

REGINA CAELI GIRLS HIGH SCHOOL

PHYSICS 232/1

FORM THREE 4 (Assignment)

Time: 2 Hours

Name:Adm No:

School:Class:

Signature:Date:

Instructions to candidates

- This paper consists of two sections *A* and *B*.
- Answer all the questions in the two sections in the spaces provided after each question
- All working must be clearly shown.
- Electronic calculators, mathematical tables may be used.
- All numerical answers should be expressed in the decimal notations.

You may use 'g' as 10m/s^2

For Examiner use only

SECTION	QUESTION	MAX MARKS	CANDIDATE'S SCORE
A	1–13	25	
B	14	13	
	15	13	
	16	14	
	17	07	
	18	08	
	TOTAL	80	

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

SECTION A (25 MARKS)

- Figure 1, shows a Vernier caliper of zero error 0.02 cm being used for measuring the diameter of a cylindrical container of height 10 cm. The scale reading of the Vernier is as shown alongside.

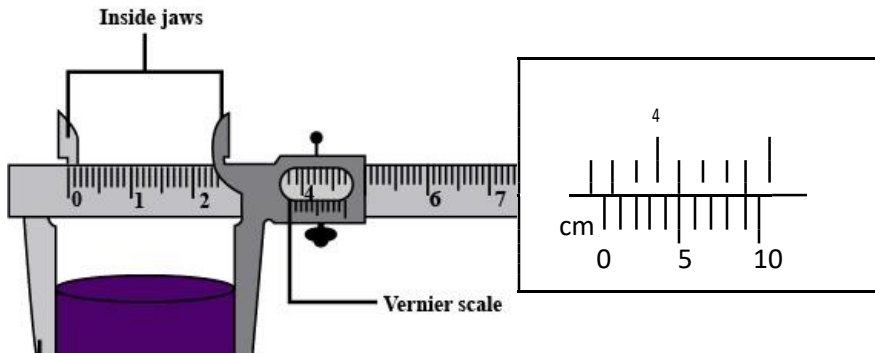


Figure 1

Determine the diameter of the container

(2 marks)

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Estimate the volume of a liquid which can completely fill the container

(2 marks)

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2.

State **one** factor that affects the turning effect of a force on a body.

(1 mark)

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3. **Figure 2** shows some air trapped by mercury in a glass tube. The tube is inverted in a dish containing mercury.

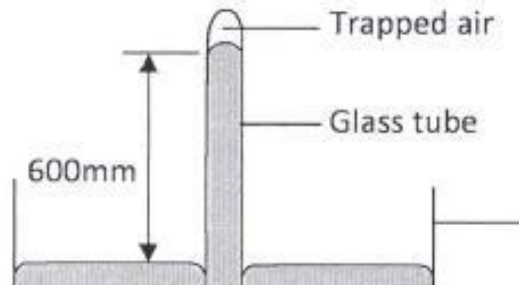


Figure 2

Given that the atmospheric pressure is 760 mmHg and the height of mercury column in the tube is 600 mm, determine the pressure of the air trapped in the tube in mmHg. (2 marks)

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4. Figure 3 shows drops of mercury and water on a glass surface, Explain the difference in the shapes of the drops. (2marks)

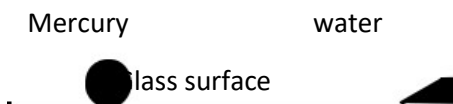


Figure 3

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5. A ball is thrown from the top of a cliff 20m high with a horizontal velocity of 10ms^{-1} . Calculate the distance from the foot of the cliff to where the ball strikes the ground. (3 marks)

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6. Explain **one** advantage of mercury over alcohol as a thermometric liquid. (1mark)

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7. A body of mass **M** is allowed to slide down an inclined plane. State **two** factors that affect its final velocity at the bottom of the inclined plane. (2marks)

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8. A stopwatch reads 08:10:84 and 09:10: 90 before and after an experiment respectively. Determine the duration of the event in SI units. (2marks)

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9. Explain the meaning of thermodynamics as a branch of physics. (1 mark)

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10. State the Hooke's Law. (1mark)

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11. **Figure 4** shows identical spiral springs supporting a load of 90N. Each spring has a spring constant $k = 200\text{N/m}$

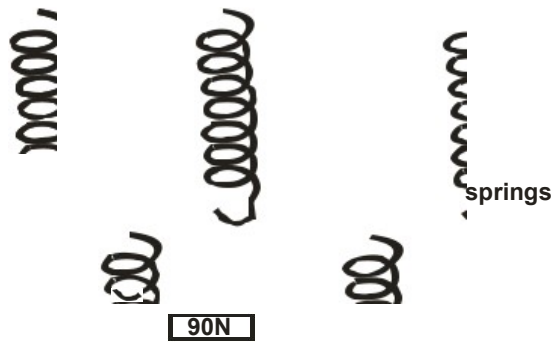


Figure 4

Determine the total extension of the system (take the weight of the cross bars and springs to be negligible) (2 marks)

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12. **Figure 5** shows a rectangular loop with a thin thread loosely tied and dipped into a soap solution.

