NAME…….. INDEX NO…….....

232/1 **CANDIDATE'S SIGN……...**
PHYSICS
PAPER 1 **DATE……**
(THEORY)
JULY/AUGUST, 2014
TIME: 2 HOURS

KIHARU/KAHURO DISTRICT JOINT EXAMINATION - 2014

Kenya Certificate of Secondary Education
PHYSICS
PAPER 1
(THEORY)
TIME: 2 HOURS

INSTRUCTIONS TO THE CANDIDATE:

(a) Write your **name** and **index number** in the spaces provided above.
(b) **Sign** and write the **date** of examination in the spaces provided above.
(c) This paper consists of **two** Sections **A** and **B**.
(d) Answer **all** the questions in sections **A** and **B** in the spaces provided.
(e) All working **must** be clearly shown in the spaces provided.
(f) Mathematical tables and electronic calculators **may be** used.

FOR EXAMINER'S USE ONLY:

Section	Question	Maximum Score	Candidate's Score
A	1 – 14	25	
B	15	11	
	16	9	
	17	7	
	18	9	
	19	9	
	20	10	
Total Score		80	

SECTION A: (25 MARKS)

1. Draw a diagram of a micrometer screw gauge which shows a reading of 5.75mm. (1mk)

2. The figure below shows a small toy boat floating in water in a basin. **P** and **Q** are two points near the toy.

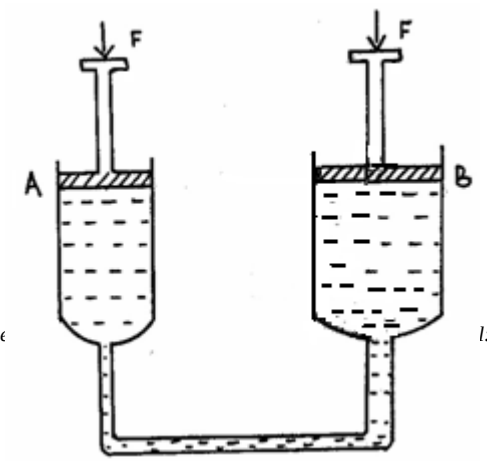
When a drop of kerosene is introduced in water at point Q, the toy is observed to move towards P. Explain this observation. (2mks)

_____

_____

_____

3. The figure below shows two cylinders containing a liquid and connected with a tight-fitting flexible tube. The cylinders are fitted with air-tight pistons **A** and **B** as shown.



With application of equal forces **F** on the piston, it is observed that **B** moves up while **A** moves down. Explain this observation. (2mks)

_____

_____

_____

4. State the reason why a spherical ball resting on a horizontal surface is said to be in neutral equilibrium. (2mks)

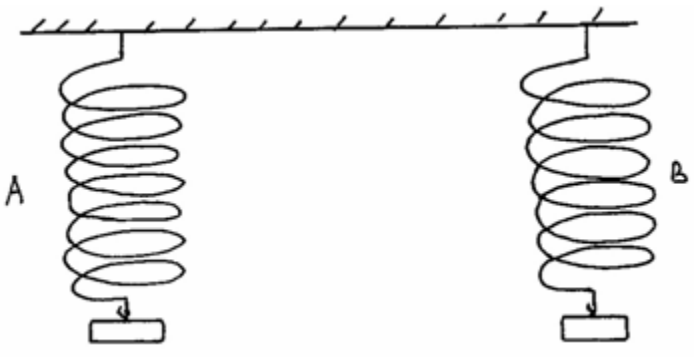
_____

_____

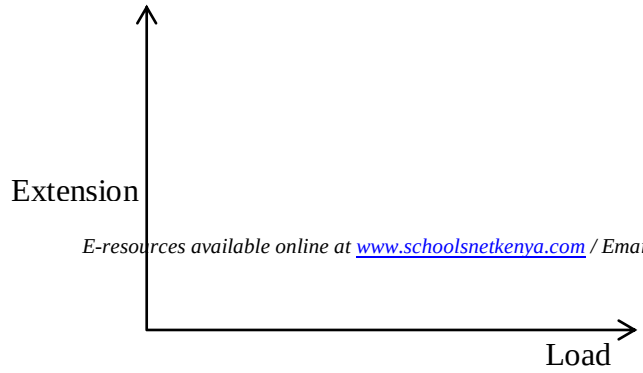
_____

_____

5. The figure below shows two springs **A** and **B** made of the same material. The thickness and the length of the springs is the same in both springs. Masses are added on each at the same interval and the extension noted each time.



