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 ± 0.1 cm*** and the width as ***2.6 ± 0.1 cm.*** Calculate the area of the glass slide with the correct absolute uncertainty.

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

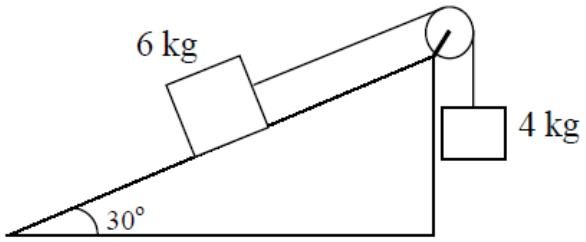
6. Two quantities x and y are related by the equation $y=0.25x^2$.

(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 $\boldsymbol{m = Kb^n}$

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.

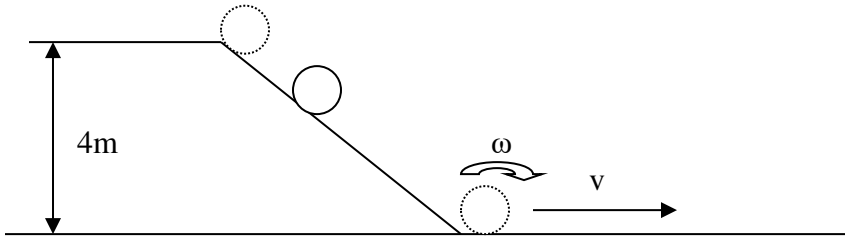
a. Calculate the force of friction on 6kg mass.
b. Hence determine the acceleration of the system.

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.

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

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



The barrel has a mass of 15kg.

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