$F_g = \frac{Gm_1m_2}{r^2}$

$F_{wt} = mg$

# Physics Unit 5 Quiz: Gravitational Force

**Name** _____ **Period** ___ **Date** _____ **Teacher** _____

1. List the scientists in order of the development of theories of gravity.

Aristotle
Galileo
Newton
Cavendish
Einstien

Aristotle Got Newton (a) Catapult Everyday

2. Compare and contrast the contributions to the theories of gravity by Aristotle and Galileo

1st Aristotle: Heavier falls faster → Galileo: All fall @ same rate

3. Explain Newton's contribution to the theories of gravity.

Newton $F_g$ equation: $F_g = \frac{G m_1 m_2}{r^2}$ Everywhere Everything Same $F_g = F_{wt} = mg$ only on earth $G \neq g$

4. How does the gravitational force change as objects move closer together?

closer r is smaller $\frac{1}{r^2}$ $F_g = \frac{G m_1 m_2}{r^2}$

5. What are the two ways that distance is measured between objects

1st Edge to Edge: r not

2nd Center to Center: r includes size of planet

a. What is the difference

b. Which should be used in calculating gravitational force

Celestial Bodies = Stuff in Space

6. The moon's gravitation pulls space debri toward the moon. What does the debri do?

Moon pulls debris by same force debris pulls moon

a. Which of Newton's Laws of Motion are represented by this interaction.

Newton's 3rd Law

b. Explain
- every action.
- = and opposite
- reaction

} action/reaction Force Pairs

c. Does the debri accelerate, decelerate, move at constant velocity, or move at constant acceleration toward the moon due to gravitational attraction?

$a_c = \frac{v^2}{r}$ as r↓ $a_c$↑ just as $F_g$↑ as r↓ a lot

Don't forget
- $r^2$
- use ( )
- small steps
- denom then numer then ÷

7. What is the gravitational force of a 550kg unicorn when visiting the lovely Saturn whose radius is $5.82 \times 10^7$m and mass is $5.68 \times 10^{26}$kg.

$F_g = ?$ $m_1$ $m_2$ r

$$F_g = \frac{G m_1 m_2}{r^2} = \frac{(6.67 \times 10^{-11})(550)(5.68 \times 10^{26})}{(5.82 \times 10^7)^2} = \frac{5.68 \times 10^{26}}{3.38 \times 10^{15}} = 6.15 \times 10^3 \text{ N}$$

8. Find the mass of an object that exerts a force of 1.7x1015N on a 3.6x1025kg object that is 2.3x1012m away

$m_2 = ?$ $F_g$ $m_1$ r

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

$$1.7 \times 10^{15} = \frac{(6.67 \times 10^{-11})(3.6 \times 10^{25}) m_2}{(2.3 \times 10^{12})^2}$$

$$1.7 \times 10^{15} = \frac{4.539 \times 10^{-10} (m_2)}{4.539 \times 10^{-10}}$$

$$m_2 = 3.74 \times 10^{24}$$