Name..... **Index Number**.....

232/1
PHYSICS
PAPER 1
July/August 2011
(Theory)

2 Hours

NAKURU NORTH JOINT EVALUATION

Instructions to Candidates

Write your name and index number in the spaces provided in the question paper.
This Paper consists of TWO sections: Sections A and B.
*Answer **ALL QUESTIONS** in sections A and B in the spaces provided after each question*
All working must be clearly shown.
Non programmable calculators and KNEC Mathematical tables may be used

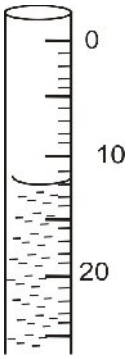
Take : **Acceleration due to gravity, g = 10m/s^2**
Density of water = 1000kg/m^3

For Examiner's Use Only

SECTION	Question	Maximum Score	Candidate's Score
A	1 – 14	25	
B	15	8	
	16	13	
	17	11	
	18	13	
	19	10	
	Total Score	**80**	

SECTION A (25 MARKS)

1. The figure below shows the reading on a burette after 60 drops of liquid have been used.



If the initial reading was zero mark, determine the volume of one drop (2mrk)

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2. A thin rod is suspended freely about an axis through the centre of gravity. What is its state of equilibrium? (1mrk)

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3. Water flows in a horizontal smooth pipe. State the changes that would be observed in the nature of the flow if the speed of the water is steadily increased from low to high value. (1mrk)

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4. The melting point of oxygen is given as -281.3^{o}c. Convert this to Kelvin (K.) (1mrk)

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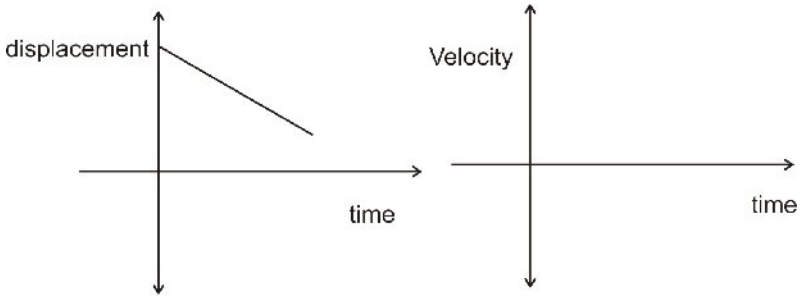
5. The figure below shows a displacement time graph for some motion.



Sketch on the axis given a velocity – time graph for the same motion. (1mrk)

6. A boat is pulled on water at a constant velocity of 5m/s. The tension in the pulling string is 500N. Calculate the rate at which the pulling agent does work. (2mrks)

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7. A car tyre was inflated in the morning when the temperature was low. It was observed that in the afternoon when the temperature was higher, the pressure had increased. Explain this observation using kinetic theory. (2mrks)

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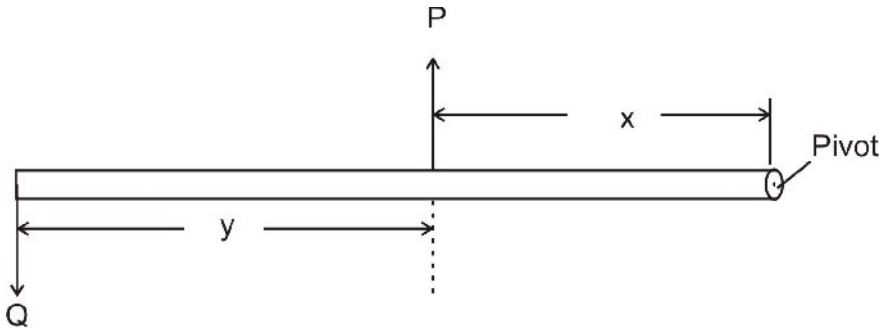
8. The diagram below shows a beam of negligible weight balanced by constant forces P and Q.



