MARANDA HIGH SCHOOL

Kenya Certificate of Secondary Education
PRE-MOCK EXAMINATIONS 2024

232/1 PHYSICS PAPER 1

MARCH/APRIL 2024 TIME: 2 Hours

Name: ……..…… Adm No: ……

Class: ……Candidate's Signature: …… Date: …../…./2024.

Instructions to candidates

a) Write your name and admission number in the spaces provided above
b) This paper consists of two sections A and B.
c) Answer ALL questions in both section in the spaces provided
d) All working MUST be clearly shown.
e) Silent non-programmable electronic calculators may be used
f) **This paper consists of 14 printed pages. Candidates should check the question paper to ascertain all the pages are printed as indicated and no questions are missing.**

FOR EXAMINER'S USE ONLY.

Section	Question	Maximum score	Candidate's score
A	1-12	25	
B	13	11	
	14	12	
	15	12	
	16	9	
	17	11	
Total score		80	

SECTION A (25 MARKS)

(Answer all questions in the spaces provided)

1. **Figure 1** shows part of the main scale of a vernier calipers.

Figure 1

Insert the vernier scale to the main scale, to show a reading of 0.24cm. (2 marks)

2. Explain why steel is selected as a better material for reinforcement of a concrete beam (1 mark)

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3. F**igure 2** shows two aluminium containers **A** and **B** placed on a wooden table. The containers **A** and **B** have equal volumes of hot water initially at the same temperature.

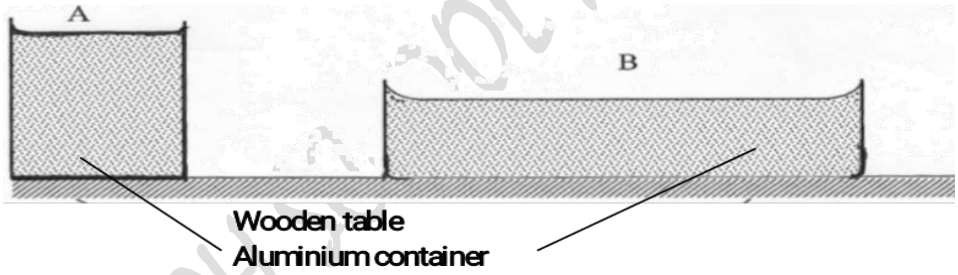

Figure 2

Explain which water in the two containers cools faster than the other after some time (2 marks)

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4. Explain why kinetic energy is not conserved during inelastic collision (1 mark)

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5. Two samples of bromine vapour are allowed to diffuse separately under different conditions. One in a vacuum and the other in air. State with a reason the condition in which bromine will diffuse faster. (2 marks)

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6. a) A stone and a feather are dropped from rest from a building 20m tall. If they reach the ground at the same time, state the condition under which they fall (1 mark)

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b) **Figure 3** shows a velocity–time graph for a certain object

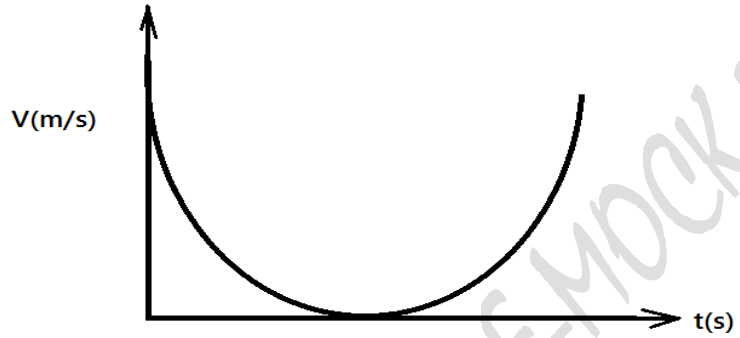

Figure 3

Describe the motion of the object. (2 marks)

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7. **Figure 4** shows a system in equilibrium.

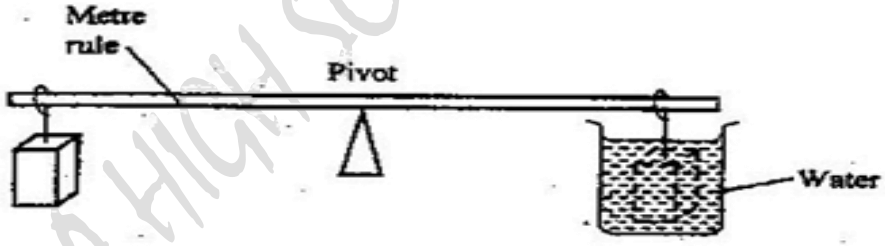

Figure 4

When the temperature of the water is raised the system is observed to tilt to the right, state the reason for this observation. (2 marks)

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8. **Figure 5** shows a wooden sphere with a nail hammered into it at **point A** as shown.

