NAME:……..……INDEX NO:…….……

SCHOOL:…….……
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Candidate's Signature: …….

Date: …….

232 / 1
PHYSICS
PAPER 1 (Theory)
JULY / AUGUST 2009
2 HOURS

JOINT INTERSCHOOLS EVALUATION TESTS
JISET 2009

232 / 1
PHYSICS
PAPER 1

INSTRUCTIONS TO CANDIDATES

- *Write your name and index number in the spaces provided above*
- *Sign and write the date of the examination in the spaces provided*
- *This paper consists of two sections, A and B.*
- *Answer **all** the questions in the spaces provided*
- *All working must be clearly shown*
- *Non programmable silent electronic calculators and KNEC Mathematical tables **may** be used except where stated otherwise.*
  Take acceleration due to gravity g 10ms^{-2}

For Examiners Use Only

Section	Question	Maximum Score	Candidates' Score
A	1 – 14	25	
B	15 16 17 18 19	10 11 09 13 12	
	Total Score	80	

SECTION A (25 MARKS)

Figure one below shows part of a micrometer screw gauge. use the information and the figure to answer question one and two

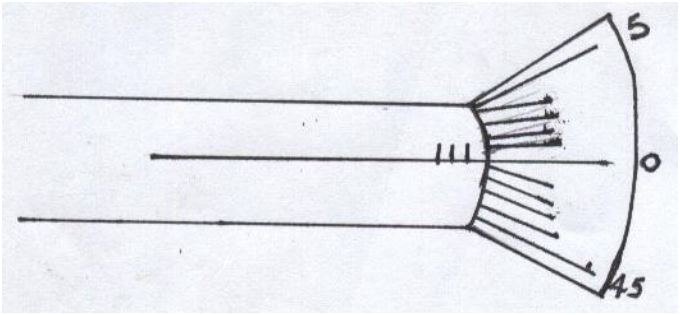

Figure 1

1. **State** the pitch of the micrometer screw gauge (1mark)

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2. **What** are the two limitation of the micromere screw gauge? (1mark)

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3. Figure 2 shows two identical springs arranged in parallel supporting a force **F**

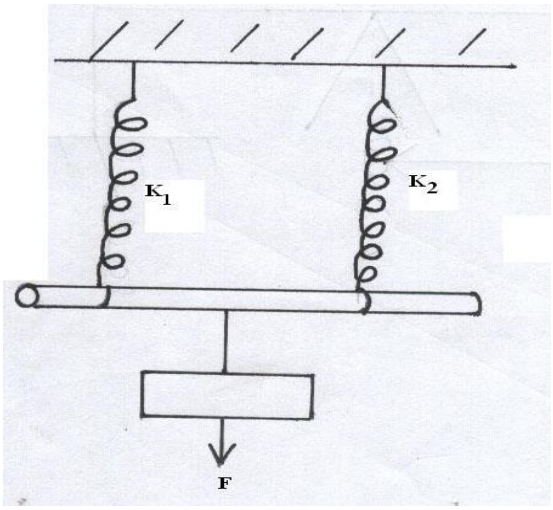

Figure 2

The spring constants for the parallel arrangement is K_p while K_1 for each spring
Show that $K_p=2K$ (3marks)

4. Two table tennis balls are suspended from a support by thin springs and air blown between them as shown in the figure below.

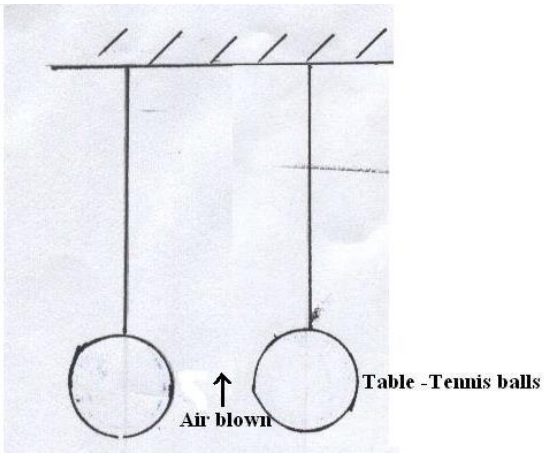

Figure 3

(i) **State** the observation (1mark)

