RISHIKUL SANATAN COLLEGE
YEAR 12 PHYSICS REVISION SHEET 1

Uncertainties & Measurement

1. State the number of **significant figures** in each of the following:
   (i) 0.053 (ii) 9.005 (iii) 0.3670
   (iv) 12001 (v) 300

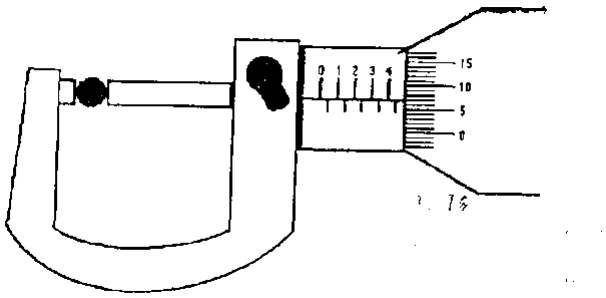
2. Using the rules of significant figures to evaluate the following:
   (i) 0.04 x 31.65 (ii) 32.5 x 3.325 (iii) 430.56 + 53.004
   (iv) 20 ÷ 0.3 (v) 5.14 + 0.5 + 11
   (vi) 9.16 x 0.2 ÷ 0.03

3. The dimensions of one of the sides of a microscopic slide with its appropriate uncertainities are:
   length = *7.6 ± 0.1 cm*
   width = *2.6 ± 0.01 cm*

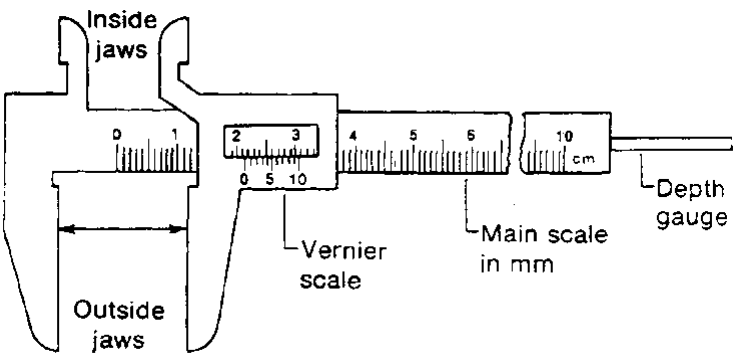
   Calculate the area of the slide giving your answer with **appropriate** uncertainities.

4. Given A = 2.5 ± 0.1 and B = 5.45 ± 0.01 ,
   Calculate the value of:
   (i) A + B (ii) B – A (iii) A x B (iv) B ÷ A
   (v) 2A (vi) B^2

5. State the reading of the following instruments giving your answers with appropriate uncertainties:
   (i)



   (ii)



YEAR 12 PHYSICS REVISION SHEET 2
Graphs and Relationships

1. State whether the following are a derived quantity , derived unit, fundamental quantity or fundamental unit:

(i) mass (ii) power (iii) Newton (iv) seconds
(v) Joules (vi) Temperature (vii) Torque
(viii) Volts

2. Write the following numbers using **prefixes**:

(i) 2×10^{-6} m (ii) 3.16×10^{6} J (iii) 500×10^{-3} g
(iv) 7×10^{-9} m (v) 2×10^{-5} m

3. Write the following numbers in **standard form** :

(i) 2 km (ii) 700 nm (iii) 5.67 μC
(iv) 50 MW (v) 32.3 cm (vi) 2 mg

4. Convert the following units :

(i) 200 mm to m (ii) 10 cm^2 to m^2 (iii) 20 km/hr to m/s
(iv) 50 g/cm^3 to kg/m^3 (v) 20 cm^3 to m^3 (vi) 50 μm to m
(vii) 700 nm to m (viii) 2.5 mm^2 to m^2

5. For the given equations:
(a) state the type of relationship between the stated variables
(b) sketch a suitable graph.
(c) state the significance of the slope of the graph (if any).