If the springs have the same number of turns per unit length and assuming hookes law is obeyed, sketch on the same axis the graphs of extension against load for each. (2mks)



6. State the reason why gases are easily compressible while liquids and solids are not. (1mk)

_____

_____

_____

7. Explain why a glass container with thick walls is more likely to crack than one with a thin wall when a very hot liquid is poured into it. (2mks)

_____

_____

_____

_____

8. A bullet moving at a velocity of 350m/s hits a tree trunk of diameter 70cm. It emerge from the opposite side with a velocity of 180m/s. Determine the average deceleration of the bullet in the trunk. (3mks)

_____

_____

_____

_____

9. A high jumper usually lands on a thick soft mattress. Explain how the mattress helps in reducing the force of impact. (1mk)

_____

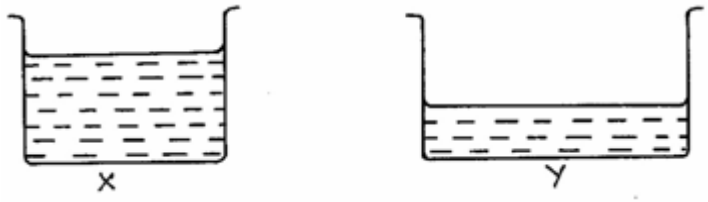
_____

_____

10. A certain machine uses an effort of 400N to cause a load of 600N. If the efficiency of the machine is 80%, determine the velocity ratio. (3mks)

_____

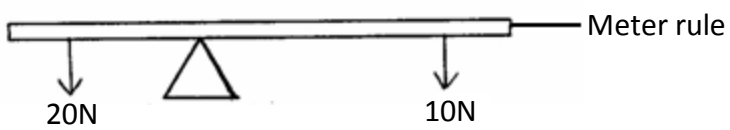
11. The figure below show two alluminium containers **X** and **Y** placed on a wooden table. **X** and **Y** have equal volumes of hot water initially at the same temperature.



Explain why the water in **Y** cools faster than the water in **X**. (2mks)

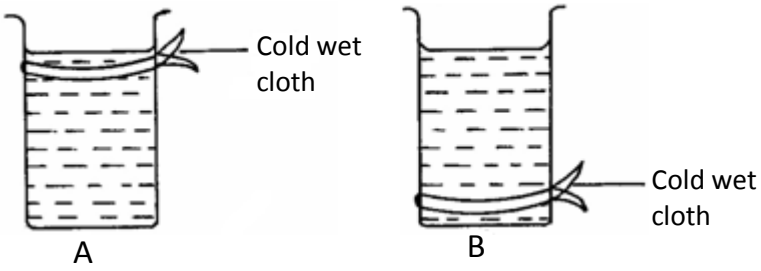
12. An aeroplane is moving horizontally through still air at a uniform speed. Explain what is observed when the speed of the aeroplane is increased. (2mks)

13. The figure below shows forces 10N and 20N acting on a metre rule such that it is in equilibrium.



Mark on the figure a third force 3N acting downward on the ruler such that its equilibrium is maintained. (1mk)

14. The figure below shows identical beakers **A** and **B** full of water at 80°C. Two similar cold wet clothes are wrapped one around the top of **A** and the other around the bottom of **B**.



