Reminder: no food or drinks in the planetarium!

Astronomy 4 - *Solar System Astronomy*

Reminders

Instructor: Dr. Ann Marie Cody

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-Feel free to email me about course questions or astronomy in general.

Class website:

-*https://amcody.github.io/astro4*

Your one-stop shop for anything course related, including homework readings and exam practice material.

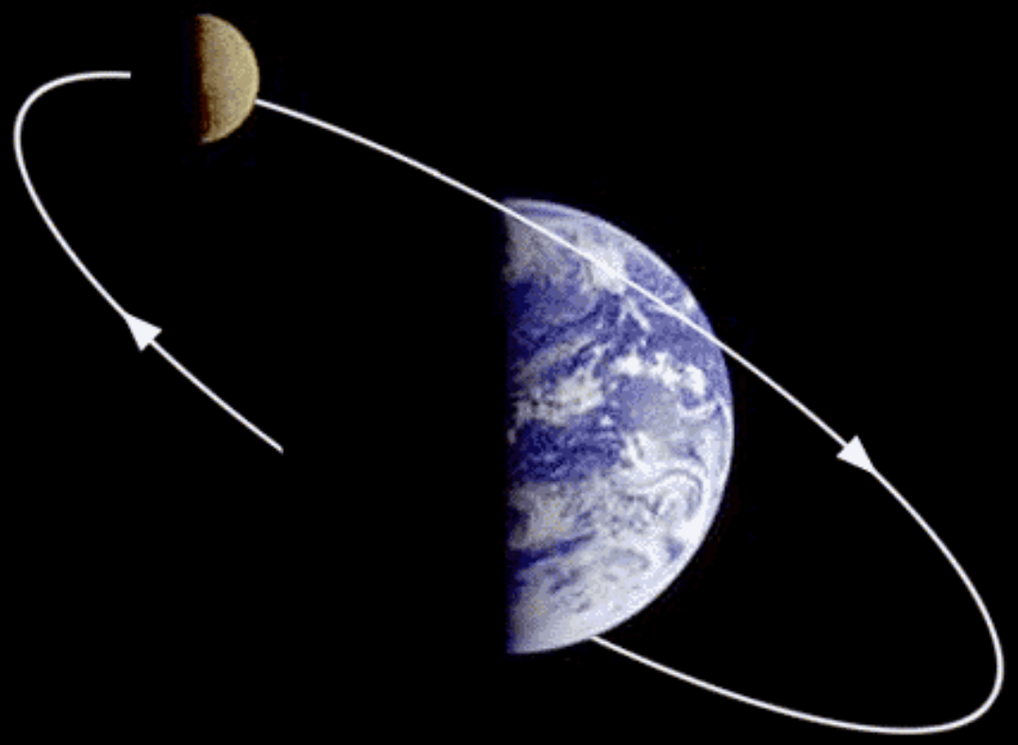
Lost and found:

-At the end of class, check to make sure you aren't leaving anything behind. Any items will be added to the Lost and Found box in back.

Newton eventually realized that some force must pull the moon toward Earth's center.

- If there were no such force altering the moon's motion, it would continue moving in a straight line and leave Earth forever.
- It can circle Earth only if Earth attracts it.

Hence … gravity!



Gravity – its not just a good idea, it's the law

- The mass of an object is a measure of the amount of matter in the object—usually expressed in kilograms.
- Mass is not the same as weight.
  - An object's weight is the force that Earth's gravity exerts on the object.
  - We tend to measure weight in pounds.

