ST. PETER'S SEN.SEC. SCH. BOMBO.KALULE
P.O.BOX 25762, KAMPALA – UGANDA. TEL: +25772642832/0753-642832
Email.stpeterssbombo@yahoo.com. 23 miles Kampala-Bombo road.

S.2 PHYSICS

1. (a) Define the following terms;

   (i) Mechanical advantage

   (ii) Velocity ratio

   (iii) Efficiency

   (b) In using a pulley system, an effort of 100N is need to raise steadily a load of 800N.

   (i) Calculate the mechanical advantage

   (ii) If this effort moves through a distance of 20m and the load is then moved up a distance of 2m, calculate the velocity ratio.

   (iii) Calculate the efficiency of the system.

2. (a) State one condition of equilibrium. (1 mark)

   (b) A uniform rod 1m long of mass 50g is supported horizontally on two knife edges placed 10 cm from its ends.

   (i) What will be the reactions at these supports when a 100g mass is suspended 10cm from the mid-point of the rod. (5 marks)

3. (a) Define the following terms as applied to motion;

   (i) Displacement. (1 mark)

   (ii) Velocity (1 mark)

(iii) Acceleration. (1 mark)

(iv) Momentum (1 mark)

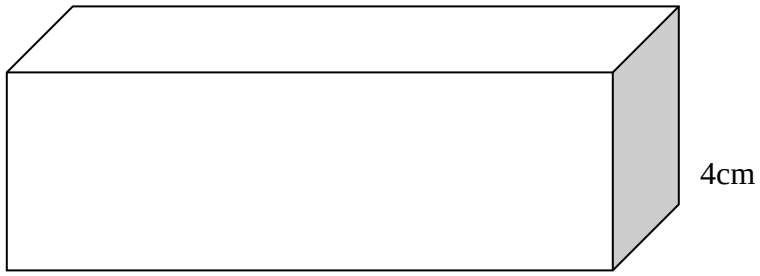
(b) (i) Calculate the momentum of a body of mass 20kg moving at a constant speed of $40ms^{-1}$. (2 marks)

(ii) A gun of mass 25kg fires a bullet of mass 200g with a velocity of $1000ms^{-1}$ Find the recoil velocity of the gun. (4 marks)

4. (a) (i) Define pressure and state its units. (2 marks)

(ii) Give one reason why a dam is made thick at the base than at the top. (1 mark)

(b)



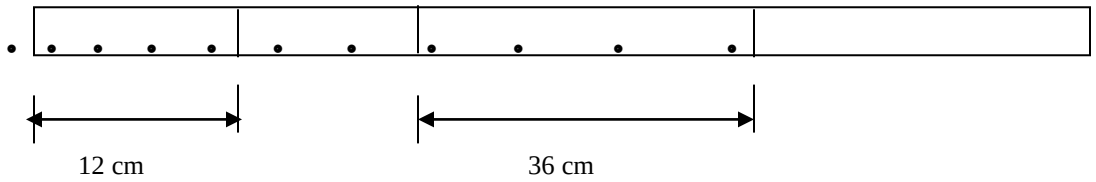
The figure above shows a block of density 1.89 gcm^{-3}. If the block rests on a level ground. Calculate the minimum and maximum pressure it would exert on the ground. (5 marks)

(c) Draw a diagram of apparatus to demonstrate that;

(i) Pressure in liquid increases with depth. (2 marks)

(ii) Pressure is transmitted equally in all directions. (2 marks)

5. The figure below shows a tape pulled by a moving body through a ticker timer operating at a frequency of 50Hz.



a) Comment on the motion of the body (2 marks)

b) Determine the acceleration of the body in ms^{-2}. (4 marks)

6. a) State the principle of conservation of linear momentum (2 marks)

b) State two practical applications of the principle of conservation of momentum.

c) A trolley of mass 4.0 kg travelling at $15ms^{-1}$ collided with another stationary trolley of mass 2kg, and the two stuck together and moved with a common velocity. Calculate the common velocity of the two trolleys after collision. (3 mks)

a) Define surface tension of a liquid (2 marks)