State with a reason the beaker in which the water cools faster. (1mk)

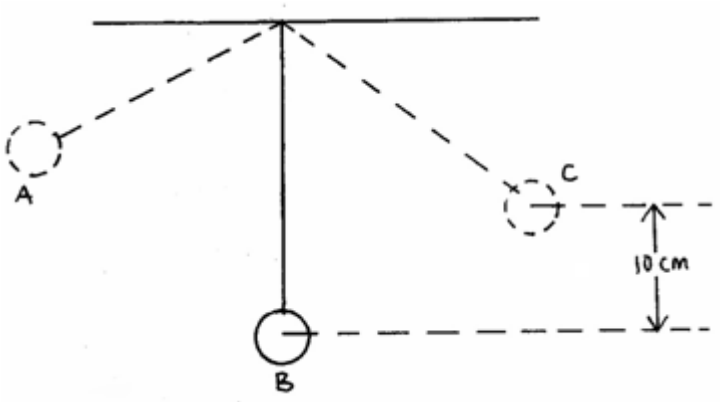
_____

_____

_____

SECTION B: (55 MARKS)

15. The diagram below shows a pendulum bob swinging freely to and fro.



(a) (i) State the position where the pendulum bob has maximum kinetic energy. (1mk)

(ii) Determine the velocity of the bob at the position identified in (a)i above if the maximum vertical displacement of the bob is 10cm. (3mks)

_____

_____

_____

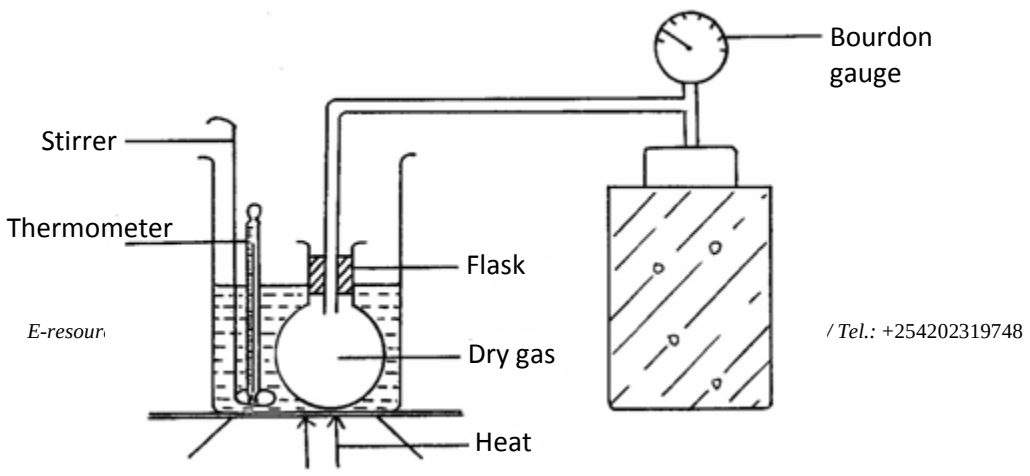
(b) A bullet of mass 20g moving with a velocity of 1000m/s hits a stationery wooden block of mass 12kg. The bullet imbeds and the two move in one direction. Calculate its final velocity. (3mks)

(c) A block of mass 200g rests on a rough horizontal table. A force of 0.6N pulls the block so that it moves with a constant acceleration of $1m/s^2$. Calculate

(i) the time it takes to travel a distance of 200m. (2mks)

(ii) the friction force between the block and the table. (2mks)

16. The diagram below shows a set-up that a student used to investigate pressure law of a gas.



(a) (i) State the measurements that should be taken in the experiment. (2mks)

_____

_____

_____

_____

(ii) Explain how the measurements in (i) above may be used to verify pressure law. (3mks)

_____

_____

_____

_____

(b) Name one limitation of the gas laws. (1mk)

_____

(c) Oxygen gas of volume of 2500cm³ at 10°C and pressure of 3N/m² is compressed until its volume in 500cm³ at a pressure of 6N/m². Determine the new temperature of the gas after this compression in Kelvin. (3mks)

_____

_____

_____

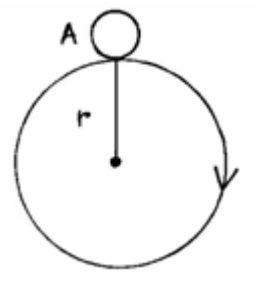
_____

_____

17. (a) (i) Explain why a bucket of water can be swung in a vertical circle without the water pouring out. (1mk)

(ii) A car of mass 800kg moves on a circular truck of radius 20m. The force of friction between the tyres and the tarmac is 4800N. Determine the maximum speed at which the car can be driven on the track without skidding. (3mks)

(b) The figure below shows the path of an object of mass M attached to a string of length **r** when whirled in a vertical circle at a constant speed **r**. It is the highest point on its path.

