**Name: ……………………………………………………Adm. No: ………………Class:……………..**

232/1

**PHYSICS**

Paper 1

(THEORY)

NOV.

**Time: 2 Hours**

**MWAKICAN JOINT EXAMINATION (MJET) FORM 3**

**TERM 3 – 2016**

***Kenya Certificate of Secondary Education (K.C.S.E)***

**PHYSICS**

Paper 1

**Time: 2 Hours**

**INSTRUCTIONS TO CANDIDATES:-**

* *Write your* ***name****,* ***index******number*** *and* ***class*** *in the spaces provided above.*
* *This paper consists of* ***two*** *sections;* ***A*** *and* ***B***
* *Answer* ***all*** *the questions in section* ***A*** *and* ***B*** *in the spaces provided*
* *All working* ***must*** *be clearly shown.*
* *Mathematical tables and electronic calculators may be used*
* *This paper consists of 11 printed pages. Candidates should check to ascertain that all pages are*

*printed as indicated and that no questions are missing.*

* *Candidates should answer the questions in English.*
* *Take g = 10N/kg*

**For Examiner’s Use Only:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Section** | **Question** | **Maximum**  **Score** | **Candidate’s**  **Score** |
| **A** | **1 – 13** | **25** |  |
|  | **14** | **11** |  |
|  | **15** | **9** |  |
| **B** | **16** | **11** |  |
|  | **17** | **11** |  |
|  | **18** | **13** |  |
| **Total Score** | | **80** |  |

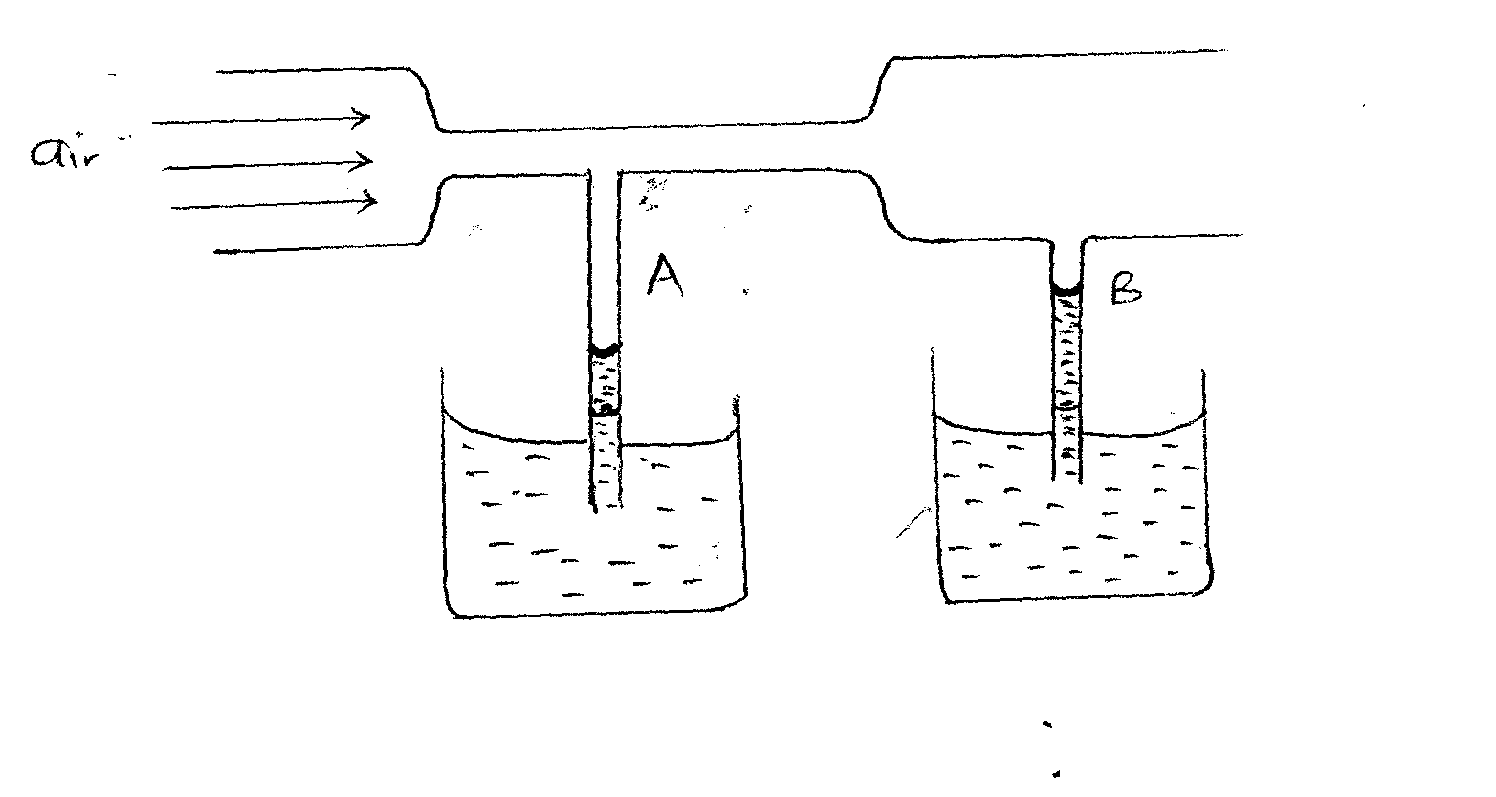
**SECTION A: 25mks (Answer all the questions)**

