Circular Motion & Gravity Practice Test - Pre-AP Physics Name:_____

Gravitate to an A in a round about way!

Short Answer

1. What does the word *centripetal* mean?

2. For an object in uniform circular motion, there must be a *centripetally / centrifugally* (circle one) directed force acting on the object.

3. The acceleration of an object in uniform circular motion depends on two things. List the two.

4. For the following examples, name the force responsible for uniform circular motion:

An electron orbiting a positive atomic nucleus_____

A satellite orbiting the Earth_____

A car turning on a flat road_____

A stopper spinning in the String in the Glass Tube Lab_____

A person in a roller coaster loop-the-loop_____

5. Some physics students casually refer to these three using the same word (gravity), but what's the difference between $\mathbf{F_g}$, **G** , and **g** ?

6. Suppose the distance between two students on the gym floor is suddenly increased to 3 times its original value. What happens to the gravitational force between the two?

Increase / decrease / stays the same? (circle one)
If it changes, by how much?
Would the two students notice?

7. Which of Kepler's 3 Laws of Planetary Motion overthrew the ancient idea that planets traveled in circles? *1st, 2nd, or 3rd?* (circle one--if you can't remember the number and would rather summarize the law, that's fine to do instead)

8. Which of Kepler's 3 Laws of Planetary Motion overthrew the ancient idea that planets traveled at constant speeds in their orbits? *1st, 2nd, or 3rd* (circle one--if you can't remember the number and would rather summarize the law, that's fine to do instead)

9. Tarzan (m = 87 kg) swings on a 10.0 meter long vine in a circular arc. At the bottom of the swing the tension in the vine is 1200 N. Draw a free body diagram and use it to help calculate the speed of Tarzan at the bottom of his swing.

F.B.D.:

Speed =

10. Brian swings a bucket full of water around in vertical circle. The distance from his shoulder socket to the center of mass of the bucket is 1.25 m. Starting with a free-body diagram and Newton's 2nd Law, determine the minimum speed he must swing the bucket at the top of its path in order to complete the circular path.

F.B.D.:

Speed =

11. A 2.00 kg mass and an 8.00 kg mass are positioned 6.00 meters apart. Find the position one could place a 3rd mass in-between them such that the net gravitational force on it is zero.

Distance from
smaller mass:

12. Europa, a moon of Jupiter, apparently has liquid water under its icy surface. What value of **g** would an "Europan" life-form experience near the surface of Europa if the mass of the moon is 4.8×10^{22} kg and its radius is 1,561 km. (for comparison, g for Earth's Moon is 1.6 m/s^2)

g =

13. The dwarf planet Pluto's largest moon is named Charon. If Charon orbits in a radius of 17,536 km and with a period of 6.387 days, determine the mass of Pluto.

Mass =