Draw on the space provided what is observed when point A is punctured. (1mark)

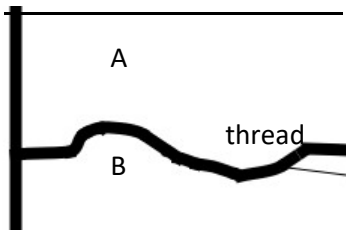


Figure 5

13. Two horizontal strings are attached to a block, resting on a frictionless surface, as shown in figure 6.



Figure 6

A force of 100N pulls on one string. The block does not move. Find the value of the force, F on the other string. (1 mark)

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14. A wooden bench feels neither warm nor cold when touched by your bare hands. Explain this observation. (2 marks)

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SECTION B (55 MARKS)

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- (a) State the principle of conservation of linear momentum. (1 mark)

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- (b) Distinguish between elastic and inelastic collision. (1 mark)

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- (c) A striker kicks a ball of mass 200g initially at rest with a force of 78N. Given that the foot was in contact with the ball for 0.30s; determine the take off velocity of the ball. (3 marks)

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- (d) A high jumper usually lands on thick soft mattress. Explain how the mattress helps in reducing the force of impact. (2 marks)

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- (e) A ball is thrown horizontally from the top of a vertical tower of height 75m and strikes the ground at a point 80m from the bottom of the tower. Determine the:

- (i) Time taken by the ball to hit the ground. (*Acceleration due to gravity*= 10m/s^2) (3 marks)

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- (ii) Initial horizontal velocity of the ball. (3 marks)

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16. State two factors that affect the boiling point of a liquid (2 marks)

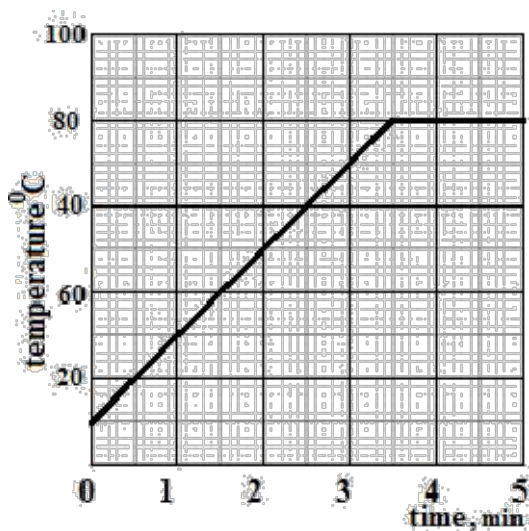
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100g of a liquid at a temperature of 10^0 C is poured into a well lagged calorimeter. An electric heater rated 50W is used to heat the liquid. The graph in figure 7 shows the variation of the temperature of the liquid with time.



(i) From the graph, determine the boiling point of the liquid

(1mark)

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(ii) Determine the heat given out the by the heater between the times $t = 0.5$ minutes and $t = 5.0$ minutes

(3 marks)

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iii. From the graph determine the temperature change between the times $t = 0.5$ minutes and $t = 5.0$ minutes, hence determine the specific heat capacity of the liquid

(3 marks)

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xv) Figure 10 shows a graph of **pressure** against **volume** for a fixed mass of a gas at constant temperature.

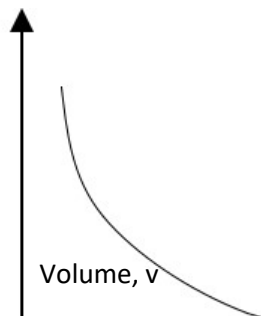


Figure 10

In the space provided, sketch a graph of pressure, p against $\frac{1}{V}$ (1 mark)

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xvi) Explain the pressure law using the kinetic theory of matter (3 marks)

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xvii) 20cm^3 of a gas exerts a pressure of 760mmHg at 25°C . Determine the temperature of the gas when the pressure increases to 900mmHg and the volume decreases to 15cm^3 . (3 marks)

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17. a. Define the term velocity ratio of a machine (1 mark)

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- b) The figure 11, below shows part of the hydraulic lift system. State any **one** property of the liquid under which the hydraulic system works
(1 mark)

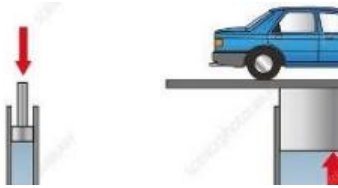


Figure 11

- c) The hydraulic lift machine above has velocity ratio 45 and it overcomes a load of 4500 N when an effort of 135 N is applied. Determine:
- The mechanical advantage of the machine (2 marks)

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- Efficiency of the machine (3 marks)

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- The percentage of work that goes to waste (1 mark)

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