1. State one assumption made when determining the size of a molecule in an oil drop experiment

(1 Mark)

* **The drop is perfectly spherical any one = ✓1 Mark**
* **The layers/ patch is one molecule thick.**

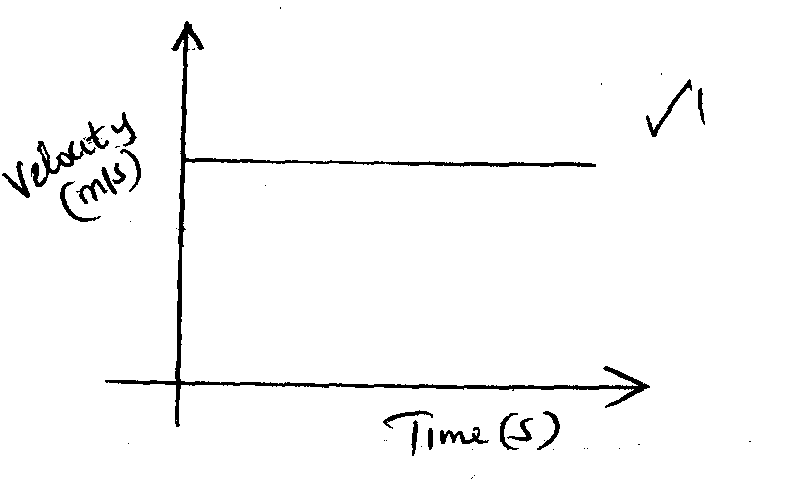
1. Air is blown into the horizontal tube as shown below.
2. Indicate the levels of water in tubes A and B when air passes through the horizontal tube at a high velocity . (1 Mark)



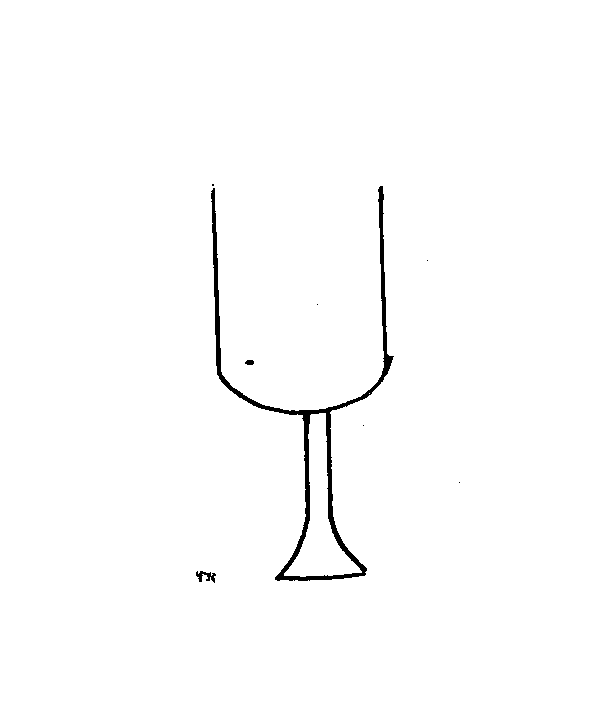
1. Explain your observation in (a) above (1 Mark)

* **In tube A, velocity of air above it is higher ✓than velocity of air above tube B**
* **Therefore in table A, pressure is lower than tube B**

