12/11/2017

Review of Previous Lesson

- State as many Vocabulary words and Learning Objectives that you remember from the last lesson as you can.
- Now complete the content learning objectives.
- Remember to grade yourself from 0 – 3.

1

12/11/2017

Newton's Universal Law of Gravitation

Grade 7

2

12/11/2017

Vocabulary

Content:	Start	End
Newton		
law		
universal		
gravitation		
force		
directly		
proportional		
inversely		
Fg		

3

12/11/2017

Vocabulary

Language:	Start	End
calculate		
variables		

4

12/11/2017

Learning Objectives

Content:	Start	End
Discuss the difference between acceleration due to gravity and the force due to gravity.		
Calculate Fg given mass.		
Rearrange to calculate mass given Fg.		
Recognise increasing distance from source decreases force.		

5

12/11/2017

Learning Objectives

Language:	Start	End
Explain, using algebra and GFEMA, "working out".		

6

Newton's Law of Universal Gravitation

- Newton's law of universal gravitation is about the universality of gravity.
- Newton's place in the Gravity Hall of Fame is not due to his discovery of gravity, but rather due to his discovery that gravitation is universal.
  - ALL objects attract each other with a force of gravitational attraction. Gravity is universal.

Newton's Law of Universal Gravitation

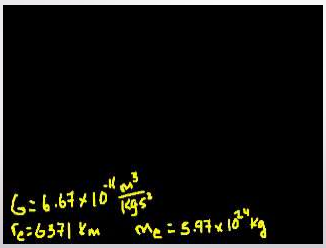
- This **force** of **gravitational attraction** is **directly dependent** upon the **masses** of **both objects** and **inversely proportional** to the **square** of the **distance** that **separates their centres**.

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

F = force applied on object 2 exerted by object 1
G = Gravitational Constant (6.673×10^{-11} Nm^2/kg^2)
m_1 and m_2 = the masses of objects 1 and 2 respectively
r = distance between the object's centres

Newton's Law of Universal Gravitation

(Khan Academy)
https://www.khanacademy.org/science/physics/centripetal-force-and-gravitation/gravity-newtonian/v/introduction-to-newton-s-law-of-gravitation



Newton's Law of Universal Gravitation

(Khan Academy)
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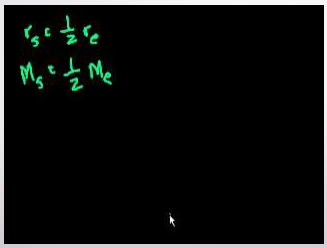


Newton's Law of Universal Gravitation

(apbiolghs - youtube)
https://www.youtube.com/watch?v=MTY1KjeoyLg

Difference between weight and mass?

- Mass:
  - A measure of how much matter (kg) an object has.
  - Does not change when an object's location changes.
- Weight:
  - A measure of the gravitational force (Newtons – N) acting on an object.
  - Changes with location.
    - https://www.nyu.edu/pages/mathmol/textbook/weightvmass.html
    - http://www.physicsclassroom.com/class/newtlaws/Lesson-2/Types-of-Forces
- W = mg or F_{grav} = mg
  - W = weight, F_{grav} = Force of gravity = Weight
  - m = mass
  - g = acceleration of gravity
    - Where does this equation come from?
      - **F = ma (Newton's Second Law)**

Problems and Solutions:

- Weight vs Mass:
  - Invent your questions regarding your weight on other planets using the following links:
    - http://www.physicsclassroom.com/class/circles/Lesson-3/The-Value-of-g
    - https://www.nyu.edu/pages/mathmol/textbook/weightvmass.html
    - http://www.rapidtables.com/convert/weight/kg-to-pound.htm
  - http://en.mcqslearn.com/o-level/physics/mcq/mass-weight-density.php?page=5
  - https://www.proprofs.com/quiz-school/story.php?title=force-weight-mass
  - https://quizizz.com/admin/quiz/54ef1aff1e246ab31e491b0a
  - https://reviewgamezone.com/mc/candidate/test/?test_id=23043&title=Mass%20Vs%20Weight
  - http://en.mcqlearn.com/science/g6/measuring-mass-mcqs.php
  - https://www.thatquiz.org/tq/previewtest?Y/J/R/C/50721317644863

How to properly use GFEMA:

G: givens – write down every value that the problem gives you with a symbol and units, separated by commas

F: find – write down the variable of the quantity you are looking for

E: equation – write down the equation you are going to use

- I highly recommend writing it in its standard format first and then rearranging, that way if you rearrange it wrong, the right equation is still there to get you credit

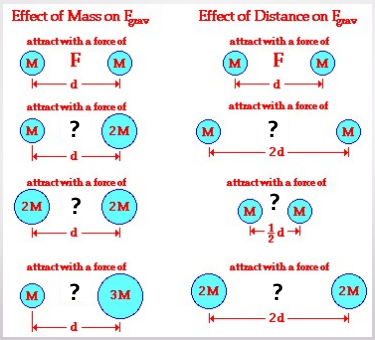
M: Math – substitute numbers here and solve.

- Show your working out (algebra and numbers). More work means more chances to find simple mistakes.

A: Answer – the answer, with units

- AND if you know the answer is wrong, and have no idea why – this is where you should tell me that.
- Please note: you DID the whole problem. Even if you got a wrong answer, it's all here.

Plenary



Plenary