

Practice Exam 1

- The slope of a graph of the acceleration of a particle vs. time is
 - velocity
 - acceleration
 - rate of change of acceleration
 - position
- A bowling ball is dropped from a height of 200 meters. How long does it take to reach the ground?
- What must the vertical component of the initial velocity of an artillery shell be in order for the shell to reach a maximum altitude of 1 mile?
- True or False: Due to the presence of air resistance, an artillery shell must be fired at angle less than 45 degrees to the horizontal in order to travel the greatest distance.
- True or False: For low velocities, the force of air resistance increases linearly with velocity.
- True or False: The acceleration of a particle may be described as a vector.
- Consider two velocity vectors. The components of the first vector are 300 m/sec north and 400 m/sec east. The components of the second vector are 200 m/sec south and 400 m/sec west. What are the components of the velocity that is the sum of these velocity vectors?
- The velocity of an airplane relative to the air is 300 mph north and 400 mph east. The velocity of the air relative to the ground is 200 mph south and 400 mph west. What is the velocity of the airplane relative to the ground?
- The vertical component of the initial velocity of a rocket is 400 m/sec, and its horizontal component is 300 m/sec. What is the initial speed of the rocket?
- The minute hand of a clock tower is 5 meters long. What is the magnitude of the acceleration of the tip of this minute hand in meters/sec²?
- What is the angular velocity about the rotational axis of the earth of a person sitting at the equator? Give your answer in radians per second.
- An ocean liner has a total mass of 10^7 kilograms. Her captain throws its engines into reverse. The backward force of the engines together with that of the water comes to 10,000 kg-m/sec². What is the magnitude of the acceleration felt by the passengers?
- True or False: Your mass on the moon is the same as your mass on earth.
- True or False: If a particle is in motion, it must have a force currently acting on it.
- A 1-kg brick is on a plane inclined at an angle of 30 degrees to the horizontal. What is the component of the brick's weight in the direction parallel to the surface of the inclined plane?
- A 50-kg chandelier is suspended from the ceiling by a chain. What is the tension in

the chain?

17. Which of Newton's laws says that objects at rest tend to remain at rest and those in motion tend to remain in motion?
18. An object has 4 forces acting on it. These forces point in different directions outward from the object. The object is not moving. Is the object in equilibrium?
19. A woman weighing 300 lbs stands on a concrete sidewalk whose density is 418 grams per cubic centimeter. What is the force exerted by the sidewalk on the woman?
20. A particle moves in a circle at a constant speed. Is its velocity constant?
21. A carnival ride consists of a cylindrical room that rotates about its axis of symmetry. Riders stand against the curved wall of the cylindrical room. After the room sufficiently increases its rate of rotation, the floor of the room is caused to drop away. The riders find that they are held in place against the wall and do not fall. Assuming that the coefficient of static friction μ between the wall and the riders is 0.5 and that the radius of the room is 5 meters, what is the minimum rate of rotation of the cylindrical room required to keep the riders from falling? Express your answer in rotations per minute.