Express X in terms of P, Q and Y (2mrks)

9. One property of a liquid that is considered while constructing a liquid – in – glass thermometer is that the liquid expands more than the glass for the same temperature change. State any other two properties of the liquid that are considered. (2mrks)

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10. The height of the mercury column in a barometer at a place is 64cm. What would be the height of a column of paraffin in barometer at the same place. Take density of paraffin as 8.0 x 10^2kg/m^3 and that of mercury as 1.36 x 10^4kg/m^3. (3mrks)

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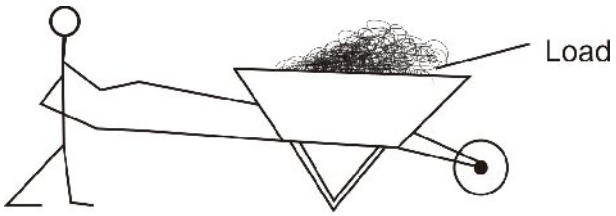
11. The figure below shows a worker ready to lift a loaded wheelbarrow.



i) Indicate and label on the diagram three forces acting on the wheelbarrow when the worker is just about to lift the handle. (1½mrks)

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ii) Suppose the handle bars of the wheelbarrow were extended, which force(s) would change and how?

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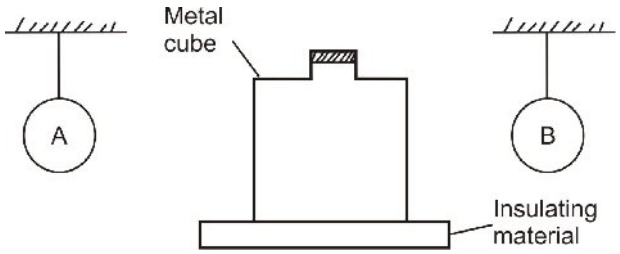
12. The figure below shows two identical balloons A and B. The balloons were filled with equal amount of the same type of gas. The balloons were suspended at equal distance from a metal cube filled with boiling water and placed on an insulating material.



State the mode by which heat travels from the cube to the balloons. (1mrk)

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13. A girl stands inside a lift on the second floor of an 18 storey building. If the lift is ascending upwards at an acceleration of $3ms^{-2}$ and her mass is 60kg, determine the reaction of the lift at the girl's feet. (3mrks)

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14. What happens to the motion of smoke particles in the smoke cell experiment when the set up is moved from an environment at $27^{o}c$ to an environment at $47^{o}c$. (1mrk)

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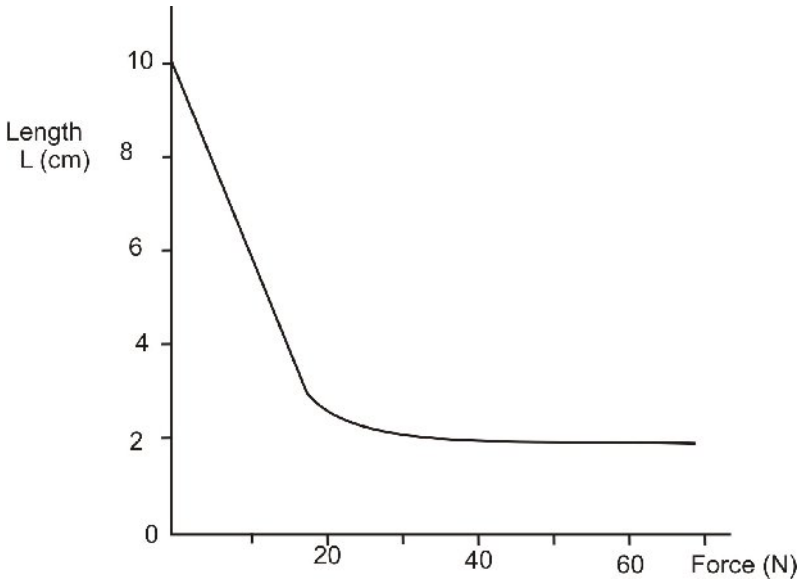
SECTION B (55 MARKS)

15. a) State Hooke's law. (1mrk)

b) An experiment was performed to find out how the length L of a spiral spring varies with the compression force F. The figure below shows variation of the length L against the compression force F.



i) Draw a diagram of a possible set up of the apparatus, used. (2mrks)

ii) Over which range of the force does the spring obey Hooke's law? (1mrk)

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iii) Give the reason for the shape of the graph between 40N and 60N. (1mrk)