1. Sketch a velocity – time graph of a body moving with uniform velocity. (1 Mark)



1. The figure below shows an empty wire glass.



1. How is its stability affected when filled with wine? (1 Mark)

* **Stability is reduced ✓**

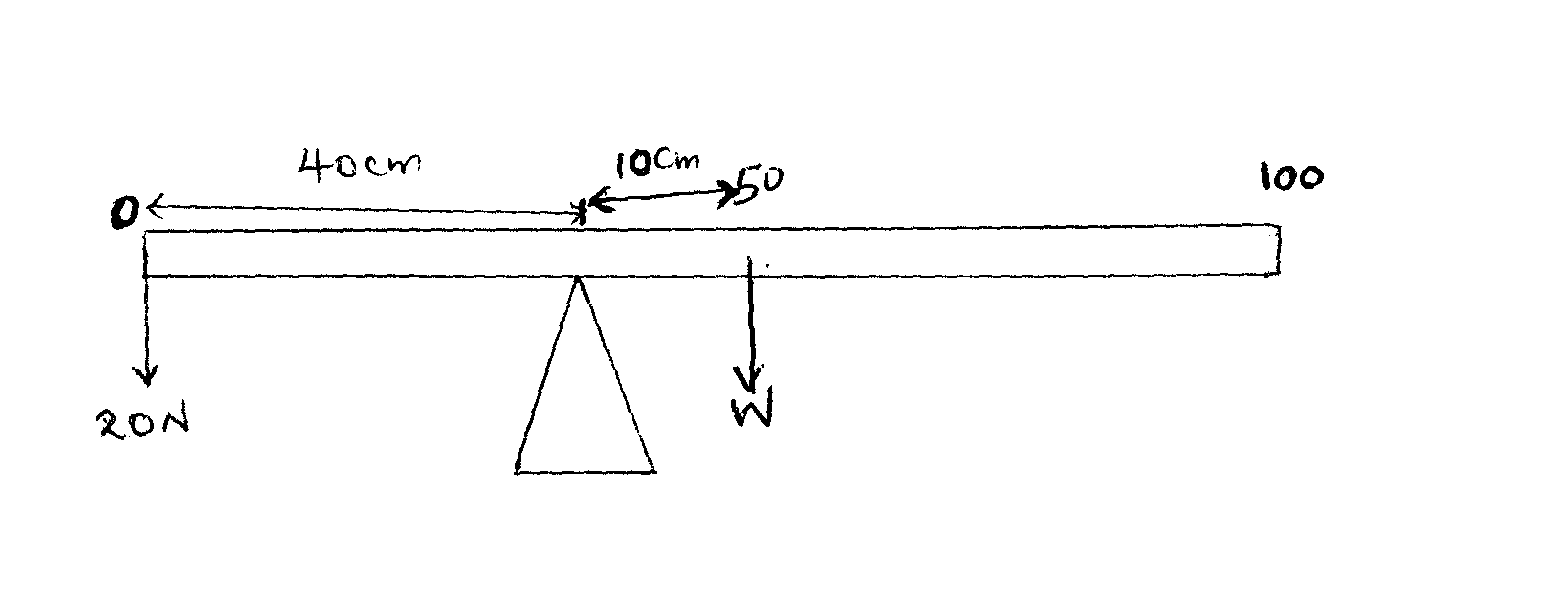
1. Explain the observation in (a) above (1 Mark)

* **The position of the centre of gravity is raised ✓1 when more weight is added on the upper side, reducing stability**

1. State one factor that affects heat transfer in solids. (1 Mark)

* **Length of the conductor**
* **Cross sectional area any one=✓1**
* **Temperature difference of the source**
* **Nature of the material making the conductor.**