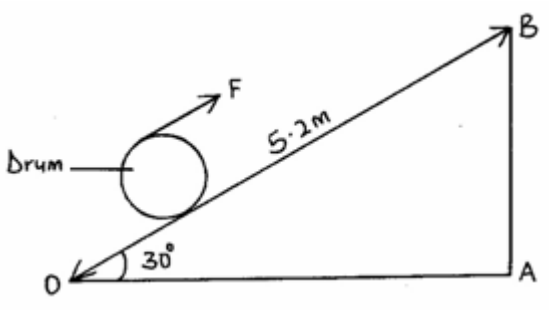


(i) State the forces that provide the centripetal force on the object when it is at **A**. (2mks)

(ii) Indicate with an arrow on the diagram the direction of the net force F acting on the object when it is at **A**. (1mk)

18. (a) Define the term efficiency of a machine. (1mk)

(b) The figure below shows a drum of mass 80kg being rolled up a plane inclined at 30° to the horizontal. The force applied in 420N and the distance moved by the drum along the plane is 5.2M.



Determine

(i) The work done by the effort. (2mks)

_____

_____

_____

_____

(ii) The work done in raising the drum. (3mks)

_____

_____

_____

_____

(iii) The efficiency of the inclined plane. (2mks)

_____

_____

_____

_____

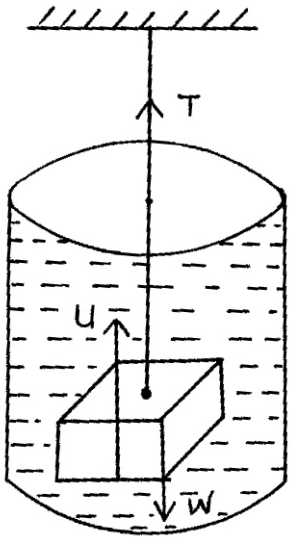
(c) Explain why the efficiency of a machine increases when it is used to lift large loads. (1mk)

_____

_____

19. (a) State the law of floatation. (1mk)

(b) The figure below shows a metal block of density 10500kg/m³ and dimensions 30cm × 20cm × 20cm suspended inside a liquid of density 1200kg/m³ by a string attached to a point above the liquid.



The three forces acting on the block are tension **T** on the string, weight **W** of the block and the up thrust **U** due to the liquid.

(i) Write an expression relating **U**, **W** and **T** when the block is in equilibrium inside the liquid. (1mk)

(ii) Determine the weight W of the block. (3mks)

(iii) Determine the weight of the liquid displaced by the fully submerged block. (2mks)

(c) A ship made of steel is observed to float on water yet the density of steel is about 8 times that of water. Explain this observation. (1mk)

20. (a) Explain why a drop of methylated spirit on the back of the hand feels colder than a drop of water at the same temperature. (2mks)

(b) A block of metal of mass 150g at 100°C is dropped into a lagged calorimeter of heat capacity 40J/K containing 100g of water at 25°C. The temperature of the mixture is 34°C (specific heat capacity of water = 4200J/kg/k). Determine

(i) Heat gained by the calorimeter. (2mks)

(ii) Heat gained by water. (1mk)

(iii) Heat lost by the metal block. (1mk)

_____

_____

_____

_____

(iv) Specific heat capacity of the metal block. (3mks)

_____

_____

_____

_____

(c) A student heated some water and noticed that it boiled at 102°C. State **one** possible reason for this observation. (1mk)

_____

_____

_____