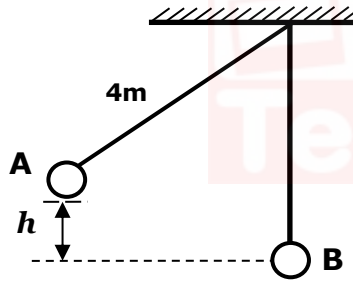
**FORM 3 PHYSICS**
**APRIL HOLIDAY ASSIGNMENT - 2024**

1.State the law of conservation of energy. (1mk)

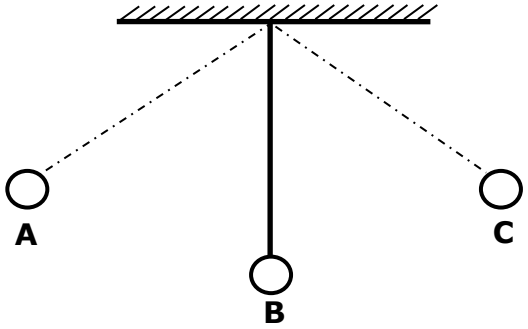
2.Define the terms and state the **S.I** units of each.
**(i)** Work (2mk)
**(ii)**Energy (2mk)
**(iii)**Power (2mk)
**(iv)**Machine (2mk)

3.Name a device that is used to convert;
i.Sound to electrical energy
ii.Electrical energy to kinetic energy.
iii.Electrical energy to sound energy
iv.Electrical energy to light energy
v.Solar energy to electricity energy

4.A metal ball suspended vertically with a wire is displaced through an angle as shown in the diagram below. The body is released from **A** and swings back to **'B'**. Given that the maximum velocity at the lowest point **B** is **2.5 m/s.** Find the height **h** from which the ball is released.

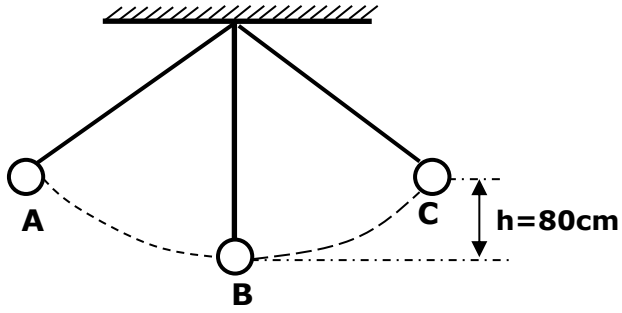



5.The figure below shows a swinging pendulum.

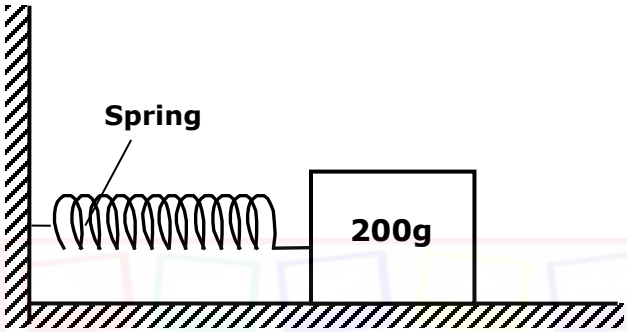



state the energy conservation taking place as the pendulum moves from **A** to **B** and **B** to **C** (2mk)

6.The figure shows a simple pendulum of length 80cm. The pendulum bob whose mass is **50g** oscillates between points **A** and **B**, through its rest position **C.** **A** and **C** are both **80cm** higher than **B**.

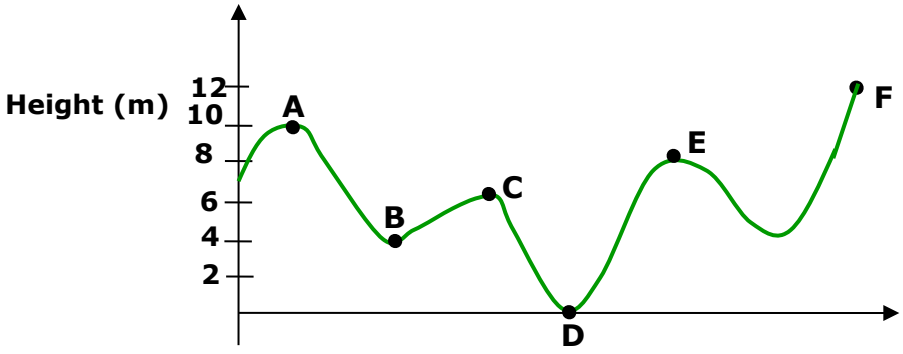



7.The figure below shows a 200g mass placed on a frictionless surface and attached to spring.




The spring is compressed and released. Given that the elastic potential energy of the compressed spring is $2.7 \times 10^{-2}$ J, determine the maximum speed with which the block moves after it is released. (4mk)

8. A load of **60kg** moves from rest position to a point E along a frictionless path **ABCDE**




(a) Calculate the

(i) Maximum Kinetic energy of the load. (3mks)

(ii) Maximum velocity (3mks)

(iii) Velocity at **C** (3mks)

9.A crane lifts a load of **500 kg** through a vertical distance of **2m** in **8 s** determine

