

Name _____ Hour _____

Review for the Circular Motion and Gravity Test

Make sure you understand all the information on:

Flying Pigs Assignment
Gravity Notes
Level 1 and Level 2 Problems

Pendulum Lab
Summary of circular motion and gravity
Book assignment

Circular Motion and Centripetal Force.

1. Explain the difference between " Δt " and "T."
2. Explain the difference between centripetal force and centrifugal force.
3. Calculate the speed in **miles per hour** that we travel around the sun if the average radius is 1.5×10^{11} m. (ans. about 66,870 mph) (Yes you do know T!) **Assume circular path at constant speed**
4. Calculate the centripetal force acting on you (mass 60 kg) if you are driving in a circle with a radius of 6.37 meters and it takes you 47 seconds to drive around that circle 10 times. (ans. 683 N)
5. You (mass 65kg) are at a NASA training center preparing to handle g-forces in space. You get inside a capsule with a radius of 3 meters that spins in a plane that is parallel to the floor. If you spin at 35 **miles per hour**, how many g's will you experience? (ans. 8.3 g's)

Gravitation

6. Calculate the gravitational force between the earth and the moon. (The earth and the moon are at an average distance of 3.8×10^8 m apart. The distance includes the radius already! The mass of the moon is on your equation sheet) (ans. 2.03×10^{20} N)
7. What happens to the acceleration due to gravity as you go further away from the earth? _____
8. Calculate the acceleration due to gravity on the **moon**. (1.62 m/s^2)

Name _____ Hour _____

9. What 2 variables does gravitational force depend on? _____
10. What are the units of: F_g , g , G , and F_c ?
11. In order for an object to stay in a consistent orbit, what 2 forces must be equal? _____
12. Calculate the velocity a satellite must have in order to maintain an altitude of 1,500,000 m above the **earth's surface**. (ans. 7,119 m/s)
13. Calculate your **weight in Newtons** and **how many g's** you would feel (compared to weight on Earth) if you were 804,500 m above the surface of **Jupiter** (mass 1.9×10^{27} kg, radius 71,492,000 m). You can assume your mass is 65 kg. (ans. 1,576 N, 2.47 g's)
14. Calculate the height of a satellite from the center of the Earth (r) if it is moving around the earth at 6928 m/s and the gravity there is 5.78 m/sec^2 . (about $8.3 \times 10^6 \text{ m}$)

Pendulums

15. What variable(s) (length, mass, gravity) affect(s) the period of a pendulum? Explain how the equation for a pendulum backs up your answer.
16. A friend bets you that you can't make a pendulum with a period of exactly one second. What length would you make it and how much mass would you attach to the end of it? Show your calculations. (ans. 0.25 m, doesn't matter)
17. Find the length of a pendulum on the MOON ($g=1.62 \text{ m/s}^2$) that has a period of 2.15 sec.