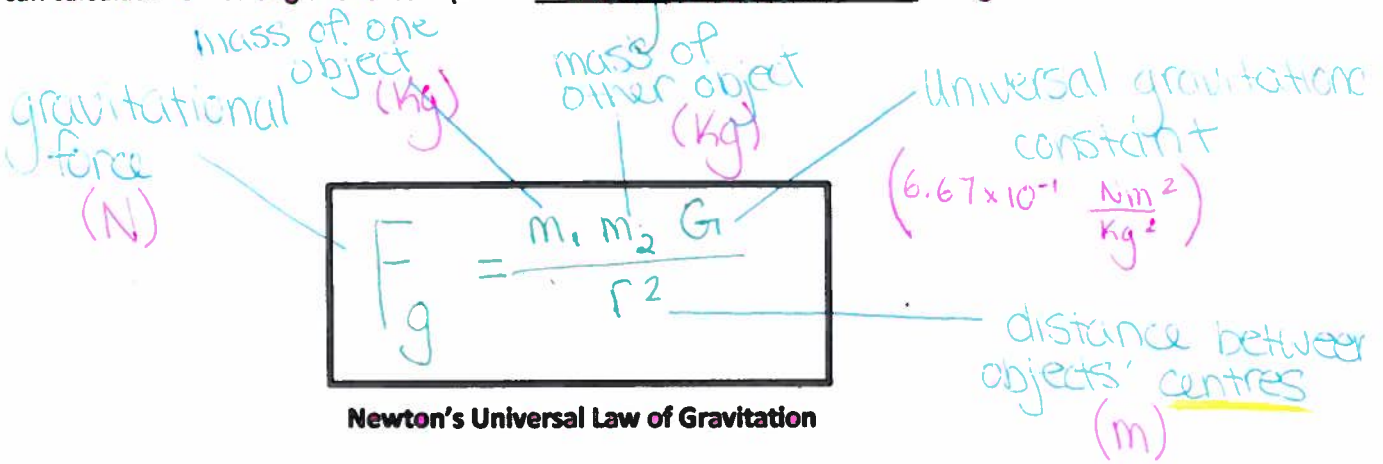
Saleena Jian
Physics 11
April 21 15

Unit 5 - Forces
Section 5.1: Newton's Universal Law of Gravitation

Gravity is a force that attracts every pair of objects in the universe. Its strength depends on their

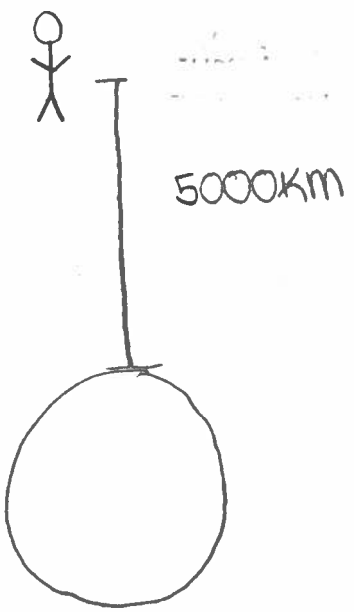
masses and the distance between them.

We can calculate how strong this force is (i.e. its magnitude **) using...**



Newton's Universal Law of Gravitation

Example: An astronaut at an altitude of 5000 km experiences a force of 215 N? What is the astronaut's mass?



mass of Earth
5.98×10^{24} kg

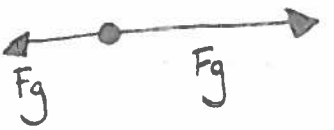
Radius of Earth
6.38×10^{6} m

$$F_g = \frac{m_1 m_2 G}{r^2}$$

$$\frac{F_g r^2}{m_2 G} = m_1$$

$$\frac{(215)(5\times10^6 + 6.38\times10^6)^2}{(5.98\times10^{24})(6.67\times10^{-11})} = 69.8\,kg = m_1$$

Example: Three objects, each with a mass of 10 kg, are placed in a straight line as shown below. What is the net force on the centre object due to the other two?



$$\sum \vec{F} = F_{gB} - F_{gA}$$

$$= \frac{m_B m_C G}{r^2} - \frac{m_A m_C G}{r^2}$$

$$= \frac{(10)(10)(6.67\times10^{-11})}{(0.4)^2} - \frac{(10)(10)(6.67\times10^{-11})}{(0.5)^2}$$

$$= \boxed{1.5\times10^{-8}\ \text{N right}}$$