1. The figure below shows a uniform bar of length 1 metre. Calculate the weight of the beam. (3 Marks)

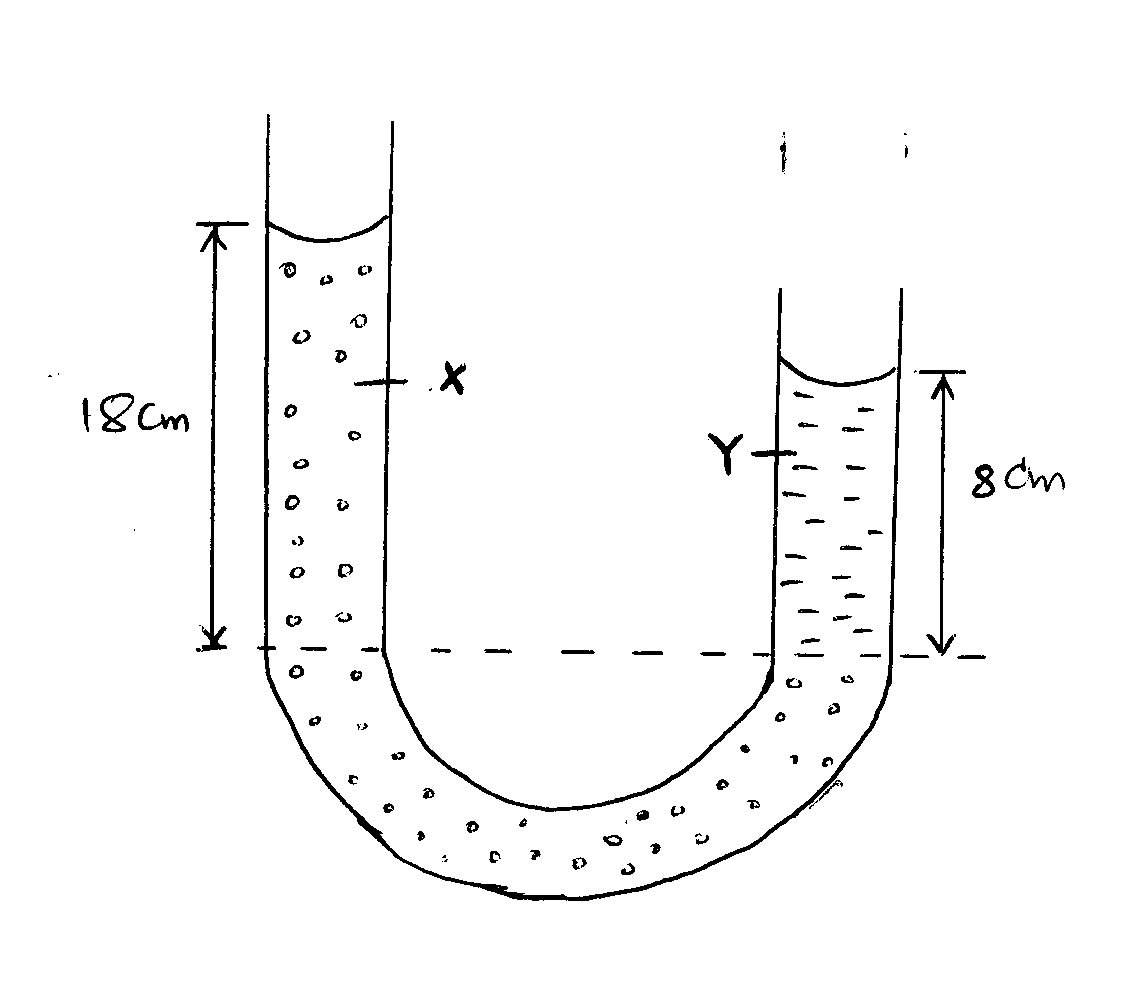


* **Clockwise moments = Anti clockwise moments**

**✓ ✓**

**✓**

1. The figure below shows a u-tube containing the liquids X and Y. Given that the density of liquid X is 1.8g/cm3, calculate the density of liquid Y in g/cm3. (3 Marks)



**✓**

**=**

**✓**

**✓**

1. Name one factor that affects surface tension. (1 Mark)

* **Temperature**
* **Impurities**

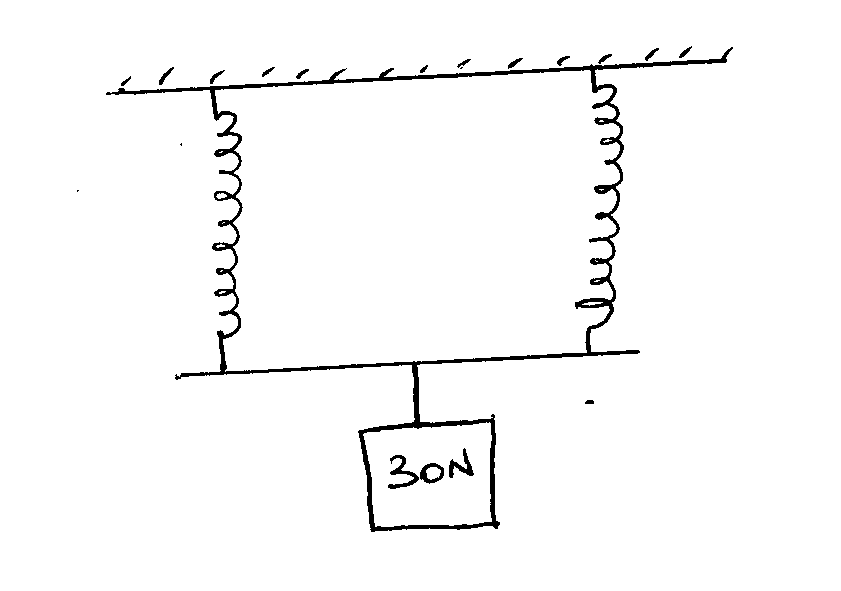
**Any= ✓1**

1. When a liquid is heated in a glass flask, its level first falls and then starts rising. Explain this observation.

(2 Marks)