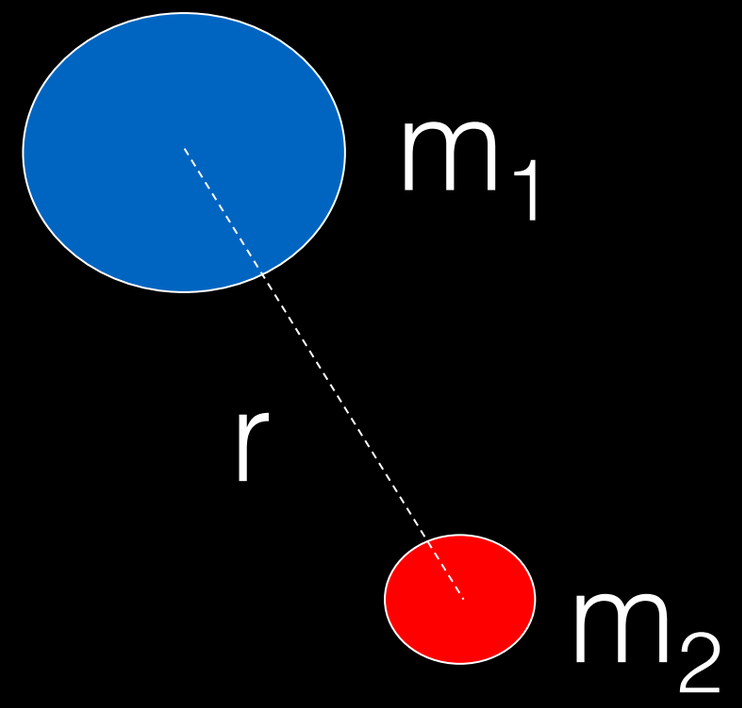
Newton's Law of Gravitation

- Newton's law of gravitation states: Two bodies attract each other with a force that is directly proportional the product of their masses and is inversely proportional to the square of the distance between them.

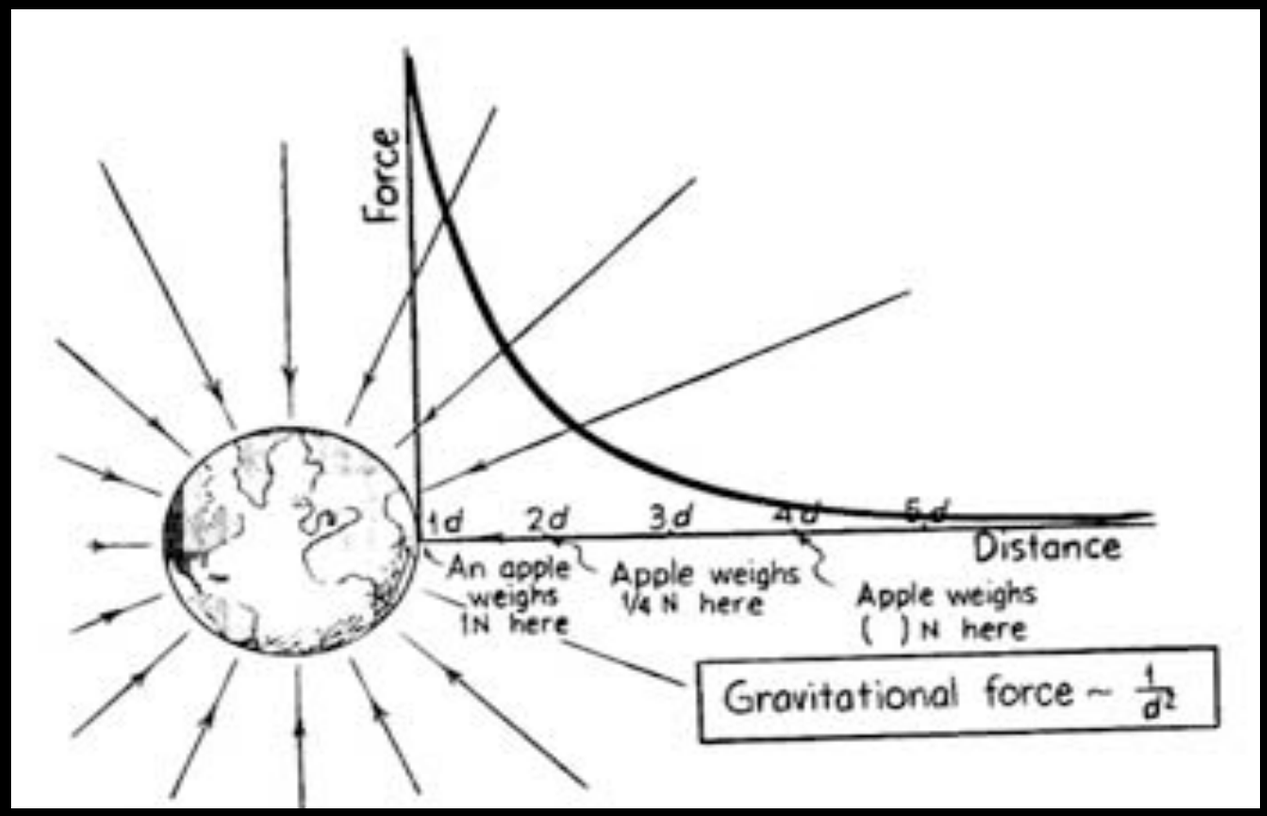
Newton's Law of Gravitation

- To figure out the gravitational force just multiply the mass of the two things together then divide by the distance they are apart (squared).

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



- Newton recognized that the force of gravity decreases as the square of the distance between the objects increases – the inverse square law
  - Specifically, if the distance from Earth to the moon were doubled, the gravitational force between them would decrease by a factor of 2^2, or 4.



