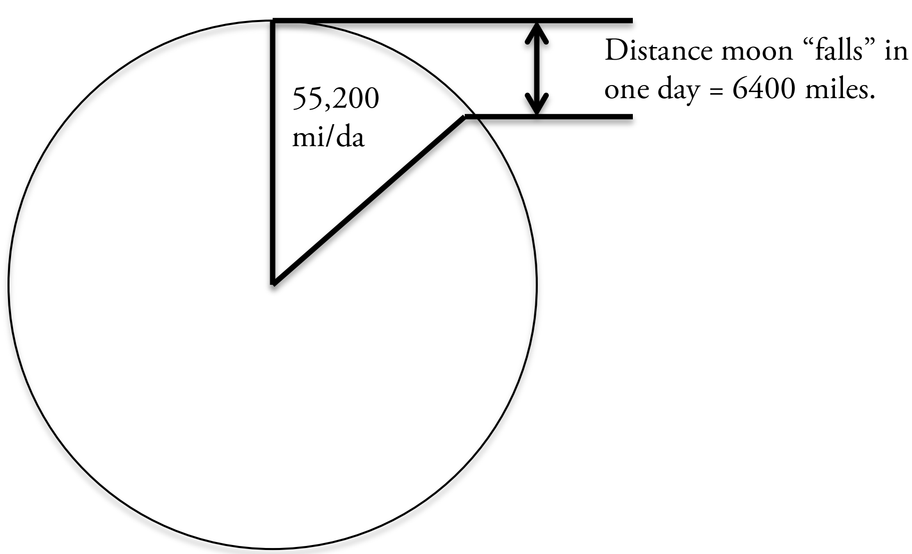


$$\frac{at}{v} = \frac{vt}{r} \text{ and } a = \frac{v^2}{r}$$

at represents the velocity along the radius towards the center of the circle. *v* is the velocity along the tangent in the direction the stone would take if the string were broken. *vt* is the distance travelled by an object in the depicted orbit between any two points on the circumference. The ratio of *at* to *v* will be equal to that between the distance *vt* and the radius of the circle. This was worked out by Christian Huygen in 1673. See William Dampier, *The History of Science* (1930) p. 167.

Remembering that the distance from the earth to the moon is about 240,000 miles, the above formula can be used to calculate the acceleration of the moon. First, however, the moon's velocity must be computed. The formula for velocity is $v = \frac{d}{t}$ For the moon, that's $\frac{2\pi \times 240{,}000\ miles}{27.3\ days} = 55{,}200\ miles/day$. Therefore $a = \frac{(55{,}200\ mi/da)^2}{240{,}000\ miles} = 127 \times 10^2\ mi/da^2 = 0.0090\ ft/sec^2 = 0.0090\ ft/sec^2$



The distance the moon "falls" is equal to *at* in the diagram above and shows how far the moon travels as it accelerates towards the center of the earth in one day.