1- An automobile of mass 1000 kg moves on a level horizontal road in a circle of radius 30 m. The maximum frictional force between tires and road is 500 N. Calculate the maximum speed with which this car can round this curve.

$$F_R = m \frac{v^2}{r}$$

$$500 \text{ N} = 1000 \frac{v^2}{30}$$

$$v = \sqrt{\frac{30 \, (500)}{1000}} = \boxed{3.87 \frac{m}{s}}$$
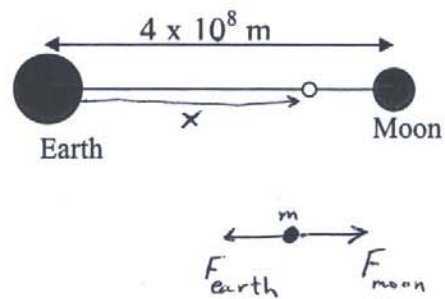
2- Find the distance from Earth's center at which the net gravitational force from both Earth and Moon **cancel** each other ($F_{net} = 0$).
$M_{earth} = 6 \times 10^{24}$ kg $M_{moon} = 7 \times 10^{22}$ kg
Distance from Earth's center to Moon's center = 4×10^8 m
(**Hint**: start by placing an object of mass m at that point)

$$F_{net} = 0$$

$$\Rightarrow F_{earth} = F_{moon}$$

$$\cancel{G} \frac{\cancel{m} M_{earth}}{x^2} = \cancel{G} \frac{\cancel{m} M_{moon}}{(4 \times 10^8 - x)^2}$$

$$\frac{6 \times 10^{24}}{x^2} = \frac{7 \times 10^{22}}{(4 \times 10^8 - x)^2}$$

take the square root of both sides.

$$\Rightarrow \frac{2.4 \times 10^{12}}{x} = \frac{2.6 \times 10^{11}}{4 \times 10^8 - x}$$

solve for x to get:-

$$\boxed{x = 3.6 \times 10^8 \, m}$$