(i) $F = kx$ [F and x] (ii) $F = ma$ [a and m]

(iii) $E_k = \frac{1}{2} m v^2$ [E_k and v] (iv) $E = \frac{KQ}{r}$ [E and r]

(v) $F = \frac{GMm}{r^2}$ [F vs r] (vi) $s = ut + \frac{1}{2} at^2$ [s and t]

(vii) $E = \frac{1}{2} k x^2$ [E and x^2]

6. Which of these equations shows that y is inversely proportional to x?

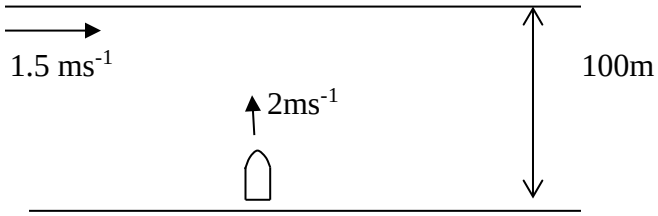
A. $y = 4x$ B. $xy = 4$ C. $\frac{x}{y} = 4$ D. $4y = x$

7. Which of the following quantities can be resolved into components in specified directions?

A. Mass B. Force C. Energy D. Temperature

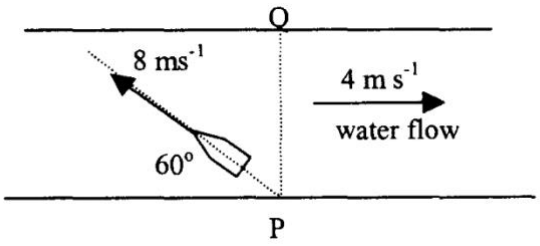
YEAR 12 PHYSICS REVISION SHEET 3
Relative Velocity

1. A man from Nausori rows a punt at a steady speed of $2ms^{-1}$. He sets out at right angles to the Rewa river which is 100m wide at this section of the river. The river flows downstream at $1.5ms^{-1}$.



(i) How long will it take to cross the river?
(ii) How far downstream does he land?
(iii) What is the speed of the punt relative to the river bank?

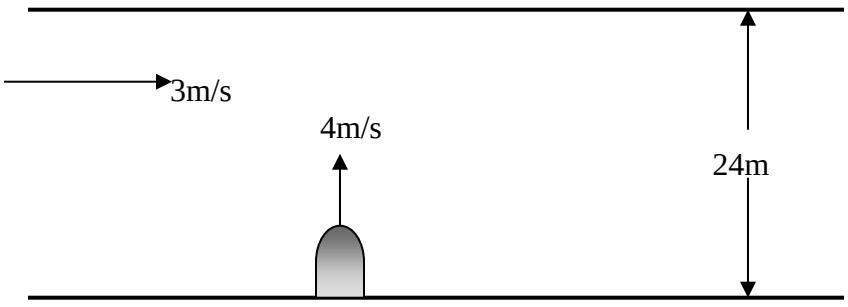
2. A boat has a water speed of 8 ms^{-1}. It aims upstream across a river at an angle of 60° to the river bank. The water flows downstream at a speed of 4 ms^{-1}.



3. The boat in the situation above will
A. reach the other bank at Q.
B. reach the other bank at a point to the left of Q.
C. reach the other bank at a point to the right of Q.
D. not reach the other bank since the river flow is too strong.

4. If the boat takes 14 s to reach the other bank, then the width of the river is approximately
A. 48 m B. 83 m C. 97 m D. 107 m

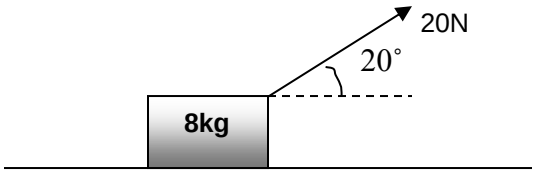
5. A motor boat is traveling directly across a river at its maximum engine speed of 4m/s relative to water. The speed of the current is 3m/s East and the width of the river is 24m.



The distance boat is carried downstream while crossing the river is:
A. 24m B. 18m C. 14.4m D. 8m

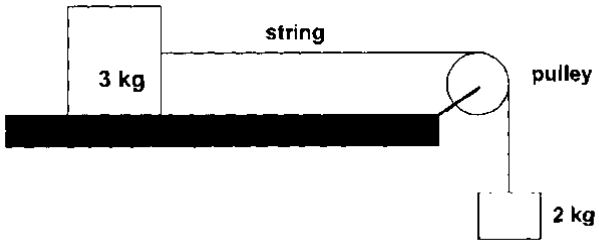
YEAR 12 PHYSICS REVISION SHEET 4
Forces in motion

1. A 20N force is applied to an 8kg mass as shown, by pulling on a light cord at an angle of elevation of 20˚.



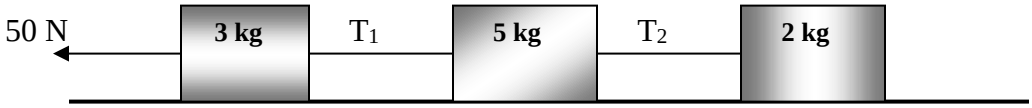
(i) Find the acceleration of the mass.
(ii) Calculate the normal reaction force applied by the surface on the mass.