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c) A spring of elastic constant 300Nm^{-1} supports an object of mass 200g, hanging vertically. The object is then pulled down by an extra force of 2.5N. Work out the total extension of the spring. (3mrks)

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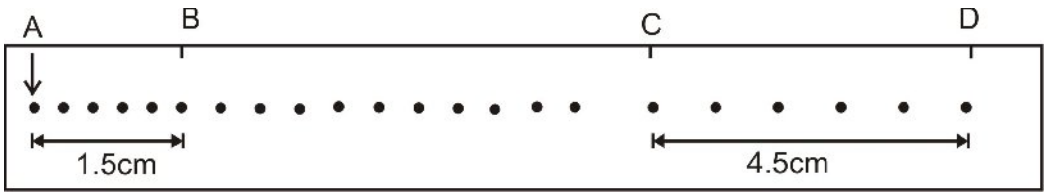
16. The figure below represent dots made on a tape by a ticker timer the dots were made at a frequency of 50 dots per second.



a) What is the time interval between two consecutive dots. (1mrk)

b) The arrow on the tape indicates the dot made at t = 0. Indicates in a similar way the dot made at t = 0.2 sec.

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c) Determine the;

i) Average velocity at intervals AB and CD. (4mrks)

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ii) Average acceleration of the tape. (3mrks)

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d) An electric pump can raise water from a low level reservoir to the high level reservoir at the rate 3.0 x 105 kg per hour. The vertical height of the water raised is 360m. If the rate of energy loss in form of heat is 200KW, determine the efficiency of the pump. (4mrks)

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17. a) State the Archimedes' principle. (1mrk)

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b) A block of metal is suspended from the lower end of a spring balance and is then gradually lowered into water until its upper end is some distance below the surface. Describe the changes observed in reading of the spring balance during the process. (2mrks)

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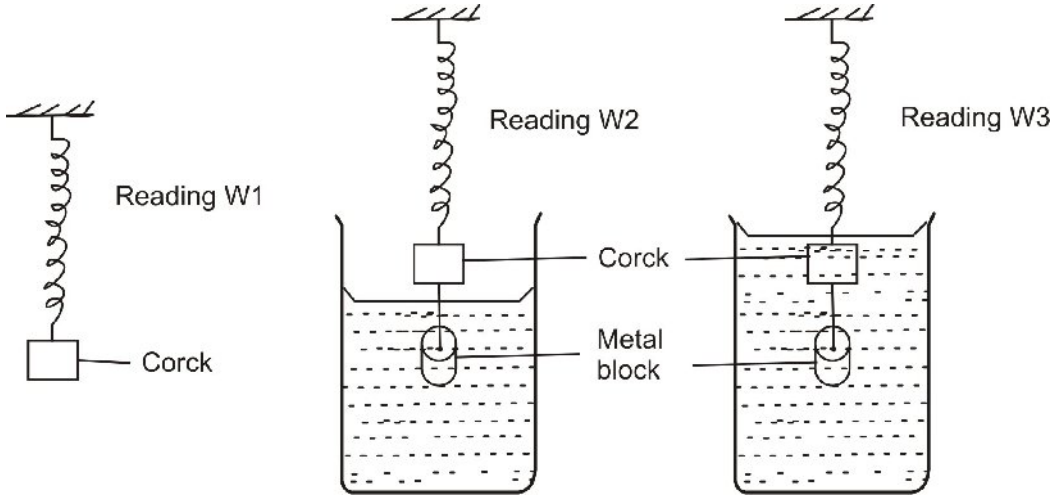
c) A student was provided with water in a beaker, a spring balance, a metal block and a string. Using the arrangement shown below she recorded the following.



Weight of cork in air = W_1

Weight of cork in air and metal block in water = W_2,

Weight of Cork and metal block in water = W_3

i) Write an expression for the upthrust on the cork in water. (1mrk)

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ii) Derive an expression for the relative density of the cork. (3mrks)

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d) A piece of wax of mass 380g and volume 400cm^3 is kept under water by tying it with a thin thread to a piece of metal. Determine the tension in the thread. (4mrks)

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18. a) Define specific latent heat of fusion. (1mrk)