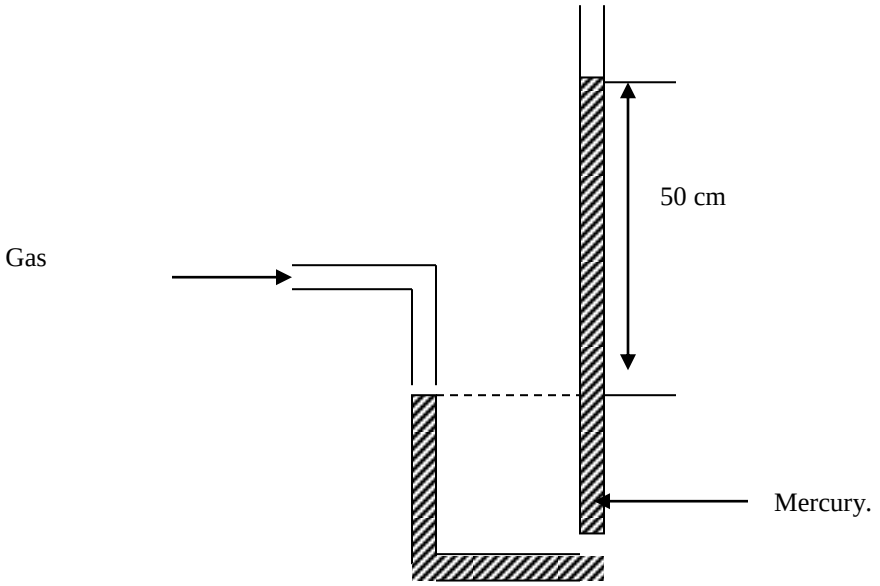
b) Give two ways in which surface tension of a liquid can be reduced. (2 marks)

c) State what is observed when a capillary tube is placed in a beaker container

i) Mercury (1 mark) (ii) Water (1 mark)

7. a) State the principle of transmission of pressure in fluids. (2 marks)

b) The diagram shows the apparatus used to measure gas pressure.



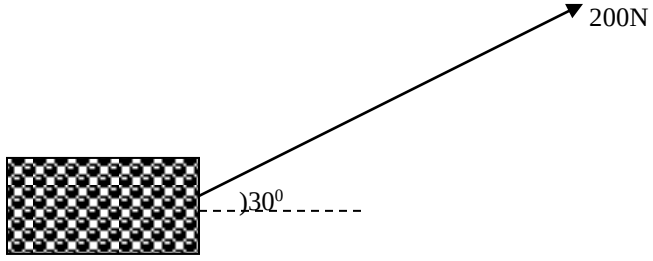
i) What name is given to the apparatus above (1 mark)

(ii) Calculate the pressure of the gas in Nm^{-2} given that the atmospheric pressure is 750mmHg and the density of mercury is $13600kgm^{-3}$

(3 marks)

8. a) Define work and state its SI units

b). The figure below shows a force of 200N acting at an angle of 30^o to the horizontal pulling a load of 10kg.



Calculate the work done by the effort if it pulls the load through a distance of 15m

9. An object of mass 2kg is moving with a velocity of $1ms^{-1}$, it is then acted on by a force of 5N through a distance of 16m.

Calculate:

(a) The acceleration produced by the force. (3 marks)

(b) The final velocity of the object. (3marks)

(c) The work done by the force (4marks)

10. (a) (i) Define the term velocity. (2marks)

(ii) Sketch the velocity-time graph for a body moving with uniform velocity. (2marks)

(b) A vehicle traveling at a velocity of $90Kmh^{-1}$ is uniformly brought to rest in 20s.

(i) Calculate the acceleration of the vehicle. (3marks)

(ii) If the vehicle had originally been traveling at the velocity of $90kmh^{-1}$ for 60s, calculate the total distance traveled before it finally stopped. (3marks)

11. (a) Define (i) density. (1mark) (ii) Mass (1 mark)

(b) Explain clearly how you would determine the volume of an irregular object.