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(ii) **Explain** the observation (2marks)

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5. A Uniform rod of length 4m and mass of 4kg is pivoted at 3.6m mark. The rod is held horizontal with a vertical rope at the 4m marks as shown in the figure 4 below. **Calculate** the tension in the rope. (3marks)

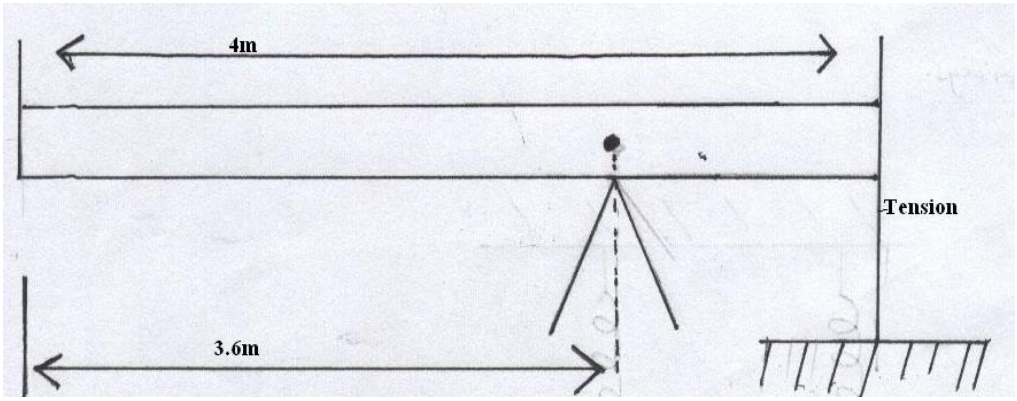

Figure 4

6. **Sketch** a velocity –time graph for a body thrown vertical upwards to a maximum height. (2marks)

7. A tight rope walker carries a pole to maintain stability. **Explain** how he used it to achieve it. (1mark)

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8. A small nail may pierce an inflated car tyre and remain there without pressure reduction in the tyre.**Explain** this observation (2marks)

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9. **Give** a reason why heat transfer by radiation is faster than heat transfer by conduction (1mark)

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10. **Name two** forces that determine the shape of a liquid drop on solid surface. (2marks)

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11. Equal masses of water and paraffin are heated for same length of time. The final temperature of paraffin was found to be greater than the final temperature of water. **Explain** the observation. (2marks)

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12. **State** Archimedes principle (1mark)

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13. A solid copper sphere will sink in water while a hollow copper sphere of the same size may float. **Explain** this observation. (2marks)

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14. **Explain** why pressure is more important than force when considering the damage which stiletto heels might cause to floor (2marks)

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SECTION B (55MARKS)

15. A ballon seller has a cylinder of helium gas which he uses to blow up his ballons .The volume of the cylinder is $0.10m^3$ .It contains helium gas at a pressure of $1.0x10^7$ Nm^{-2} The balloon seller fills each balloon to a volume of $1.0x10^{-2}$ m^3 and a pressure of $2.0 \times 10^5 Nm^{-2}$

a) **Explain** in terms of particles how the helium in the cylinder produces a pressure (1mark)

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b) **Calculate** the total volume that the helium gas occupy at a pressure of $1.2x10^5$ N/m^2.Assume the temperature of the helium does not change. (3marks)

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c) **Calculate** the number of balloons of volume $1.0x10^{-2}$ M^3 that the balloon seller can fill using the gas. (2marks)

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d) The graph below in figures shows how the pressure of a gas trapped inside a sealed container changes with temperature. The pressure is caused by the gas particles continually hitting the sides of the container