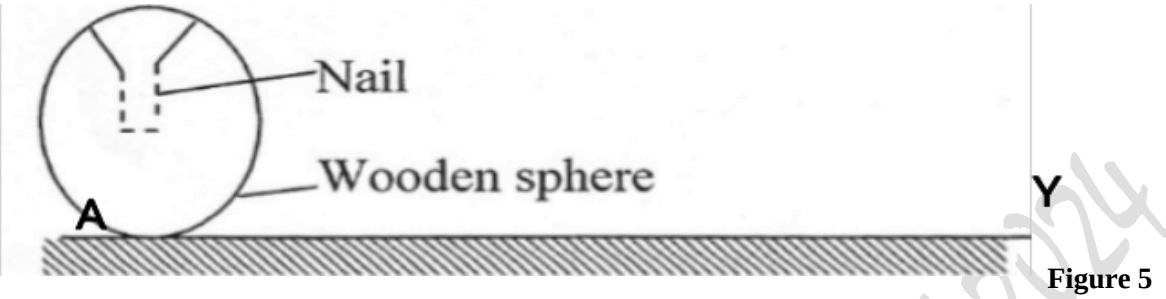

Figure 5

The sphere is rolled on a horizontal ground and comes to rest after some time at **point Y**. Draw the sphere after it comes to rest at **point Y**. (1 mark)

9. a) State the reason why it may be very difficult to suck a liquid using a drinking straw on the surface of the moon (1 mark)

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b) **Figure 6** shows a car braking system. The brake fluid is an oily liquid

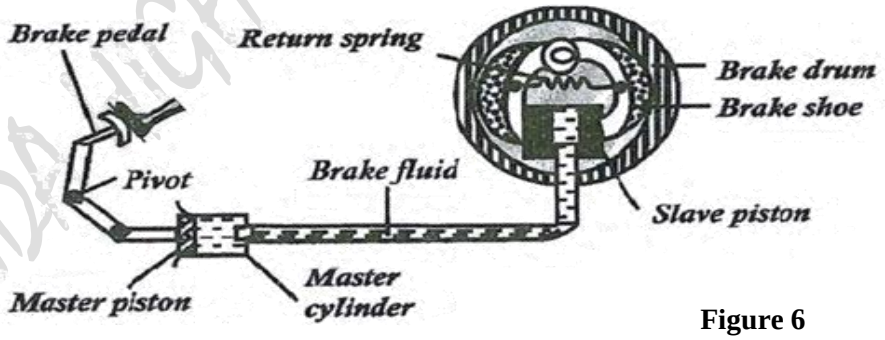

Figure 6

i. State the principle by which a car braking system works. (1 mark)

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ii. Explain why the master piston is wider than slave piston (1 mark)

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iii. State the function of the return spring in the system (1 mark)

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10. F**igure 7** shows a stone of weight **W** placed on an inclined plane and the angle of inclination is $\boldsymbol{\theta}$.

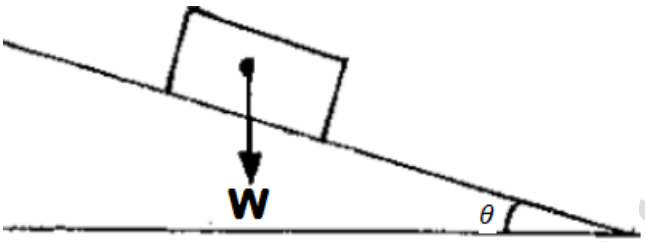

Figure 7

a) Indicate with arrows, **two** other forces acting on the stone (2 marks)

b) State how the forces in **a)** above is affected when angle $\boldsymbol{\theta}$ increases (1 mark)

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11. Study the set up in **Figure 8** and use it to answer the questions that follows:

