81. He knew that some force F must point toward the center of the orbit in order to hold the Moon in orbit around Earth, and that the approximation of a circular orbit with constant speed means the acceleration must be

$$a = \frac{v^2}{r} = \frac{(2\pi r/T)^2}{r} = \frac{4\pi^2 r^2}{T^2 r} \ .$$

Plugging in $T^2 = Cr^3$ (where C is some constant) this leads to

$$F = ma = m \frac{4\pi^2 r^2}{Cr^4} = \frac{4\pi^2 m}{C r^2}$$

which indicates a force inversely proportional to the square of r.