True or False: You have the same mass on Earth as you do on the moon?

A) True

B) False

True or False: You have the same mass on Earth as you do on the moon?

A) True

B) False

You have the same mass but will weigh less

Q: If we moved the Earth from 1 AU to 2 AU the force of gravity on the Earth from the Sun would be

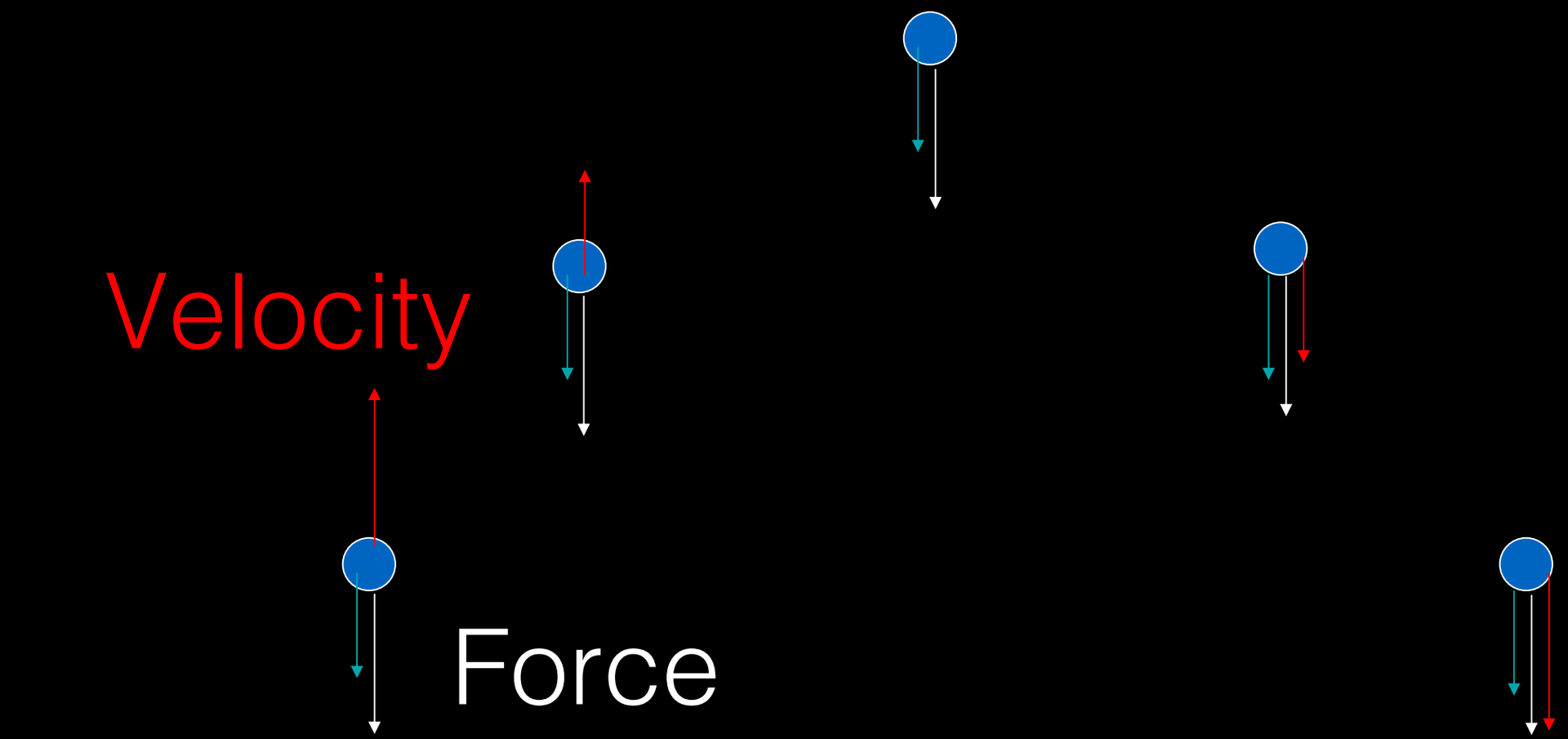
A) Twice as much
B) Four times as much
C) ½ as much
D) ¼ as much
E) None of the above

Q: At this distance the force of the Earth on us would be

A) Twice as much
B) Four times as much
C) ½ as much
D) ¼ as much
E) None of the above

Newton's Law and Gravitation

- All my favorite Projectiles behave like this!!!



Newton's friend Edmund Halley predicted the comet would return in 1758 and it did!