* **The level first dropped due to expansion of glass ✓1**
* **The level then started rising when the heat reaches the water. ✓1**

1. The figure below shows two identical springs with negligible weight. The extension produced on the system is 10cm



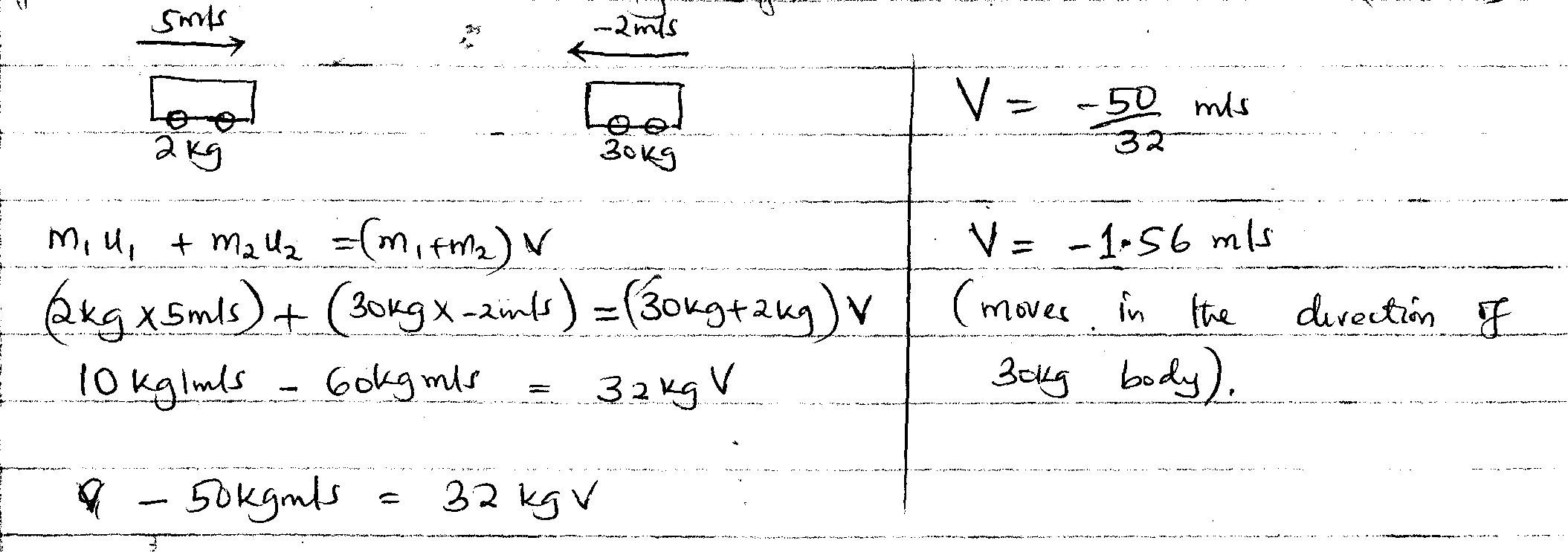
Determine the spring constant of each spring. (3 Marks)

**✓**

**✓**

**✓**

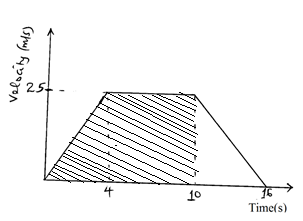
1. A body A of mass 2kg moving with a velocity of 5m/s collides with a body B of mass 30kg travelling at 2m/s in the opposite direction. If the collision is perfectly inelastic, find their common velocity after collision. (3 Marks)



**V✓**

**✓**

1. The figure below shows a velocity time graph for a trolley



From the graph, calculate the distance covered by the trolley in the first 10 seconds (2 Marks)

