Circular Motion/Waves Practice Test

You are in the Rotor ride at Great Adventure. You have a mass of 60 kg, and are against the wall in a round room with a radius of 3.0 meters, which is rotating at 4.0 m/s. From above, the room is rotating clockwise.

1. Draw the view from above for this ride. Clearly indicate where you are, and the direction of your velocity and acceleration.

2. What is the magnitude of the centripetal acceleration?

3. What is the magnitude of the centripetal force?

4. Explain, briefly, why you feel pressed back into the wall when you ride this ride, and what is actually happening.

5. The moon has a mass of 7.35 x 10^{22} kg. The earth has a mass of 5.98 x 10^{24} kg. They are 4 x 10^8 meters apart. Determine the force between them.

6. An astronaut has a mass of 100 kg. What is his weight on earth?

7. An astronaut has a mass of 100 kg. His weight on the moon is 160 N. What is the acceleration due to gravity on the moon?

A 100 kg satellite is orbiting a small planet at a radius of 1,000,000 m. The satellite is moving at 100 m/s.

8. What is the centripetal force on the satellite?

9. What is the mass of this small planet (given that is produces this force on the satellite)?

10. Give 2 examples of transverse waves.

11. Give 1 example of a longitudinal wave.

12. Draw a periodic wave, and indicate the amplitude and wavelength.

13. The speed of sound is 346 m/s. If it takes thunder 5 seconds to reach you, how far away is the lightning?

14. The speed of sound is 346 m/s. If a note has a frequency of 512 Hz, what is its wavelength?

15. When a transverse wave moves through a medium, what is the action of the particles of the medium?

16. When an opera singer hits a high pitch note, a glass on the opposite side of the opera hall shatters. Explain this phenomenon.

17. You are standing by the side of the road, and an ambulance rushes past you. What happens to the frequency of the siren's sound as it passes you?