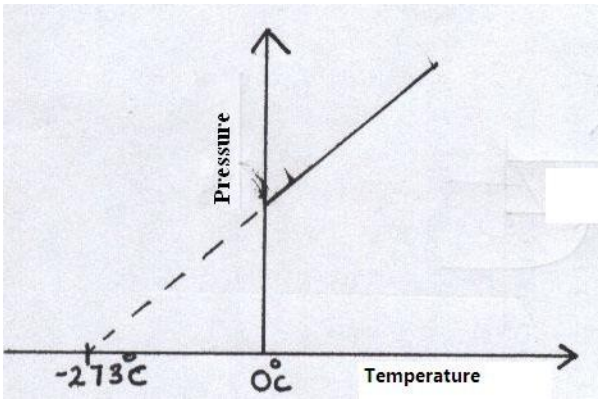

Figure 5

(i) **Write down** the name of the temperature at which the gas particles stop hitting the sides of the container (1mark)

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(ii) **What** is the momentum of the gas particles at this temperature? Give reason for the answer. (2marks)

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(iii) **Give** the value of the temperature in Kelvin. (1mark)

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16. Jerry makes a spring balance (Newton-meter) for weighing fish. She uses a stiff spring and a part of a bicycle pump. She puts a scale in Newton's on the rod.

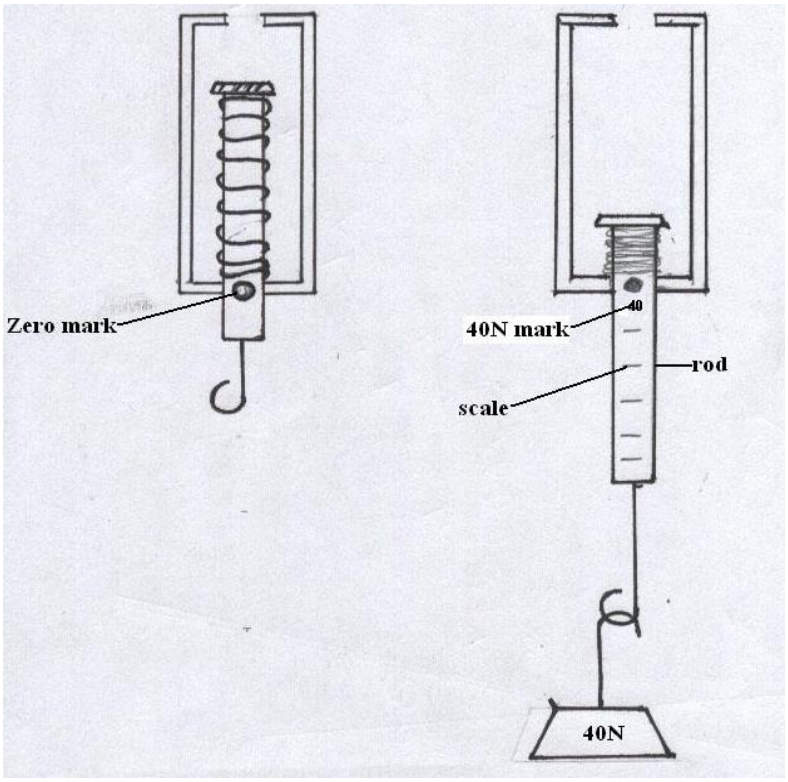

Figure 6

(i) **State** what happens to the spring when the 40N weight is put on the hook (1mark)

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(ii) **Suggest** why the spring balance would not be suitable for weighing up to 80N

(1mark)

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(b) Jerry loads the spring balance each time. She adds another 5Newtons to the weight, she makes another scale mark on the rod. The graph shown in the figure 7 shows how adding weight increases the length of the scale

Drawn Graph paper

(i) How can you tell from the graph that the gaps between the marks on the scale are equal? (1mark)

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(ii) Using the graph **find** how far long the scale the 30N mark is (2marks)

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(iii) State the relationship between the weight and the length of the scale (1mark)

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(c) (i) From the graph **determine** the spring constant in N\cm (1mark)

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(ii) Express the value of the spring constant in SI units (1mark)

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(d) Jerry catches a real big fish. It is too heavy for the balance. Her friend Tom also has a balance. They weigh the fish using both balances as shown in figure 7

