**MANGU HIGH SCHOOL**

**232/1 NAME: ----------------------------------------------------**

**PHYSICS**

**PAPER 1 CLASS: --------------- Adm. No. ------------------------**

**(Theory)**

**Kenya Certificate of Secondary Education**

**MOCK EXAMINATIONS**

**JULY 2014**

**Physics**

**Paper 1**

**2 Hours**

* This paper consists of ***Two*** sections ; ***A*** and ***B***.
* Answer ***ALL*** the questions in sections ***A*** and ***B*** in the spaces provided.
* ALL working ***MUST*** be clearly shown in the spaces provided in this booklet.
* Mathematical tables and Electronic calculators may be used.
* Non programmable silent calculators and KNEC mathematical tables may be used.
* ***This paper consists of 14 printed pages***
* ***Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing***

**For Examiner’s Use Only**

|  |  |  |  |
| --- | --- | --- | --- |
| **SECTION** | **QUESTION** | **MAX. SCORE** | **CANDIDATE’S SCORE** |
| A | 1-13 | 25 |  |
| B | 14 | 11 |  |
| 15 | 10 |  |
| 16 | 12 |  |
| 17 | 11 |  |
| 18 | 11 |  |
| **TOTAL SCORE** | **80** |  |

**SECTION A (25 MARKS)**

***(Answer all the questions in the spaces provided)***

1. **Figure 1** shows part of the main scale and vernier scale of a travelling microscope. The length of 1 division of the vernier scale is 4.9mm.

***Figure 1***

(a) determine the least count. (1mk)

(b) record the reading of the travelling microscope. (1mk)

2. State the reason why a liquid with dissolved gases cannot siphon satisfactorily in vacuum. (1mk)

1. **Figure 2** shows a magnet suspended by a string over a fixed iron nail. Explain why the tension on the string is greater than the weight of the magnet.

**S**

**N**

Fixed iron nail

**Figure 2**

4. Two wires A and B of the same material are such that, the length of B is twice of A. If wire A is stretched by e,$μm$um while B is stretched by 7e,$μ$m within elastic limit, determine the ratio of work done to stretch wire A to work done in stretching wire B. (3mks)

5. 100 drops of oil, of density 800kg/m3 are found to have a total mass of 2 x 10-4 kg. One of the drops is placed on a large clean water surface and it spreads to form a uniform film of diameter 0.5m.

Determine;

(a) the minimum value of the radius of the oil molecule. (2mks)

(b) the new diameter of the film if a second drop of the same mass is placed on the film. (1 mk)

6. **Figure 3** shows an inverted test-tube containing some air inside a large glass jar full of water. It is observed that when the bung is pressed down, the test-tube moves to the bottom of the jar. Explain this observation. (2mks)

Bung

Air

Test tube

Water

Jar

**Figure 3**

7. **Figure 4** shows a horizontally suspended capillary tube containing water at 1oc trapped by a mercury thread. Explain the observation made when the system is taking in a room where the temperature is 2oC higher. (2mks)

Thread

Capillary tube

mercury

water

**Figure 4**

8. **Figure 5** shows a uniform metre rule of weight 1.2N balanced at 35cm mark, by a mass of 100.8g immersed in a liquid and a 10g mass.

80

35

10

0

100.8g

**Figure 5**

Liquid x

10g

Determine the density of liquid X, given that the immersed object has a volume of 13.5cm3. (3mks)

9. A ball is projected vertically upward with an initial velocity of 20m/s from the top of a tower. At the same time, another ball is projected vertically upward with an initial velocity of 30m/s from the bottom of the tower. If both balls reach the bottom of the tower at the same time, determine the height of the tower. (3mks)

10. State the advantage of using a machine with a mechanical advantage of less than 1. (1mks)

11. **Figure 6** shows a section of a garden sprinkler. Each hole has a diameter of 1.596mm. The water is supplied at the rate of 3.0x10-3m3s-1.

3 x 10 -3 m3s-1

Holes

5m/s

**Figure6**

If the average velocity of the spray is 5m/s, determine the number of holes in the sprinkler have. (2mks)

12. State the reason why some lengths are written in standard form.

(1mks)

13. When water is at a higher attitude, it boils at a lower temperature. State the factor that affects its boiling point. (1mks)

**SECTION B (55 MARKS)**

***(Answer all the questions in the spaces provided)***

14. (a) State two basic assumptions of the kinetic theory of gases. (2mks)

(b) **Figure 7** shows how the pressure of a fixed mass of air was made to vary with its volume.