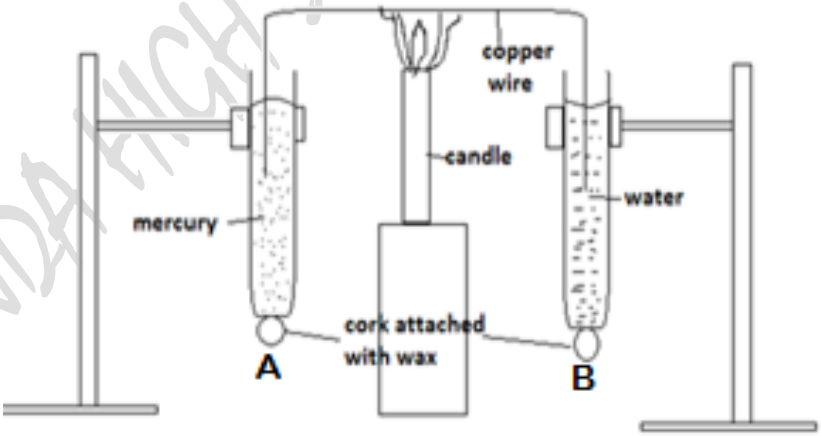

Figure 8

a) State what the experiment illustrates. (1 mark)

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b) Which cork between **A** and **B** fell off first? Explain (2 marks)

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12. F**igure 9** shows a metal wire structure with a loop of thread inside after it was dipped into a soap solution.

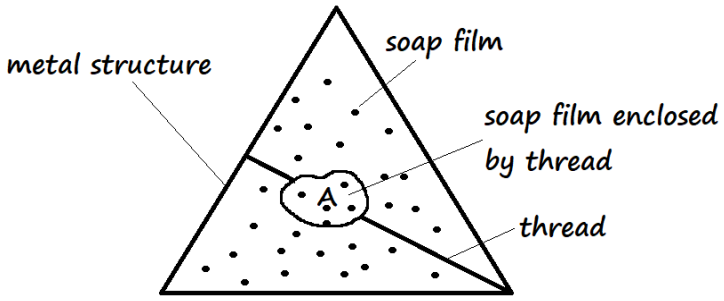

Figure 9

Sketch the appearance of the thread loop after the film is broken at **A** (1 mark)

SECTION B (55 MARKS)

Answer all questions in the spaces provided

13. a) State the Archimedes principle (1 mark)

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b) **Figure 10** shows a cube of a certain wood whose density is the same as that of water. The cube is held on the surface of the water in a long cylinder.

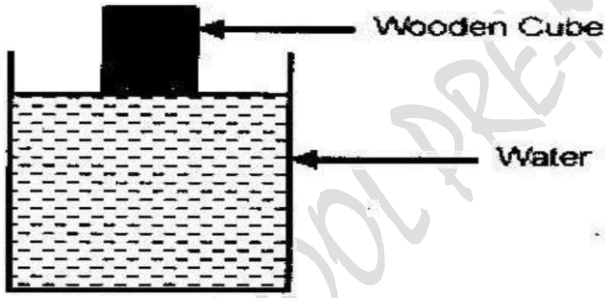

Figure 10

Explain what happens to the cube after it is released. (2 marks)

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c) **Figure 11** shows a cork floating on water and held to the bottom of the beaker by a thin thread

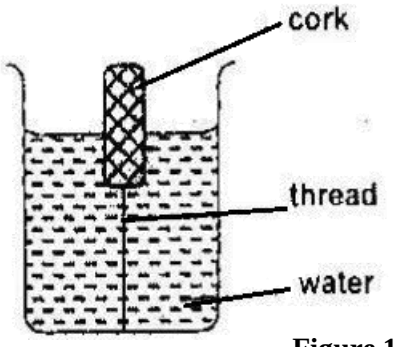

Figure 11

i. Name **three** forces acting on the cork. (3 marks)

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ii. Describe how each of the forces mentioned in **i)** above changes when water is added into the beaker until it fills up. (3 marks)

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d) **Figure 12** shows a tube of varying cross sectional area

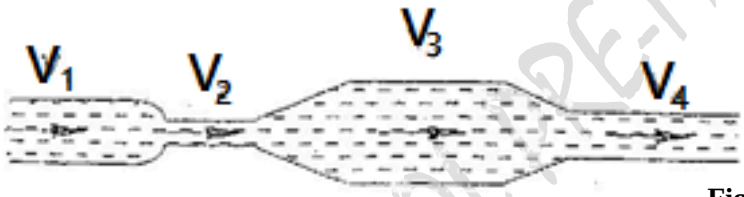

Figure 12

i. Arrange the speed V_1, V_2, V_3 and V_4 in decreasing order starting with the highest. (1 mark)

