

BA SANGAM COLLEGE
YEAR 13
PHYSICS
WORKSHEET 4

1. 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

2. Which of the following rotational quantities is analogous to force in linear motion?
 - A. Inertia
 - B. angle in radians
 - C. angular speed
 - D. Torque

3. If a net torque is applied to an object, then that object would experience
 - A. an angular acceleration.
 - B. a constant angular speed.
 - C. a constant moment of inertia.
 - D. an increasing moment of inertia

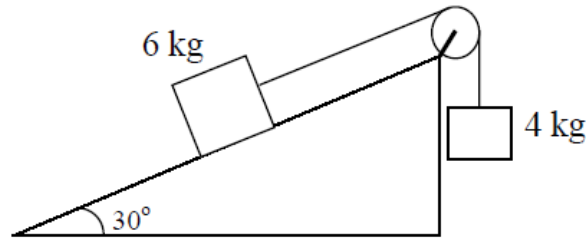
4. A group of students measured the length of a glass slide *as $6.8 \pm 0.1 \text{ cm}$* and the width as *$2.6 \pm 0.1 \text{ cm}$* . Calculate the area of the glass slide with the correct absolute uncertainty.

5. Show that the equation $x = \frac{1}{2}gt^2$ is dimensionally consistent.

6. Two quantities x and y are related by the equation $y=0.25x^2$.
 - (i) Express the equation $y=0.25x^2$ in logarithmic form that can be used to draw a straight line graph.
 - (ii) If a graph of **log y** versus **log x** is drawn, find the values of the **gradient** and **y-intercept**.

7. Obtain a linear graph for the relation $m = Kb^n$

8. A 6kg mass rests on a 30° inclined plane. The coefficient of friction between the mass and the plane is 0.1.



When a 4kg mass is connected via a string and pulley as shown, the masses start to move.

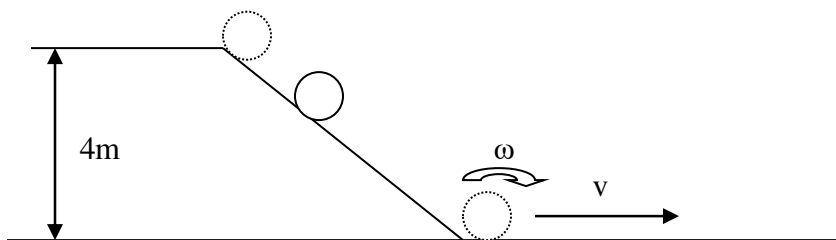
- Calculate the force of friction on 6kg mass.
- Hence determine the acceleration of the system.

9. A car rounds an unbanked curve of radius 40m without skidding at a speed of 15m/s. What is the coefficient of friction between the tires and the road?

10. The flywheel of a motor has a mass of 500kg and a moment of inertia of 575kgm^2 . The motor develops a constant torque of 210Nm as the flywheel starts from rest.

- What is the angular acceleration of the flywheel?
- What will be its angular velocity after making four revolutions?
- How much time was taken to make the four revolutions?

11. A barrel of moment of inertia, $(I = mr^2) = 0.6\text{kgm}^2$ about its axis is rolled down a slope of height 4m as shown below.



The barrel has a mass of 15kg.

- What is the total energy at the top of the slope?
- Determine the linear and the angular velocity of the barrel at the foot of the slope?
- Calculate the translational and the rotational kinetic energy at the foot of the slope?