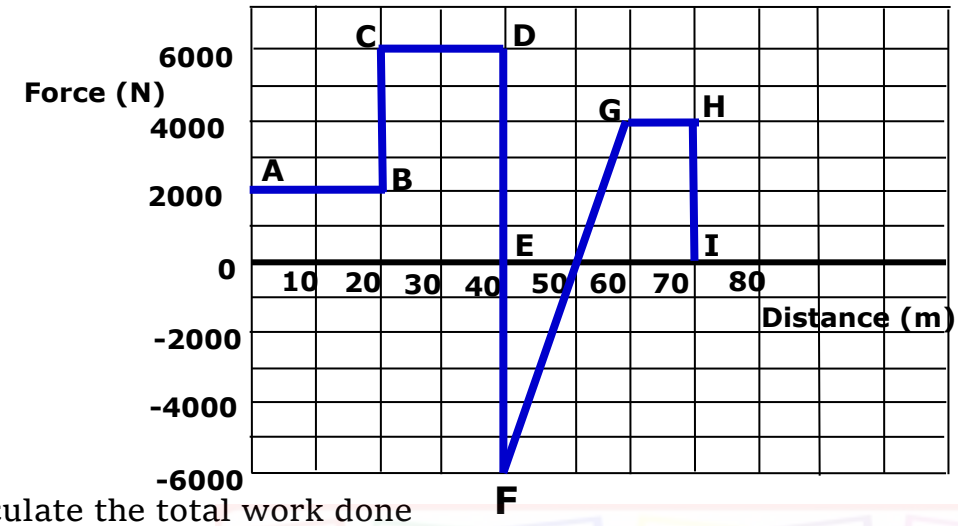
**i)** Work done by the crane (2mk)

**ii)** Power developed by the crane (2mk)

**iii)** Efficiency of the crane given that its operated by all electric motor rated **2kW** (2mk)

**iv)** State two effects which contribute to the efficiency being less than **100%** (2mk)

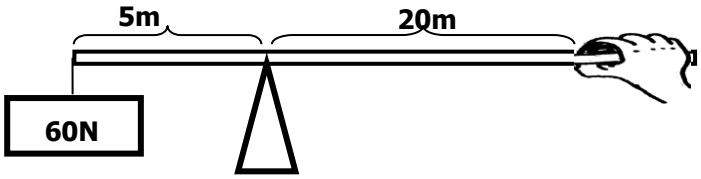
10.The fig. below shows a **force - distance** graph for a car being on a horizontal ground




**a.**Calculate the total work done

**b.**If the velocity just before reaching point **D** is **6m/s**, calculate the power developed by the agent providing the force at this point.

11.Figure shows a lever




Determine

(i) The effort applied

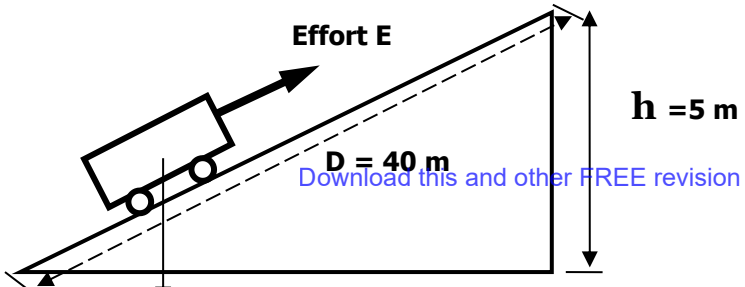
(ii) The **VR**.

(iii) The MA.

(iv) The efficiency.

(v) Suggest two ways in which the mechanical advantage could be increas

12.The figure below shows a trolley of weight **20N** pulled by a force of **4N** from the bottom to the top of an inclined plane at a uniform speed.



a) (i) State the value of the force acting downwards along the inclined plan (1mk)

ii) Explain how the value in part (a) (i) is obtained (2mk)

b) For the system, determine the:

i) Mechanical advantage: (2mk)

ii) Velocity ratio; (2mk)

iii) Efficiency. (2mk)

13.A mechanic uses a pulley system with a velocity ratio of **6** to raise an engine, of weight **2800N** through a vertical distance of **1.5m**. The mechanic pulls with an effort of **500N**. Calculate

i) The effort distance. (2mk)

ii) The work done by the effort (mechanic) (2mk)

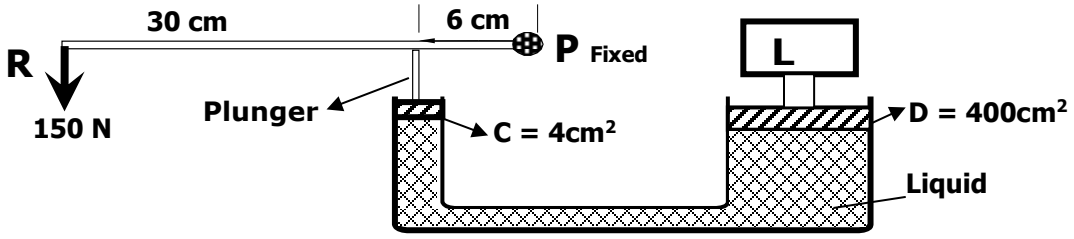
iii) The useful work done by the pulley machine. (2mk)

iv) The mechanical advantage of the machine. (2mk)

v) The efficiency of the machine. (2mk)

vi) State two reasons why the efficiency of a machine is always less than **100%** (2mk)

14.The figure below shows a hydraulic lift used to lift a load **L.** The effort applied is **150N** at the end of a lever **36cm** long and pivoted at the other end and, plunger is **6cm** from the pivot. The area of the plunger piston **C** is **4cm²** and that of the load piston **D** is **400cm²**.




Calculate

(i) The **V.R** of the lift

(ii) The effort exerted at the effort piston **C.**

(iii) The **M.A** of the system

(iv) The efficiency of the system

15.An electric pump can raise water from a lower-level reservoir to the high level reservoir at the rate of **3.0 x 10⁵ kg per hour**. The vertical height of the water is raised **360m**. If the rate of energy loss in form of heat is **200 kW**, determine the efficiency of the pump.