2. A hanging 2 kg mass is connected to a 3 kg mass on a smooth horizontal surface by a light string passing round a smooth pulley.



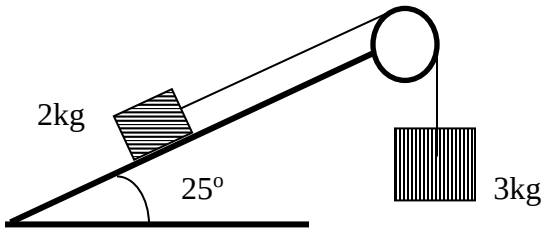
(i) Calculate the acceleration of the masses.
(ii) Determine the tension in the string.

3. Three masses are connected with a light inextensible string on a frictionless horizontal surface.



Calculate :
(i) the acceleration of the 5kg mass.
(ii) the acceleration of the 2 kg mass.
(iii) the value of T_1 and T_2.

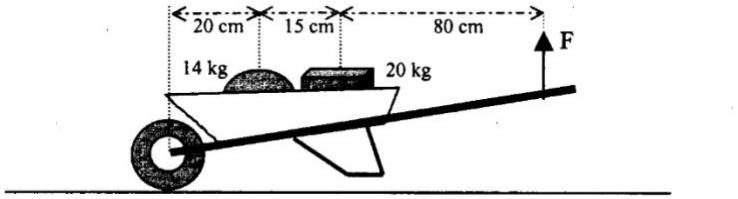
4. A 2kg mass is at rest on a frictionless slope as shown in the diagram below. This mass is connected by a light inextensible string over a frictionless pulley to a 3kg mass.



Calculate:
i) The acceleration of the system.
ii) The tension in the string.

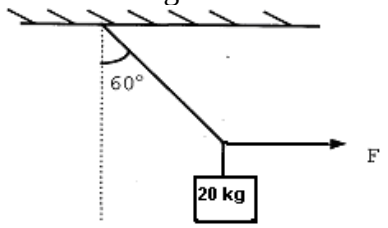
YEAR 12 PHYSICS REVISION SHEET 5
Torque and Equilibrium

1. The wheelbarrow below has a 14 kg load placed 20 cm from the axle (the wheel), and a 20 kg load placed 35 cm from the axle as shown.



Calculate the minimum force F, applied 115 cm from the axle, which must be exerted in order to lift the loads in the wheelbarrow.

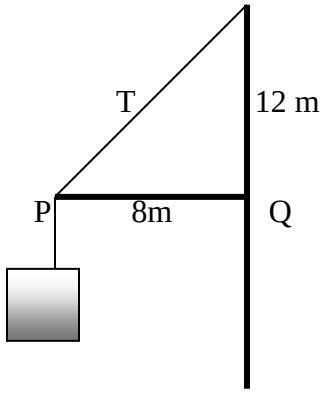
2. A mass or 20 kg is supported by a thin cord attached to the ceiling. It is being pulled by a horizontal force until the cord makes an angle of 60° with the vertical as shown below.



The **magnitude** of the horizontal force F is:

A. 346N B. 200N C. 173N D. 100 N

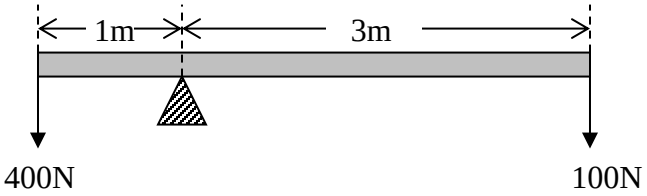
3. A mass of 500kg hangs from a wall over a frictionless pulley as illustrated:



(i) Find the tension on the string.

(ii) Find the force on the support PQ.