(c) A body has a mass 400kg and a volume of$10cm^3$. Calculate its density. (3marks)

12. (a) State Newton's laws of motion. (3 marks)

(b) (i) Define momentum (1 mark)

(ii) State the principle of conservation of linear momentum (1 mark)

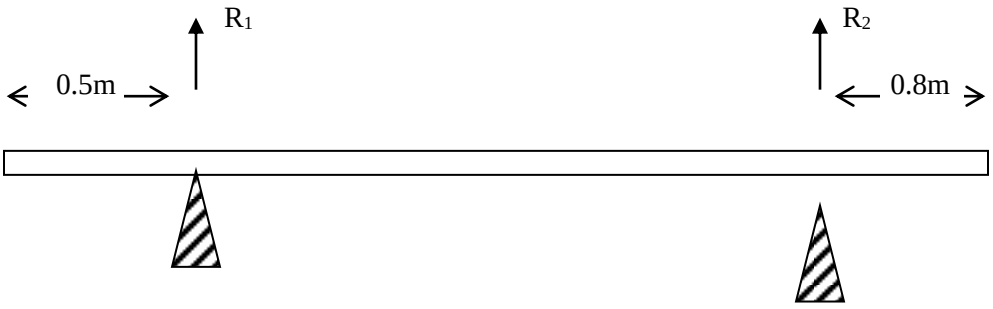
(c) (i) A ball of mass 120g moving with a velocity of $6ms^{-1}$ makes a "head on" collision with a ball of mass 220g moving with a velocity of 2 ms^{-1} in opposite direction. If both stick together after collision, calculate their common velocity in after collision. (4 marks)

(ii) State the direction of the composite body. (1 mark)

13. (a) What is the moment of a force. (1 mark)

(b) State the principle of moments (2 marks)

(c) A uniform beam 2m long and weighting 4N is resting on two knife edges placed 0.5m and 0.8m from either ends as shown



14. What is the value of the normal reactions R_1 and R_2 (7 marks)

(i) Displacement (1 mark) (ii) Weight (1 mark)

(b) What force is exerted on the floor of a lift by a man of mass 60kg when the lift is accelerating upwards at $5ms^{-2}$. (2 marks)

(c) A body starts from rest and accelerates at 3 ms^{-2} for 6s. Its velocity remains constant at the maximum value so reached for 6s and it finally comes to rest with uniform retardation after another 6s. Find by graphical method.

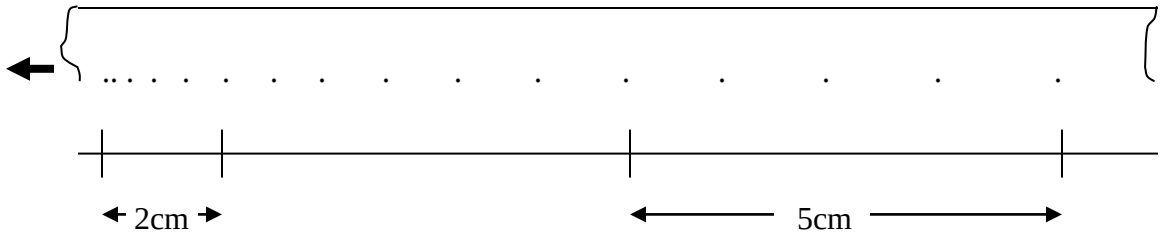
(i) The distance moved during each stage of motion. Hence total distance.(3 marks)

(ii) Average velocity over the whole period. (1 mark)

15. (a) Define;

(i) Uniform velocity. (ii) Uniform acceleration.

(b) A trolley of mass 2kg is released to move down an inclined plane. The trolley pulls a ticker tape through a timer vibrating at 50 Hz. A section of the tape looks like the one below:



Calculate:

(i) The acceleration. (ii) The force causing acceleration.

(ii) The final velocity shown on the tape section.

(c) The tape section shown above shows the motion of the trolley from the top to the bottom of the inclined plane. At the bottom of the inclined plane, the trolley collides and sticks to another trolley of mass 3kg at rest and they move together.

Find:

(i) The common velocity with which the trolley move.

(ii) What force would be required to stop them in a distance of 2m?