**Distance = Area under the graph from 0-10seconds**

**✓**

**Distance = 200m ✓**

1. State the reason why gases are easier to compress than solids. (1 Mark)

* **Gas particles have larger intermolecular distances than solids** ✓

**SECTION B: 55mks**

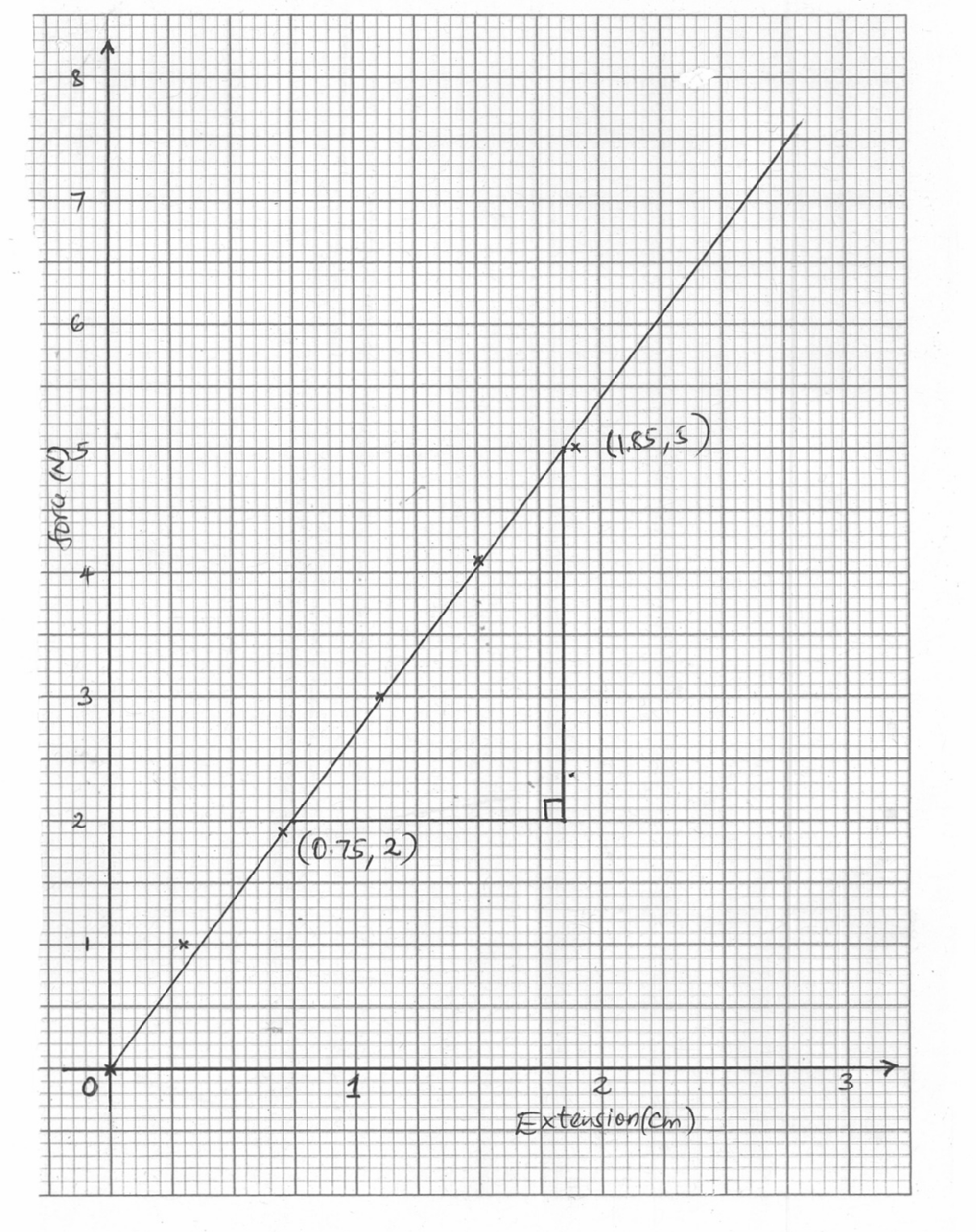
1. a. State Hook’s law (1 Mark)

**For a helical spring or any other elastic material, the extension is directly proportional to the stretching force, provided that elastic limit is not exceeded. ✓**

b. The table below shows the extension produced in a spring by various forces.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Extension (cm) | 0 | 0.3 | 0.7 | 1.10 | 1.5 | 1.9 | 2.4 |
| Force (N) | 0 | 1.0 | 1.9 | 3.0 | 4.1 | 5.0 | 8.0 |