4. A uniform rod shown below is loaded and is pivoted so that it is in equilibrium.

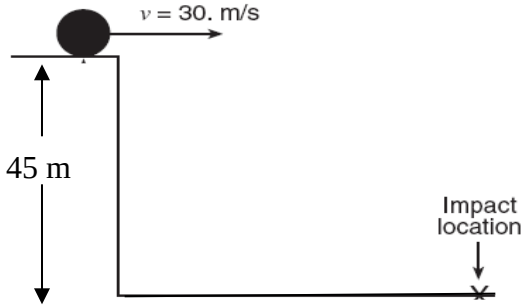


The weight of the rod is:

A. 500N B. 300N C. 200N D. 100N

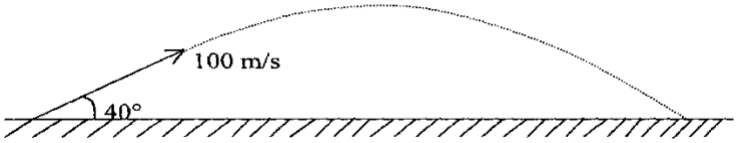
YEAR 12 PHYSICS REVISION SHEET 6
PROJECTILE MOTION

1. A projectile is launched horizontally at a speed of 30 m/s from a platform located a vertical distance *of 45m above* the ground. The projectile strikes the ground after some time.



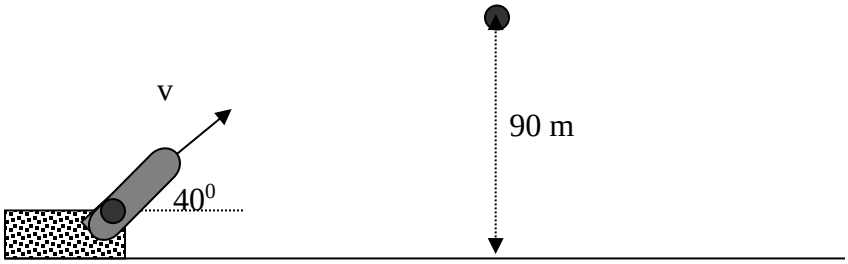
i) Determine the time taken for the projectile to reach the ground.
ii) Calculate the horizontal distance the projectile travels.
iii) Determine the velocity with which the projectile strikes the ground.

2. A projectile is launched with a velocity of 100m/s at an angle of 40° to the horizontal as given below:



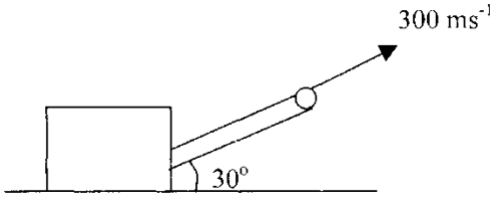
Calculate:
(i) the time of the flight;
(ii) the maximum height reached;
(iii) the range (horizontal distance).

3. A cannon ball is released at an angle of 40^0 with a velocity as shown. It rises to a vertical height of 90 m.



Calculate the initial speed, *v* with which the ball is released from the cannon.

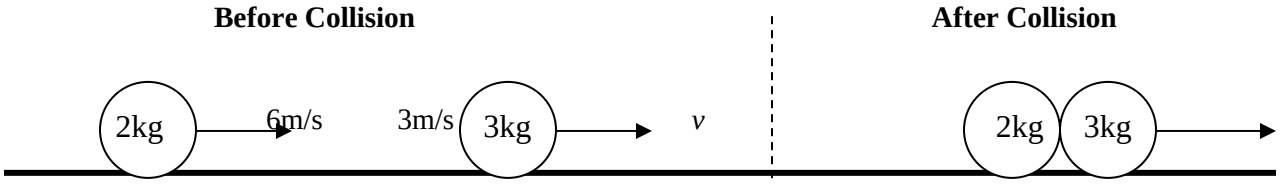
4. A cannon ball is fired at a velocity of 300 m/s at an angle of 30° from the horizontal, landing some distance away at the same level that it was fired from.



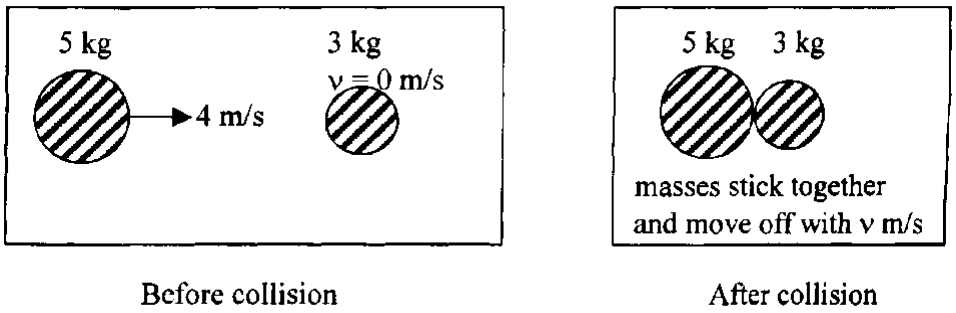
Calculate:
(i) the time of flight of the cannon ball.
(ii) the range.

