MENGO SENIOR SCHOOL

BEGINNING OF TERM EXAMS

23RD SEPTEMBER, 2002

S5 PHYSICS PAPER 1

**TIME: HOURS.**

Instructions:

1-   a)   (i)   State Newton's law of universal gravitation.   (3)

      (ii)   By using a graph, sketch the variation of acceleration due to
             Gravity g with height from the centre of the earth.   (4)

   b)   A steel ball of mass 0.50kg. is suspended from a light inelastic string of
         length 1.0m. The ball is whirled in a horizontal circle of radius 0.5m.

         Find: (i)   the centripetal force   (3)
                 (ii)   the tension in the string   (3)
                 (iii)   the angular speed of the ball.   (3)
                 (iv)   the angle between the string and the circle if the
                         angular speed is increased to such a value that the
                         tension in the string is 10N.   (4)

2-   a)   (i)   State the principle of conservation of linear momentum.   (3)

      (ii)   Distinguish between elastic and inelastic collisions.   (4)

   b)   Define the following terms:

         (i)   Gravitational potential.   (2)
         (ii)   Escape velocity   (2)
         (iii)   gravitational intensity   (2)

   c)   A body of mass 5.0kg is moving with a velocity of 2.0ms^{-1} to the right. It
         collides with a body of mass 3.0kg moving with a velocity of 2.0ms^{-1} to
         the left.

If the collision is a head-on elastic collision determine the velocities of the two bodies after collusion. (7)

3- a) (i) State the work energy theorem. (3)

(ii) The figure below shows forces acting on a particle p of mass 5kg initially at rest.
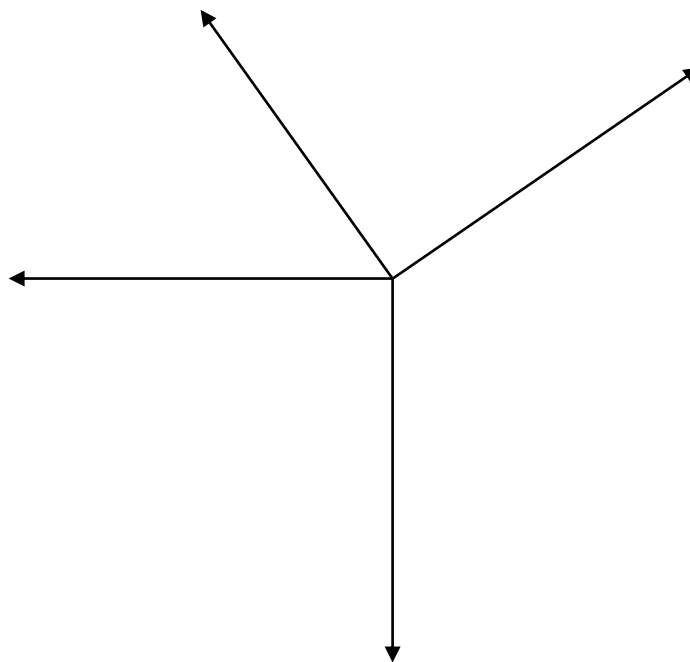
Determine the magnitude and direction of the resultant force on the particle and its kinetic energy after moving 10m. (15)

4- a) (i) What do you understand by the term dimension of a physical quantity. (3)

(ii)   The speed $\vee$ of propagation of transverse waves along a stretched string is given by $\vee = K\,^x l\,^y$ where y is the tension is the string and l is the mass per unit length of the string.
Find by dimensional analysis the values of x and y.   (7)

b)   A car is at rest is uniformly accelerated for 5 second at which time its speed is 10ms^{-1}.
The car maintains this speed for 10seocnds and is then brought to rest in 10seconds by a steady application of the brakes.

Find: (i)   the acceleration during the first 5 seconds.   (5)

        (ii)   the total distance travelled by the car in 25 seconds. (5)

x