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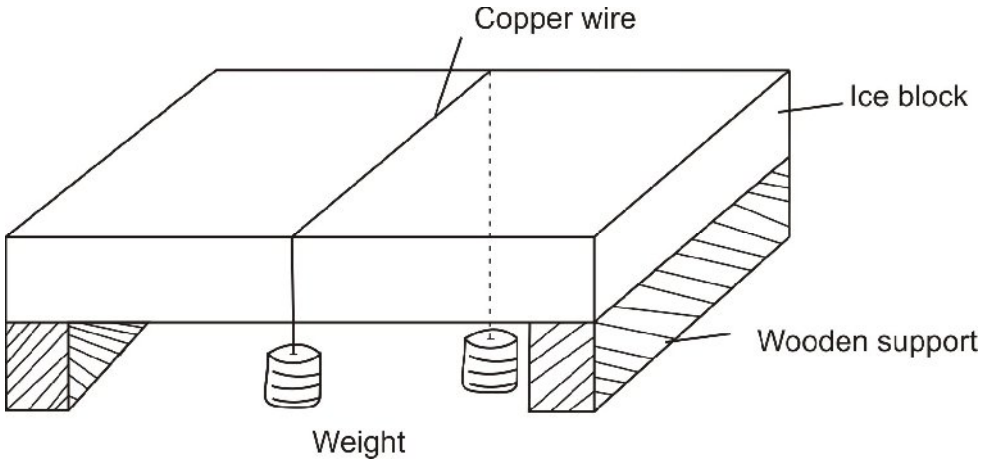
b) The figure below shows a block of ice with two heavy weights hanging such that the copper wire connecting them passes over the block of ice.



It is observed that the wire gradually cuts its way through the ice block, but leaves it as one piece.

Explain (4mrks)

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c) 3kg of hot water was added to 9kg of water at 10^{o}c and the resulting temperature was 20^{o}c. Ignoring heat gained by the container. Determine the initial temperature of the hot water. Take specific heat capacity of water = 4200J/kgK. (3mrks)

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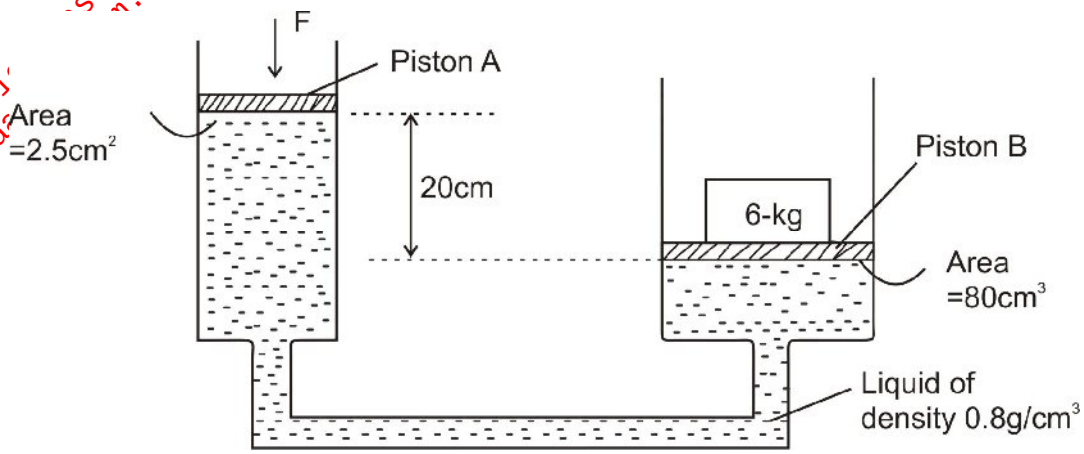
The figure below shows a mass of 6Kg on piston B balanced by force F acting on piston A



i) Explain why the liquid used in the system above should be incompressible. (1mrk)

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ii) Determine the value of the force F. (4mrks)

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19. a) In circular motion, there is acceleration yet the speed is constant. Explain. (1mrk)

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b) A bob having a mass of 1kg is moving in a uniform circular path in a vertical plane having a radius of 1m. 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 circular path. (3mrks)

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ii) The tension when the bob is at the bottom of the circle. (3mrks)

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c) At what position of the object is the string likely to break? (1mrk)

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d) A car moving at 72Km/h has wheels of diameter 60cm. Determine the angular speed of the wheels. (2mrks)

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