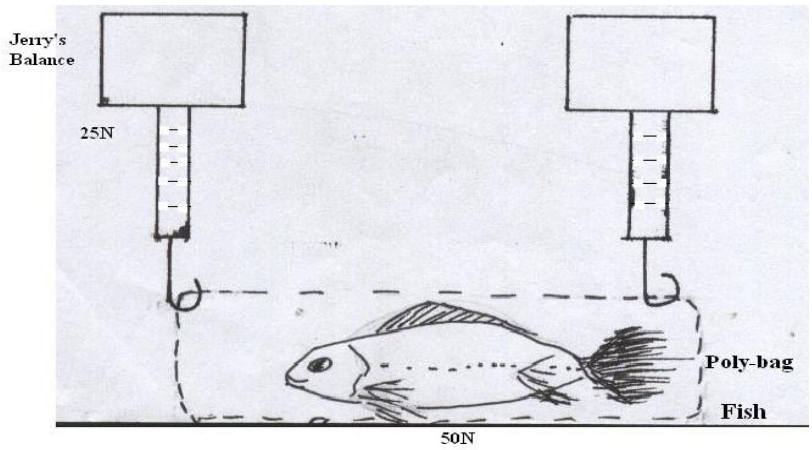

Figure 7

(i) **State** the reading of the Tom's balance (1mark)

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(ii) **Explain** the answer in d (i) above (1mark)

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17. (a) (i) **Why** must a liquid and not a gas be used as the 'fluid'in a hydraulic machine. (1mark)

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(ii) **State** the other important property of a liquid to hydraulic machine depends on (1mark)

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(b)The diagram below shows the principle of the hydraulic car jack

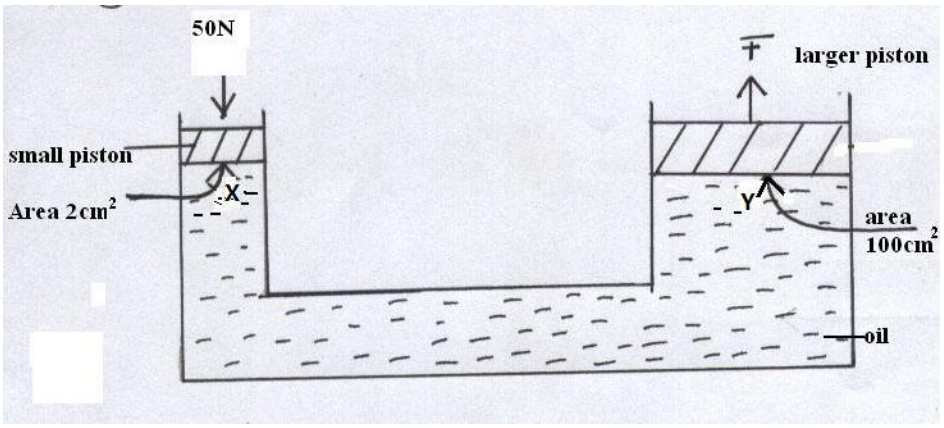

Figure 8

(i) If a force of 50N is applied to the smaller piston ;**calculate** the pressure produced in the oil at X (2marks)

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(ii) **Determine** the pressure exerted by oil at Y (1mark)

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(iii) If the small piston moves down a distance of 5cm, **determine** how far upwards the larger piston moves. (2marks)

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(iv) Using the information in the figures determine the velocity ratio v_2 of the hydraulic jack

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18. Ian has a mass of 70kgs.he dives from a high board .his vertical velocity at different times is shown in the graph in figure 9

Drawn graph paper

a) From the graph **calculate**

(i) The time he took to reach the water.

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(ii) The height of the diving board (3marks)

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(iii) Ian's deceleration in the water.

(2marks)

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(iv) The retarding force on Ian in the water (3marks)

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(v) The depth in the water that Ian reached (3marks)

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19. (a) **Define** angular velocity and state its SI unit (2marks)

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(b) What provides for the centripetal force the following cases of circular motion?

(i) The moon moving around the earth (1mark)

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(ii) A cyclist negotiating a curve (1mark)

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(c) A fun fair ride of diameter 12m makes 0.5 revolutions per second .determine

(i) Its angular velocity (2marks)

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(ii) The linear speed of a child ride in it (3marks)

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(iii) The centripetal acceleration experienced by the child if his mass was 40kg(3marks)

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