Name: $\qquad$ ADM No: $\qquad$
$\qquad$
Date: $\qquad$
232/1
PHYSICS
Paper 1
MAY/JUNE 2014
Time: 2 Hours

# CROSS COUNTRY EXAM 2014 <br> Kenya Certificate of Secondary Education <br> 232/1 <br> PHYSICS <br> Paper 1 <br> MAY/JUNE 2014 <br> <br> Time: 2 Hours 

 <br> <br> Time: 2 Hours}

## Instructions To Candidates

This paper consists of two sections: Section 1 and Section II
Answer all questions in both sections in the spaces provided
All working must be clearly shown.
Electronic calculators may be used.
Constants Specific heat capacity of water $=4200 \mathrm{~J} / \mathrm{Kg} \mathrm{K}$.
Specific latent heat of steam $=2.26 \times 10^{6} \mathrm{~J} / \mathrm{Kg}$
For examiners use only

| Section | Question | Maximum Score | Candidate's Score |
| :--- | :--- | :--- | :--- |
| I | $1-11$ | 25 |  |
| II | 12 | 13 |  |
|  | 13 | 10 |  |
|  | 14 | 10 |  |
|  | 15 | 11 |  |
|  | 16 | 11 |  |
|  | Total Score | 80 |  |

This paper consists of 10 printed pages
Candidates should check the question paper to ensure that all pages are printed as indicated and no questions are missing

Answer ALLt the questions in the spaces provided

1. Figure below shows the level of water in a measuring cylinder after a stone of mass $\mathrm{x} g$ is immersed in the water. The initial level of the water' is shown with a dotted line.


2. The diagram below shows a metal plate $2 \mathrm{~m} \times 1 \mathrm{~m}$ of negligible thickness and mass 1.0 kg . A horizontal force F applied at B just makes the plate to tilt. Calculate the value of the force F .

3. The diagram shows parallel forces acting on a body $A B$. Indicate on the diagram another force to make the resultant force on the body 10 N to the right.

4. Figure shows a section through a mug whieh has the shape of a truncated cone and which is full of liquid.


The area of the base is $0.0 .03 \mathrm{~m}^{2}$ and the depth of the liquid is 0.015 m . The density of the liquid is $1100 \mathrm{Kg} / \mathrm{m}^{3}$. What is theforce exerted by the liquid on the base of the mug?

5. A garden sprinkler has small holes each $2.00 \mathrm{~mm}^{2}$ in area. If water is supplied at the rate of $3.0 \times 10^{-3} \mathrm{~m}^{3} \mathrm{~s}^{-1}$ and the average velocity of the spray is $10 \mathrm{~m} / \mathrm{s}$. Calculate the number of the small holes.
( 2 mks )
6. The diagram below shows the essential features of a solar heating panel. A small electric pump circulates the liquid through the pipes.


State briefly why:
(i) The pipes and metal plates are blackened.
$\qquad$
$\qquad$
(ii) There is a material fibre glass on the panel.
7. The figure below shows an electric iron.


Two metal phak tes A and B are riveted to form a bimetal strip as used above.
(i) Which metal expands more
$\qquad$
$\qquad$
$\qquad$
8. (a) State Hooke's law
$\qquad$
$\qquad$
(b) Five identical spiral springs are arranged as shown below. Each spring weighs 1.0 N and each cross bar weighs 2.0 N . If the spring system extends by 21.85 cm when supporting a load of 100 N . Calculate the spring constant of one spring in S.I. units.

9. Four identical bulbs each of resistance $20{ }^{\circ}$ are arranged in a circuit as shown below. The voltage source is 10 V .


Calculate thestotal electric energy converted to heat energy by the bulbs in one hour and 10 minutes. ( 2 mks )
10. Given that a material $X$ of density $8.5 \mathrm{~g} / \mathrm{cm}^{3}$ is attached to a piece of wood of mass 100 g and density $0.2 \mathrm{~g} / \mathrm{cm}^{3}$. Calculate the volume of material X which must be attached to the piece of wood so that the two together just submerge beneath liquid of density $1.2 \mathrm{~g} / \mathrm{cm}^{3}$.
(2mks)
11. The five-tick tape shown below was produced by a ticker timer connected to mains supply of 50 Hz when a force pulls the trolley. Determine the acceleration of the trolley.


