

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

$$F_{wt} = mg$$

Physics Unit 5 Quiz: Gravitational Force

Name _____ Period ____ Date _____ Teacher _____

- List the scientists in order of the development of theories of gravity.
- Compare and contrast the contributions to the theories of gravity by Aristotle and Galileo

Aristotle
Galileo
Newton
Cavendish
Einstein

Aristotle
Got (a)
Newt
Catapult
Everyday

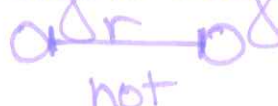
- Explain Newton's contribution to the theories of gravity.

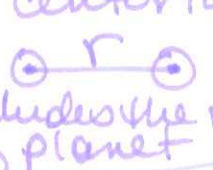
Newton
F_g equation
 $F_g = \frac{Gm_1m_2}{r^2}$
 $F_g = F_{wt} = mg$ only on earth
 same $g \neq g$
 whenever falls faster → All fall @ same rate

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

$2F_g = \frac{Gm_1m_2}{\frac{1}{2}r^2}$
 closer r is smaller

- What are the two ways that distance is measured between objects

1st Edge to Edge

 not

2nd Center to Center

 includes the r of planet

- What is the difference

- Which should be used in calculating gravitational force

- The moon's gravitation pulls space debris toward the moon. What does the debris do?

OK... moon pulls debris by the same force
 debris pulls moon

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

Newton's 3rd Law

- Explain
 - every action = and opposite reaction
 - Force Pairs

- Does the debris accelerate, decelerate, move at constant velocity, or move at constant acceleration toward the moon due to gravitational attraction?

$2a_c = \frac{v^2}{r}$ as $r \downarrow$ $a_c \uparrow$ just as $F_g \uparrow$ as $r \downarrow$

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

$$F_g = \frac{Gm_1m_2}{r^2} = \frac{(6.67 \times 10^{-11})(550)(5.68 \times 10^{26})}{(5.82 \times 10^7)^2} = \frac{5.68 \times 10^{26}}{3.38 \times 10^{15}} = 6.15 \times 10^{10} \text{ N}$$

- Find the mass of an object that exerts a force of 1.7×10^{15} N on a 3.6×10^{25} kg object that is 2.3×10^{12} m away

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

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

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

$$m_2 = \frac{4.539 \times 10^{-10}}{6.15 \times 10^{10}} = 3.74 \times 10^{24}$$

"Celestial Bodies" = stuff in space

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