C

B

A

**Figure 7**

Volume

Pressure

1. State the section of the graph that may represent.
2. Boyle’s law (1mk)
3. Charles law (1mk)
4. What does the area ABCA represent (1mk)

(c) A gas occupies a volume of 490.15cm3 at 30oC. When heated at a constant pressure to a temperature of 97oC, the gas expands to occupy 600cm3. From these data, determine the value of absolute temperature that is equivalent to boiling pint of pure water at sea level. (3mks)

(d) Town B is at a higher attitude than town A. The barometric height in town A is 70.0cmHg. Determine the difference in attitude of town A and B given that town B is 200m, above sea level.(take g=10m/s2, density of mercury =13600kg/m3, average density of air = 1.25kg/m3 and atmospheric pressure at sea level=103, 360N/m2) (3mks)

15. (a) State Newton’s third law of motion. (1mk)

(b) **Figure 8** shows two trolleys P and Q of masses 0.5kg and 1.50kg respectively connected to each other by elastic strip of negligible mass. The trolleys are pulled apart on smooth horizontal plane and then released suddenly.

1.5kg

Elastic strip

0.5kg

**Figure 8**

 (i) State with reason, the total momentum of the trolleys when they are just released. (2mks)

(ii) Determine the initial velocity of Q, if the initial velocity of P is 6ms-1. (2mks)

1. It was observed that the elastic strip did not stretch to the same original length after the impact. State a reason for this observation. (1mks)

(c) **Figure 9** shows two masses, M1=3.5kg and M2 = 2kg and block of mass M, joined together by two inextensible strings. The strings pass over frictionless pulleys.

3.5kg

2kg

Block

**Figure 9**

If the masses move with constant velocity and the coefficient of kinetic friction between the bench top and the block is 0.25, determine the mass of the block (take g=10m/s2) (4mks)

16. (a) A cylindrical object of radius 3.5cm is suspended by a spring balance and slowly immersed in a liquid.

**Figure 10**, shows a graph of the spring balance reading against the immersed height.

Immersed height h (cm)

  Spring reading W (N)

 0

**Figure 10**

**Figure 10**

 2 4 6 8 10 12 14 16 18 20

1. Using the graph, determine
2. the weight of the body (2mks)
3. the density of the liquid (2mks)
4. Determine the density of the cylinder if a force of 1.5N is required to make the object just submerge in the liquid. (3mks)

(b) **Figure11** shows two forces F1, and F2 acting on a freely pivoted bar such that the bar remains stationary.

F1

pivot

F2

**Figure 11**

1. Explain why force F1 is greater than F2. (2mks)
2. On the diagram show with an arrow, a third force F3, which has the same direction as F2 but which will not cause the bar to move.(1mks)

(c) A steel door and a wooden door are almost equally easy to turn yet one is much heavier than the other.

(i) Explain this observation (1mk)

(ii) Give a reason why the heavier one may require a slightly larger force to turn. (1mk)

17. (a) **Figure 12** shows a uniform pendulum bob of mass 96.5g and radius 1.4cm held against a compressed spring of constant 400N/m by a force of 40N. It is tied on a horizontal support with a string of length 78.6cm.

string

78.6cm

spring

40N

**Figure 12**

1. Determine the initial kinetic energy of the bob when the force is withdrawn (take g=10N/m) (2mks)
2. Determine whether the bob will rotate round the support. (4mks)

(b) (i) Draw a diagram of a pulley system with a velocity ratio of 4 and consisting of three pulley. (2mks)

(ii) If the pulley system in b (i) above is 70% efficient, determine the effort needed to raise a load of 8400N. (2mks)

1. State one reason why the system is not 100% efficient. (1mks)

18. (a) **Figure 13** shows a tall cylinder A filled with distilled water at room temperature. A large container B with a mixture of ice and salt surrounds cylinder A at the middle.

B

Thermometer T1

Thermometer T2

**Figure13**

Freezing mixture

1. If the water is cooled until ice just form, sketch on the same axis provided, the graph of temperature against time for each thermometer T1 and T2. (3mks)

Temperature oC

Time (min)

1. Explain the shapes of the graphs (2mks)

(b) A copper block is suspended in a freezing mixture at -50oC for some time and then transferred to a large volume of water at 0oC. Part of water form s 40g of ice on the block.

(i) Explain why the ice is formed (1mk)

(ii) What will be the final temperature of the copper block? (1mk)

1. Determine the heat capacity of the copper block. (2mks)

(Take specified latent heat of ice =3.4 x 105Jkg-1)

(c) **Figure 14** shows a temperature compensated pipe whose internal diameter, d, remains constant as temperature increases.

d

**Figure 14**

1. Explain why the diameter, d, remains constant. (1mk)
2. What adjustment should be made so that the diameter, d, increases with temperature. (1mk)