## SECTION II (55 Marks)

Answer ALL the questions in the spaces provided
12. (a) Distinguish between heat capacity and specific heat capacity.
$\qquad$
$\qquad$
(b) (i) Figure below shows a set-up that can be used to determine the specific heat capacity of a metal block

(I) State the measurements that should be taken in the experiment to determine the specific heat capacity of the block.
$\qquad$
$\qquad$
$\qquad$
$\qquad$
(II) Show how the measurements in (I) above can be used to determine the specific heat capacity of a metal block.
$\qquad$
$\qquad$
(III) State the functions of the following in the set-up.
$\qquad$
$\qquad$
$\qquad$

## Oil

$\qquad$
$\qquad$
$\qquad$
(IV) State one precaution that should be taken.
$\qquad$
$\qquad$
$\qquad$
(c) A well lagged copper copper can $\ddagger=0$ gether with a stirrer of total heat capacity $60 \mathrm{JK}^{-1}$ contains 200 g of water at $10^{\circ} \mathrm{C}$. Dry steam at $1 \mathrm{~F}^{5} 0^{\circ} \mathrm{C}$ is passed in while the water is stirred until the content reach a temperature of $40^{\circ} \mathrm{C}$. Calculate the mass of condensed steam.

13. A mán uses a rope to pull a crate of mass 75 Kg up an inclined wooden plank of effective length 4.50 m and 0yito a platform 1.50 m high at a steady speed. The frictional force between the crate and the plank is 200 N and the component of the weight of the crate parallel to the length of the plank is 250 N . Find:
(a) The effort he must exert on the rope
(b) The V.R.
(c) The mechanical advantage, M.A.
(d) The energy wasted in pulling the crate to the platform.
(e) Given that the normal reaction $\mathrm{N}+\frac{2}{} \cos \theta$ where $\theta$ is the angle of the plane with the horizontal. Calculate the co-efficient of friction between the crate and the plane.

14. (a) of 1.0 m . If it is whirled with a frequency of 2 cycles per second, calculate;
(i) The tension in the supporting string when the bob is at the top most part of the circle. (2mks)
(ii) The tension when the bob is at the bottom of the circle.
(2mks)
(iii) At what position of the bob is the string likely to break?
(1mk)
(b) A steel ball is dropped into a cylinder containing oil. Sketch a graph showing the variation of: (i) Velocity with time during the fall.
(1mk)
(ii) Displacement with time daring the fall.
(iii) Acceleration with time of the ball during the fall
(c) State the forces acting on the ball as it moves through the oil.
15. (a) State the pressure law.
(b) A student investigated the relationship between the pressure and temperature of a fixed mass of a gas using the apparatus as shown below.


Heat
The set up is heated continuously with a Bunsen burner and the reading of pressure and temperature recorded after every minute.
(i) State one way in which thisexperiment may be improved.
(ii) The graph shows the relationship between pressure and temperature for the above experiment.

(I) From the graph, determine the pressure at a temperature of 273 K .

(II) Determine the slope of the graph.
(III) Describe what happens to the gas molecules as the gas is cooled. Indicate how this result in reduction in pressure.
$\qquad$
$\qquad$
$\qquad$
(c) The volume and pressure of hydrogen at $15^{\circ} \mathrm{C}$ are $336 \mathrm{~cm}^{3}$ and 756 mmHg respectively. Determine the volume of hydrogen at standard temperature and pressure (s.t.p) (At s.t.p, temperature $=0^{\circ} \mathrm{C}$, pressure $=760 \mathrm{mmHg}$ ).

## 16. You are provided with the following:

- Oil
- $1 \mathrm{~cm}^{3}$ graduate pipette
- Water
- Level tary
- Two wax-coated rods ${ }_{s}^{*}{ }^{*}$
- Lycopodium powder
- Metre rule
(a) Using theapparatus listed above, describe how you would carry out an experiment to determine the size of oll molecule.
(b) What is the purpose of the lycopodium powder?
$\qquad$
$\qquad$
$\qquad$
(c) Why does the drop of oil spread out into a patch?
$\qquad$
$\qquad$
$\qquad$
$\qquad$
(d) In an oil drop experiment, it was found that one oil drop spread on water to form a patch of diameter 0.8 cm and thickness $2.0 \times 10^{-6} \mathrm{~mm}$. Calculate the radius of the drop.