YEAR 12 PHYSICS REVISION SHEET 7
MOMENTUM

1. An object of mass 2kg traveling towards east at 6m/s collides with another object of mass 3kg traveling in the same direction at 3m/s. If they become coupled (stick together),
   (i) Find their common velocity after collision.
   (ii) Show whether the collision is elastic or inelastic.



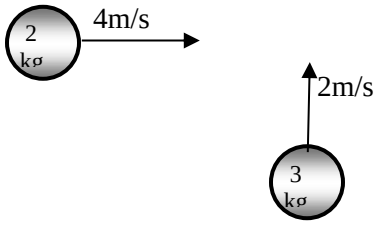
2. An object of mass 5 kg travelling towards the East at 4 m/s collides with an object of mass 3 kg initially at rest. After the collision, the two masses stick together and move off with a common velocity, v.



   Calculate:
   (i) the momentum of the 5kg mass before the collision.
   (ii) the common velocity, ***v.***
   (iii) the magnitude and direction of the **change in momentum** of the 5kg mass after collision.

3. A 10kg shell is fired from a 1000kg cannon which is at rest at the time of firing. The shell has a recoil speed of 1000m/s.
   (i) Determine the total momentum before firing.
   (ii) Find the recoil speed of the cannon.

4. A 2kg ball travelling East at 4m/s collides with a 3kg ball travelling North at 2m/s. they stick together after collision.



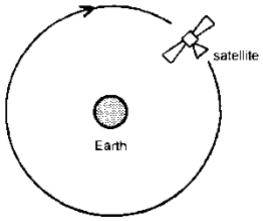
   (i) Find the total momentum of the balls before collision.
   (ii) What is the total momentum of the balls immediately after collision?
   (iii) Calculate the speed of the balls immediately after collision.

YEAR 12 PHYSICS REVISION SHEET 8
CIRCULAR MOTION

1. A 100kg satellite is placed into circular orbit around the earth with a radius of $r = 3.6 \times 10^4$ metres away from the surface of earth.

Mass of earth : $m_e = 6 \times 10^{24}$ kg $G = 6.67 \times 10^{-11} Nm^2/kg^2$

Radius of earth : $r_e = 6.4 \times 10^6$ m

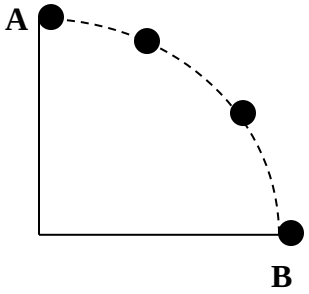


(i) Calculate the gravitational force on the satellite.
(ii) Find the speed the satellite needs to travel to keep it in that orbit.
(iii) Find the value of g at the location of the satellite.

2. A satellite is placed in a circular orbit at a constant speed around the earth. It is at such a height that frictional forces due to air can be neglected.
Which of the following reasons **best** explains why the *speed* of the satellite is *constant*?
A. The centripetal force on the satellite is balanced by an outwards force.
B. The acceleration of the satellite is zero.
C. The gravitational force on the satellite is zero.
D. The force on the satellite acts at right angles to the direction of motion.

3. The solar Maximum Mission satellite was placed in a circular orbit, 150km above the surface of the earth. Determine:
(i) the orbital speed of the satellite.
(ii) the time required for one complete revolution.
[$R_e = 6.4 \times 10^6$ m, $M_e = 6 \times 10^{24}$kg, $G = 6.67 \times 10^{-11}$ Nm^2/kg^2]

The position of an object traveling in a circle at constant speed is shown every 0.3s as it travels in an arc from A to B.



4. The period of rotation is
A. 1.5 s B. 1.8 s C. 6 s D. 7.2 s

5. If the radius of the circular path is 2m, the speed of the object (m/s) is
A. 6π B. 4π C. $7\pi/3$ D. $2\pi/3$