GIDEONS ELITE BOYS CENTRE OF EXCELLENCE

P.O BOX 583-20300 NYAHURURU

DECEMBER-2024 ASSIGNMENT

THIS ASSIGNMENT WILL COVER 70% OF OPENER EXAM.

ALL QUESTIONS SHOULD BE ANSWERED IN THE EXERSISE BOOK

PHYSICS FORM 3-2024 **Website: www.gideonseliteschools.sc.ke**

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1. a) A tennis ball is struck such that it backspins at it crosses the net before landing in the court area of an opponent player.

   i) Explain the trajectory of the ball as it rises above the net.

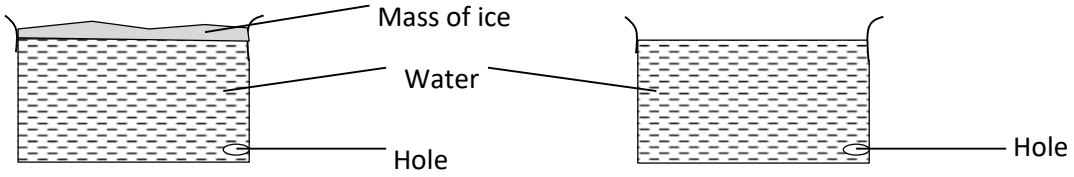
   ii) Give a possible reason that caused the ball to drop in the opponents court instead of rising continuously (1mrk)

   b) Explain the following;

   i) Mountain climbers are highly likely to nose bleed when they reach the mountain top

   ii) A bulldozer easily moves on earth roads while a saloon car cannot.

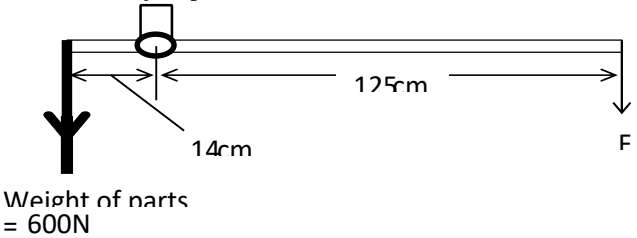
1. When washing clothes, it is easier to remove the dirt using soap in warm water than cold water. Explain.
2. The figure below shows two identical cylindrical containers of radius 10.5cm with holes drilled at the bottom of each and filled with water to the same height of 42.1cm. The holes are initially closed. Container A has a 24g mass of ice that virtually covers the whole area above it whereas container A is open.(density of water = $1000kgm^{-1}$)



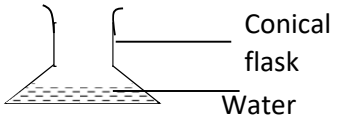
   i) State and explain the observation that would be made at the holes when opened

   ii) Determine the pressure exerted at the hole of container A.

3. When a litre of milk is poured in 20litres of water, the colour changes to white. Explain
4. Give a reason why alcohol in glass thermometer cannot be used when boiling water is to be used in an experiment
5. Otieno prefers going to the beach in the afternoon hoping to get a relief from the scotch of the day while in Mombasa. Explain how the breeze he likes reaches him.
6. Kariuki identifies an abandoned circular water well of diameter 2.1m as a breeding zone for mosquitoes. He intends to use engine oil to control the breeding by pouring it on the surface of the water. Given that the thickness of a molecule in the oil is1.635×10^{-9}, determine the minimum volume of oil he requires.
7. The figure below represents the arm of a lift pump with a force F being applied by the person drawing water. Determine the value of F that just pushes the arm downwards.



8. Water flows along a horizontal pipe of cross sectional area $48cm^2$ which has a constriction of cross- sectional area $12cm^2$ at one place. If the speed of water at the constriction is $4ms^{-1}$, calculate the speed in the wider section
9. Determine the extension produced by a pair of parallel identical springs each of constant $1000Nm^{-1}$ when a mass of 0.2kg is hung below them.
10. The figure below shows a conical flask with some water to the level indicated.



a) State the change in the stability of the flask when more water is added to it.

b) Give a reason for your answer in a) above.