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ii. State **one** application of fluid flow (1 mark)

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14. a) A car is negotiating an unbanked circular track.

i. State **two** factors that will determine the critical speed of the car. (2 marks)

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ii. F**igure 13** shows a car of mass **m** moving along a curved part of the road with a constant speed

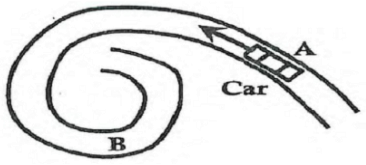

Figure 13

State in which part, **A** or **B** of the road, is the car most likely to skid off if the speed is not changed. (2 marks)

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b) Given that the car in **a)** above has a mass of 800kg and the circular path is of radius 25m. Determine the maximum speed with which the motorist can travel so as not to skid off. Given the frictional force between the tyres and the road is 6500N. (3 marks)

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c) A 200g mass tied to a string is being whirled in a vertical circle of radius 32cm with uniform speed. At the lowest point, the tension in the spring is 10.5N. Determine:-

i. The speed of the mass (3 marks)

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ii. The tension in the string when the mass is at the uppermost position of the circular path (take g = $10ms^{-2}$) (2 marks)

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15. a) Explain why water kept in a porous pot on a hot day remains cooler than that contained in a metallic vessel (1 mark)

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b) **Figure 14** shows a block of ice with two heavy weights hanging such that the copper wire connecting them passes over the block of ice.

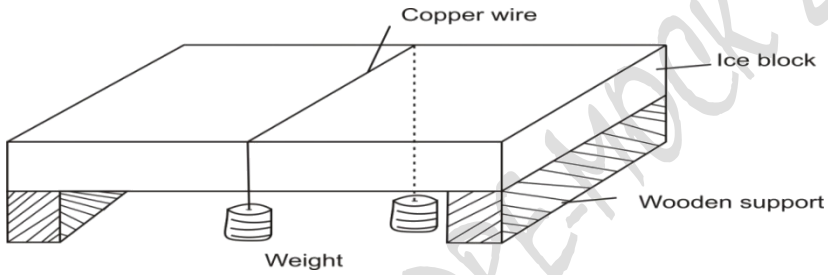

Figure 14

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

i. Explain this observation. (2 marks)

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ii. State the effect of replacing the copper wire with a cotton thread (1 mark)

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c) Distinguish between heat capacity and specific heat capacity. (2 marks)

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d) **Figure 15** shows a set-up that can be used to determine the specific heat capacity of a metal block.

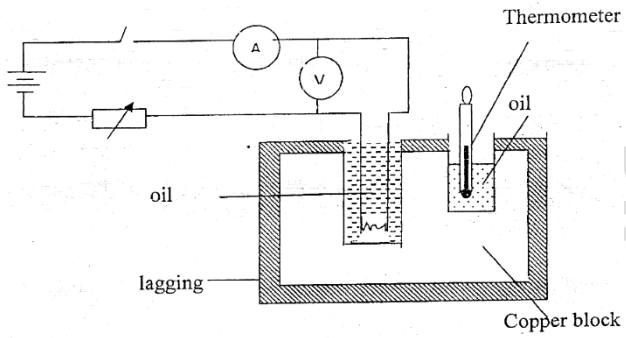

Figure 15

i. State **two** measurements that should be taken in the experiment to determine the specific heat capacity of the block. (2 marks)

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ii. Explain how the measurements in **i)** above can be used to determine the specific heat capacity of a metal block. (2 marks)

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iii. State the functions of the following in the set-up. (2 marks)

a. Lagging

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b. Oil

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16. a) Define the term 'ideal gas' (1 mark)

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b) A gas occupies a volume of 4,000 litres at a temperature of 37°C and standard pressure of 1.02×10^5Pa. Determine the new volume of the gas if it is heated at constant pressure to a temperature of 67^0C (3 marks)

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c) The pressure acting in a gas in a container was changed steadily while the temperature of the gas was maintained a constant value. The values of volume V of the gas were measured for various values of pressure. The graph in **figure 16** shows the relationship between the pressure P and the reciprocal of volume $\frac{1}{V}$

