

YEAR 13 PHYSICS

WORKSHEET 01

STRAND 1: MECHANICS

1. Which concept is used to determine the escape velocity of an object?

- A. Electric force equals magnetic force.
- B. Kinetic energy equals potential energy.
- C. Centripetal force equals gravitational force.
- D. Rotational energy equals translational energy.

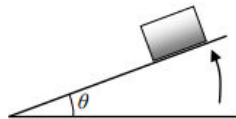
2. The mass of an object is calculated from experimental data to be 28.6789 g. The \pm absolute error in the mass was determined to be ± 0.4 g. The mass should be reported, in g, as

- A. 29 B. 28.7 C. 28.68 D. 28.679

3. What is the analogy to mass in rotational motion?

- A. Torque. B. Moment of inertia. C. Angular momentum. D. Angular acceleration.

4. The diagram below shows a block sliding down a plane which is inclined at an angle θ with the horizontal. As angle θ is increased, the coefficient of kinetic friction between the bottom surface of the block and the surface of the incline will



- A. increase. B. decrease. C. becomes zero. D. remain the same.

5. Two objects, each with a mass of 1 kg are separated by a distance of 1 m. The gravitational force between the two objects is

- A. twice G B. equal to G C. less than G D. greater than G

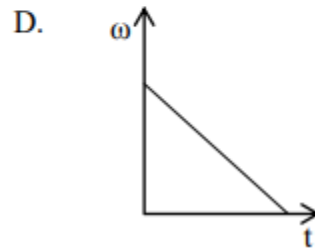
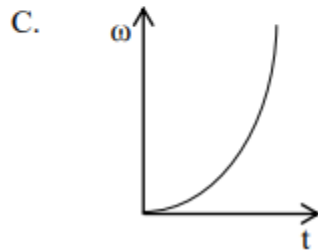
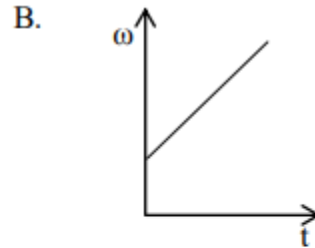
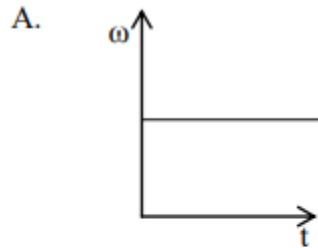
6. If moment clockwise is equal to moment anticlockwise then the system will

- A. collapse. B. rotate clockwise. C. remain stationary. D. rotate anticlockwise.

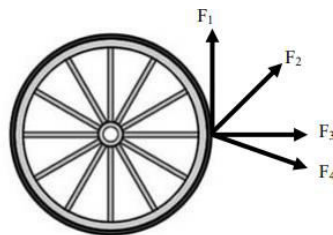
7. Which of the following is analogous to torque in linear motion?

- A. Mass B. Force C. Momentum D. Acceleration

8. Which of the following graphs best describe a rotating object slowing down?



9. The diagram given below shows the direction of four forces of equal magnitude acting at a point on a bicycle wheel.



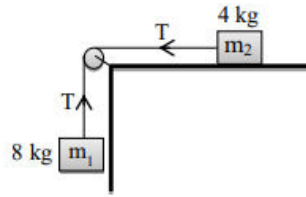
Which of the forces will give the maximum torque?

- A. F_1 B. F_2 C. F_3 D. F_4

10. Which of the following is a requirement for conservation of angular momentum?

- A. The net force on the body is zero. B. The net torque on the body is zero.
C. The kinetic energy of the body is zero. D. The net momentum of the body is zero.

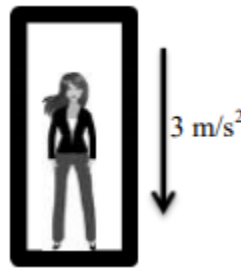
11. Two masses, ($m_1 = 8 \text{ kg}$ and $m_2 = 4 \text{ kg}$) are suspended over a frictionless pulley by a light inelastic string as shown in the diagram. The coefficient of kinetic friction, μ , between mass m_2 and the surface is 0.3.



Calculate the following:

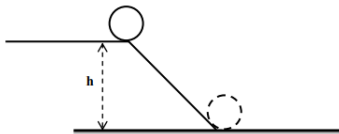
- (i) force of friction, F_f , on mass, m_2 . (1 mark)
- (ii) acceleration of the masses. (2 marks)

12. Abha who has a mass of 70 kg uses an elevator while coming down a building. The elevator descends at 3 m/s^2 .



- (i) Would Abha feel lighter or heavier while the elevator is accelerating downwards? (1 mark)
- (ii) Calculate Abha's apparent weight if her true weight is 700 N. (2 marks)

13. A spherical ball of mass m , and radius r , starts from rest at a height, h , and rolls down on a frictionless incline without slipping as shown below. Take the rotational inertia of the spherical ball to be $I = \frac{2}{5}mr^2$

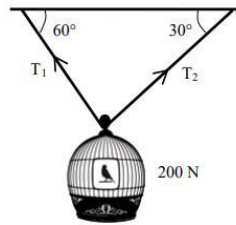


- (i) Describe the type of motion the spherical ball is undergoing. (1 mark)
- (ii) Show that the velocity, v , at the bottom of the incline is: $V = \sqrt{\frac{10gh}{7}}$ (3 marks)

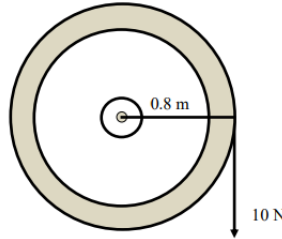
14. A bird cage weighing 200 N is suspended from a beam as shown below.

Calculate the following:

- (i) T_1 (2 marks)
- (ii) T_2 (1 mark)



15. A wheel with a radius of 0.8 m and a moment of inertia of 4.8 kgm^2 has a constant force of 10 N applied tangentially at the rim as shown below. Calculate the:

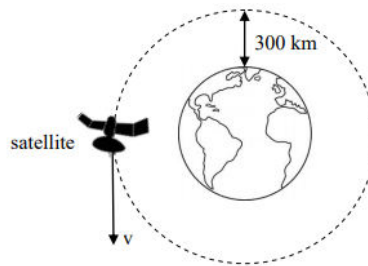


- (i) angular acceleration. (2 marks)
- (ii) angular speed, ω , after 4 s from rest. (1 mark)

16. A communication satellite is placed in a circular orbit, 300 km above the earth's surface.

Calculate the:

- (i) orbital speed of the satellite. (2 marks)
- (ii) period of the satellite. (1 mark)



17. A 50 kg satellite orbits 300 km above the surface of the earth. Calculate the following energies of the satellite.

- (i) Kinetic energy (1 mark)
- (ii) Gravitational potential energy (1 mark)
- (iii) Total energy (1 mark)

THE END.