11. a) A car initially moving with a velocity of $10ms^{-1}$ accelerates uniformly at $1ms^{-2}$ until it reaches a velocity of $15ms^{-1}$. Calculate,

i) the time taken

ii) The distance travelled during the acceleration.

iii) The velocity reached 100m from the place where the acceleration began.

iv)) A suspected gang vehicle escapes with a punctured fuel tank after being shot by a chase police unit along the highway. Drops of petrol from the tank fall on the road after every 5 seconds. The distance from the first drop to the second is 5m. 20 more drops fall as the vehicle accelerates before the tank empties. The two last drops fall 50m apart. Determine the,

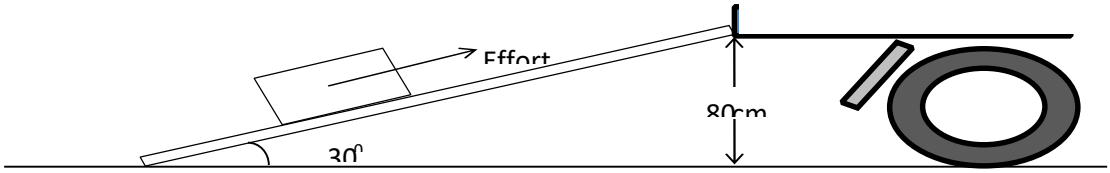
i) Initial velocity of the car

ii) Final velocity of the vehicle just before it ran out of fuel

iii) The acceleration of the car.

14. a) state the law of conservation of energy

b) Simon slides a refrigerator of mass 71kg along a wooden bar inclined at an angle of 30^0 with the ground onto a truck for transportation. Given that the distance from the ground to the floor of the truck is 80cm, as shown in the figure below, determine,



i) The length of the wooden bar (2)

ii) Useful work done on the refrigerator

iii) Work done by Simon in moving the refrigerator along the wooden bar when he applies a force of 4000N

iv) Efficiency of the inclined plane

v) Account for the value of efficiency obtained in iv) above.

15. a) state Newton's second law of motion

b) A bullet of mass 40g is fired from a gun of mass 30kg and exits the muzzle at $300ms^{-1}$. The bullet travels horizontally to hit a stationary wooden block 30m away after 0.5 seconds. Determine,

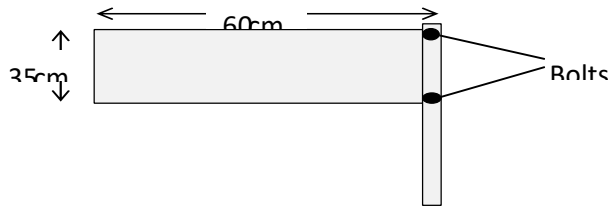
i) the recoil velocity of the gun

ii) the force with which the bullet hits the wooden block

iii) the velocity of the bullet just before hitting the block

16. a) define moment of a force

b) A sign board made from a uniform metal sheet is supported by a single post as shown in the figure below. It is to be supported by two bolts.



Given that the weight of the board is 20N,

i) determine the force that the lower bolt applies on the plate to maintain it at horizontal

ii) State one way of reducing the force in i) above.

c) Explain how the stands of students' lockers that are slightly inclined outwards improve their stability.

17. a) A tennis ball is struck such that it backspins at it crosses the net before landing in the court area of an opponent player.

i) Explain the trajectory of the ball as it rises above the net.

ii) Give a possible reason that caused the ball to drop in the opponents court instead of rising continuously

b) Explain the following;

Mountain climbers are highly likely to nose bleed when they reach the mountain top

iii) A bulldozer easily moves on earth roads while a saloon car cannot.

1. In order to determine the size of an oil molecule, a student performed an experiment using five oil drops to make a circular patch of the oil on the surface of water in a waterbath. State two assumptions made by the student during the calculations.

2.In an experiment to determine the density of Liquid R, a student obtained the followed data:

_ Mass of an empty density bottle 55.0 g _ Mass of the density bottle + water 80.0 g

_ Mass of the density bottle + Liquid R 70.0 g

Determine the density of Liquid R. (density of water is 1000 kgm ^{3}

3.It is observed that when 20 cm^3 of alcohol is mixed with 20 cm^3 of water, the volume of the mixture is 39 cm^3 , State a reason why the volume of the mixture is not 40 cm^3 (1 mark)