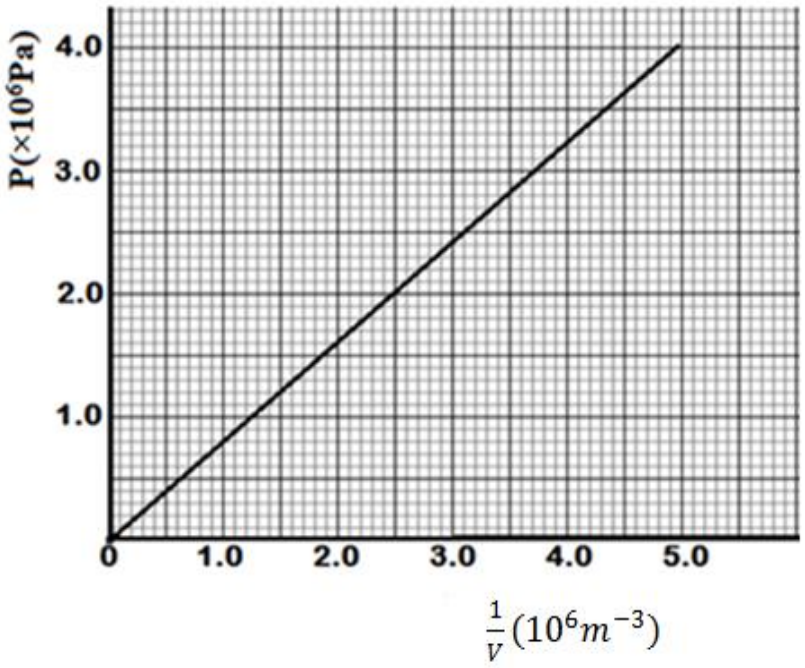

Figure 16

i. Suggest **one** way how the temperature of the gas is kept constant (1 mark)

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ii. Given that the relationship between pressure **P** and volume **V** is given by $\boldsymbol{PV = k}$, where k is a constant. Use the graph to determine the value of $\boldsymbol{k}$ (3 marks)

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iii. Identify the physical quantity represented by the constant **k** (1 mark)

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17. **Figure 17** shows a block and tackle made up of three pulley wheels on top and two pulley wheels at the bottom.

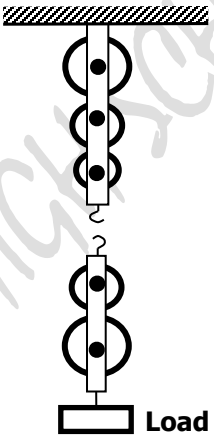

Figure 17

a) Complete the diagram by drawing the chain which passes over the wheels and indicate where the effort is applied (2 marks)

b) What is the velocity ratio of the system? (1 mark)

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c) A load of **1120N** is lifted by an effort of **250N**. Determine

i. The mechanical advantage **(M.A.)** of the system (3 marks)

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ii. The efficiency, **E**, of the system (3 marks)

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iii. How much percentage energy is wasted in the above system (1mark)

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iv. Using the axes given in **figure 18**, sketch a graph of efficiency**,** against load for the system (1 mark)

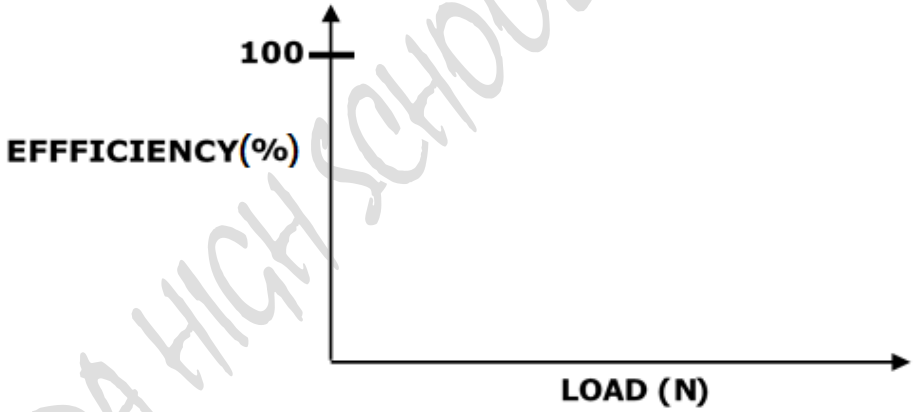

Figure 18

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