1. Plot a graph of force against extension. (5 Marks)



1. From the graph, determine the spring constant. (3 Marks)

**Gradient = Spring constant**

**✓**

**✓**

**✓**

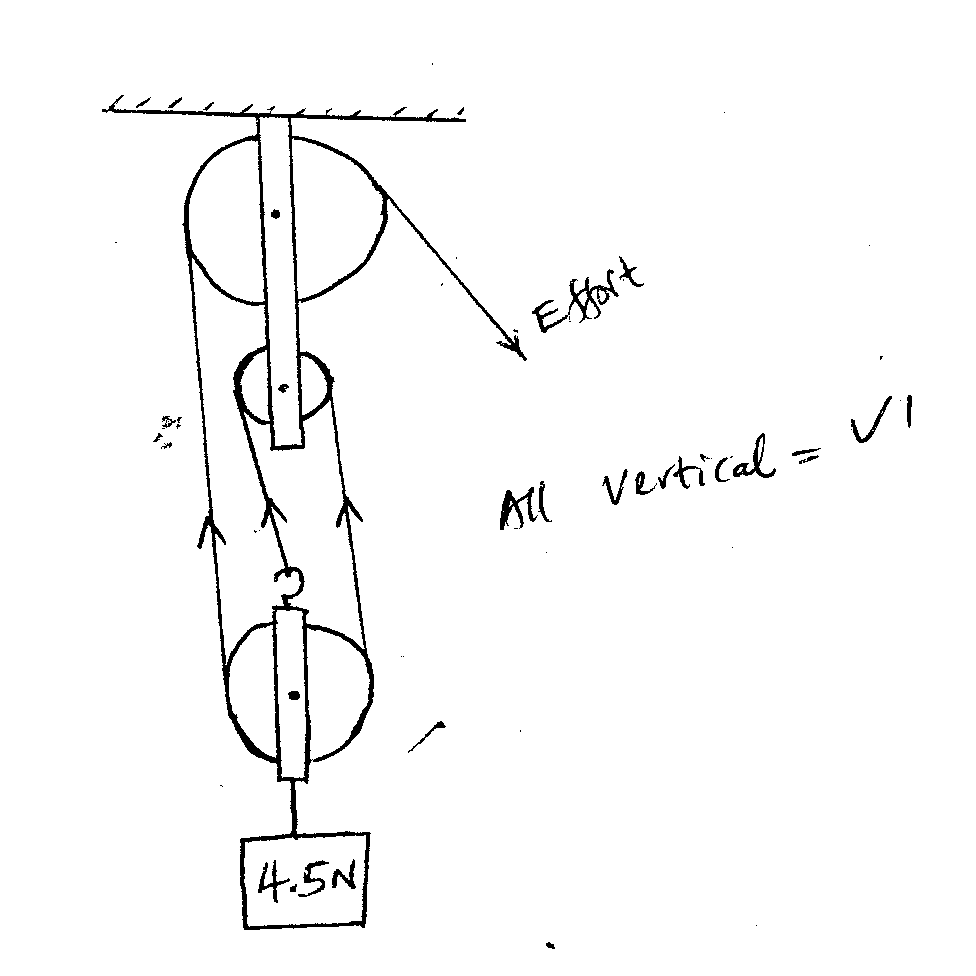
1. What force would cause an extension of 1.2cm on the spring? (2 Marks)

**Force = Ke**

**F = 2.73N/cm X 1.2cm✓**

**F = 3.276 N✓**

1. The figure below shows a block tackle system



1. State the velocity ratio of the system (1 Mark)

**3 ✓**

1. Mark the direction of tension in the springs (1 Mark)

**All vertical tensions✓1**

1. If an effort of 2N is applied, calculate the mechanical advantage of the system. (3 Marks)

**✓**

**✓**

**✓**

1. Calculate the efficiency of the system. (3 Marks)

**✓**

**✓**

**✓**

1. Explain why the efficiency of the system is less than 100%. (1 Mark)

* **Weight of the pulley blocks/ dead weight ✓1**
* **Friction**

1. A body of mass 2kg is thrown vertically upwards with a velocity of 14m/s. Determine;
2. The maximum height reached by the body (3 Marks)

**✓**

**✓**

**✓**

1. Its velocity after 0.5 seconds. (3 Marks)

**✓**

**✓**

**✓**

1. The time taken to reach maximum height. (3 Marks)

**✓**

**✓**

**✓**

1. Calculate the net force acting on the ball as it moves upwards if it experiences an air resistance of 8N. (2 Marks)

**✓**

**✓**

1. a. State the Newton’s 2nd law of motion (1 Mark)

**The rate of change of momentum of a body is directly proportional to the force applied and take place in the direction of the force ✓**

b. A lady of mass 90kg is standing on the floor of a lift. Determine the reading on the weighing machine when