4. When a liquid is heated in a glass flask, it is observed that the level at first goes down and then

5. Figure 1 shows a uniform wooden bar at equilibrium with two cans Y and Z of equal mass but different diameters.

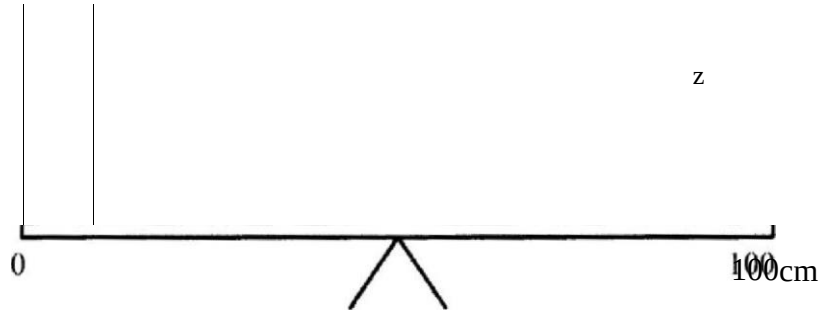


Figure 1

The cans are simultaneously filled with equal volumes of water.

Explain the observation made.

6. State the reason why the speed of water at the narrow section of a river is higher than at the wider section.

7.A stone is thro'M1 ertically ul»hards. Sketch a graph of potential energy (y axis) against time as the stone moves until it hits the ground.

8.Using the definition of impulsive force, show that F = ma

The flask is immersed in ice water for sometime. State the observation made.

10. State one assumption for the experiments carried out to erifv the gas laws.

11. A student who wanted to take a bath mixed 4 kg of water at 80 ^{o}c with 6 kg of water at 20 ^{o}c. Determine the final temperature of the water.

12. A uniform metre rule is pivoted at its centre. Two weights of20N and ION are suspended at the 20cm and 100 cm marks respectively. Determine the position at which a ION weight should be suspended in order to balance the system.

13. Figure 3 shows two possible designs of a three legged stool.

State a reason why B is more stable than A.

14. A tape attached to an accelerating trolley passes through a ticker timer that makes dots on it at a frequency of 50Hz. The ticker timer makes 10 dots on a 10 cm long tape such that; the distance a between the first two dots is 0.5 cm and the distance b between the last two dots is 1.5 cm.

(i)Determine the velocity of the trolley at:

(1) distance a,

(11) distance b.

(ii)Determine the acceleration of the trolley.

(b) State with a reason what would be observed on the spacing between the dots on the tape when the trolley is made to move on a horizontal surface.

17. (a) State the law of flotation.

(b)Figure 6 shows two solids W and X made of the same material and immersed in water.

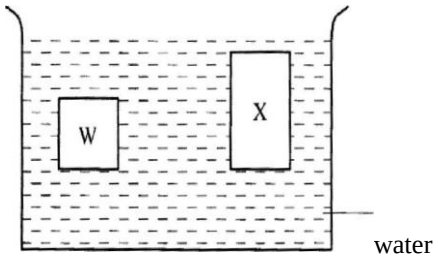


Figure 6

(i) State with a reason v,hich one of the containers experiences a greater upthrust.

(ii) Solid W weighs 12 N in air, 2N in water and 4N in another liquid. Determine the density of the other liquid.

(c) 7 two identical wooden blocks each of mass 0.2 kg suspended in water by two strings M and N.

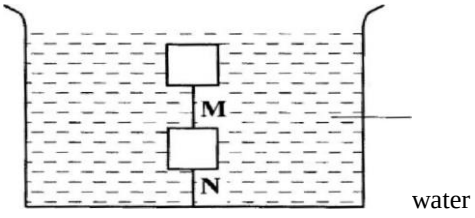
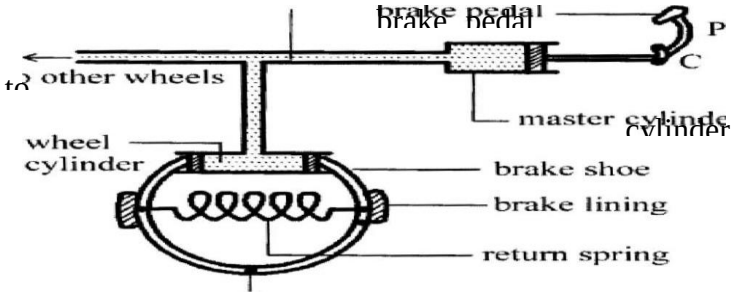


Figure 7

Given that the upthrust on each block is 3.2 N, determine the tension in string;(d)State any one application of hvdrometers.

18. (a) 8 part of a hydraulic brake system.

brake fluid



hinge Describe how the systems works. (5 marks)