Assignment 4

1. A skateboarder performs a trick over a ramp. The ramp is inclined at an angle of 30 degrees to the horizontal. The skateboarder's speed at the top of the ramp is 4 m/s. Assuming no friction, what is the maximum height reached by the skateboarder?

2. A ball is thrown vertically upward with an initial velocity of 20 m/s. How long does it take for the ball to reach its maximum height?

3. A car is traveling on a circular track with a radius of 50 m. If the car is moving at a speed of 30 m/s, what is the centripetal acceleration experienced by the driver?

4. A Ferris wheel with a radius of 20 m rotates once every 4 minutes. What is the centripetal acceleration experienced by a rider at the top of the Ferris wheel?

5. A particle moves in a circle with a constant angular speed of 2 rad/s. If the radius of the circle is 10 m, what is the tangential speed of the particle?

6. A pendulum is released from a height of 1 m. If the length of the pendulum is 1 m, what is the maximum angular displacement of the pendulum?

7. A planet orbits the sun in a circular path with a radius of 1.5 x 10^11 m. If the speed of the planet is 30 km/s, what is the orbital period of the planet?

8. A block is sliding down an inclined plane at an angle of 30 degrees. The coefficient of kinetic friction between the block and the plane is 0.2. If the mass of the block is 5 kg, what is the acceleration of the block?

9. A ball is thrown horizontally from a height of 2 m with a velocity of 10 m/s. How far from the base of the cliff will the ball land?

10. A spring with a force constant of 100 N/m is compressed by 0.5 m. If a 1 kg mass is attached to the spring, what is the maximum height reached by the mass?

11. A block is attached to a spring with a force constant of 200 N/m. The spring is compressed by 0.2 m. If the block is released from the compressed spring, what is the maximum speed of the block?

12. A block is placed on an inclined plane at an angle of 30 degrees. The coefficient of static friction between the block and the plane is 0.3. If the mass of the block is 2 kg, what is the minimum force required to move the block up the plane?

13. A pendulum with a mass of 2 kg and a length of 1 m is released from a height of 1 m. If the bob of the pendulum is 0.5 m from the point of suspension, what is the tension in the string?

14. A block is pushed on a frictionless horizontal surface with a force of 5 N. If the mass of the block is 2 kg, what is the acceleration of the block?

15. A mass of 1 kg is suspended from a spring with a force constant of 200 N/m. If the spring is compressed by 0.1 m, what is the maximum height reached by the mass?

16. A block is placed on a frictionless inclined plane at an angle of 30 degrees. The block is pushed with a force of 5 N. If the mass of the block is 2 kg, what is the acceleration of the block?

17. A ball is thrown vertically upward with an initial velocity of 20 m/s. How long does it take for the ball to reach its maximum height?

18. A car is traveling on a circular track with a radius of 50 m. If the car is moving at a speed of 30 m/s, what is the centripetal acceleration experienced by the driver?

19. A block slides down an inclined plane at an angle of 30 degrees. The coefficient of kinetic friction between the block and the plane is 0.2. If the mass of the block is 5 kg, what is the acceleration of the block?

20. A pendulum with a length of 1 m and a mass of 2 kg is released from a height of 1 m. If the bob of the pendulum is 0.5 m from the point of suspension, what is the tension in the string?