1. Lift is at rest (2 Marks)

**✓**

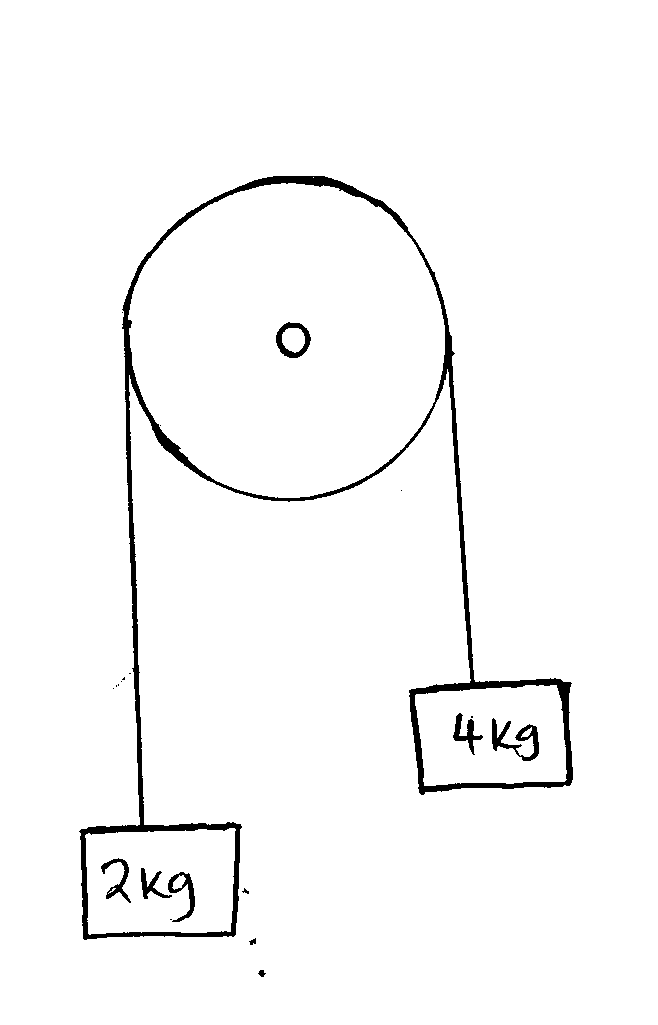
**✓**

1. Lift is moving upwards with an acceleration of 3m/s2 (2 Marks)

**✓**

**✓**

c. Two masses of 4kg and 2kg are connected by a light string passing over a frictionless pulley as shown below.



Calculate the acceleration of the masses when left to move freely. (3 Marks)

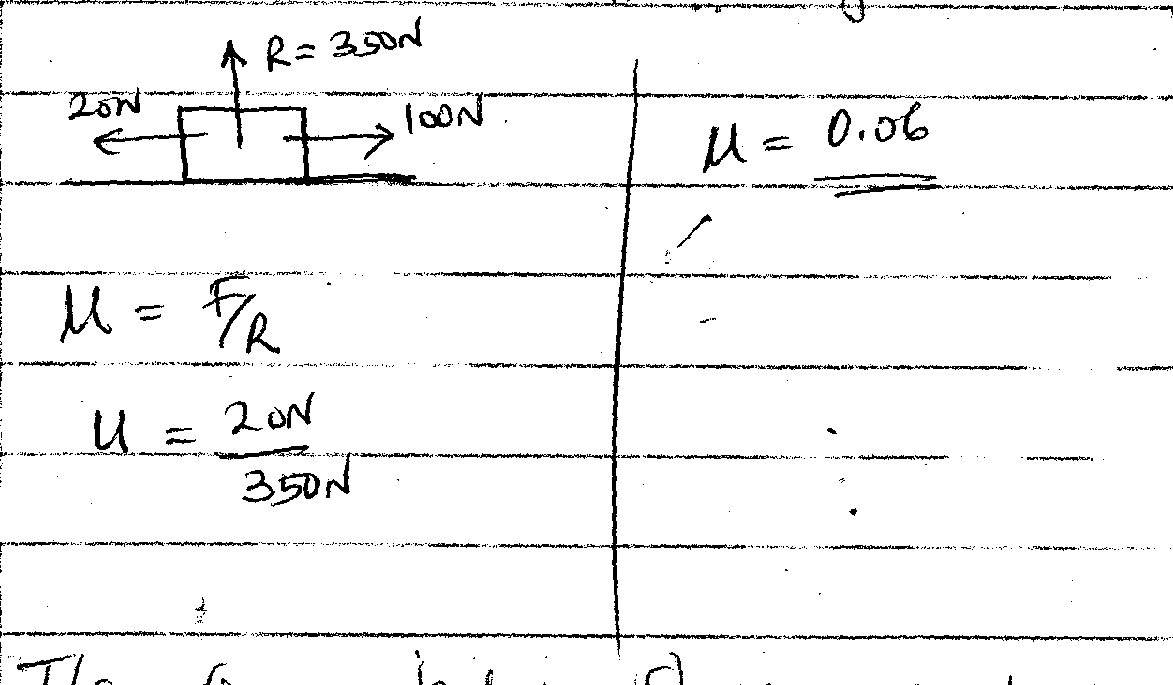
**✓**

**✓**

**✓**

d. A block of mass 35kg is pushed along a horizontal surface whose frictional force is 20N. If the force moving the block is 100N, calculate the co-efficient of friction between the block and the surface.

(3 Marks)

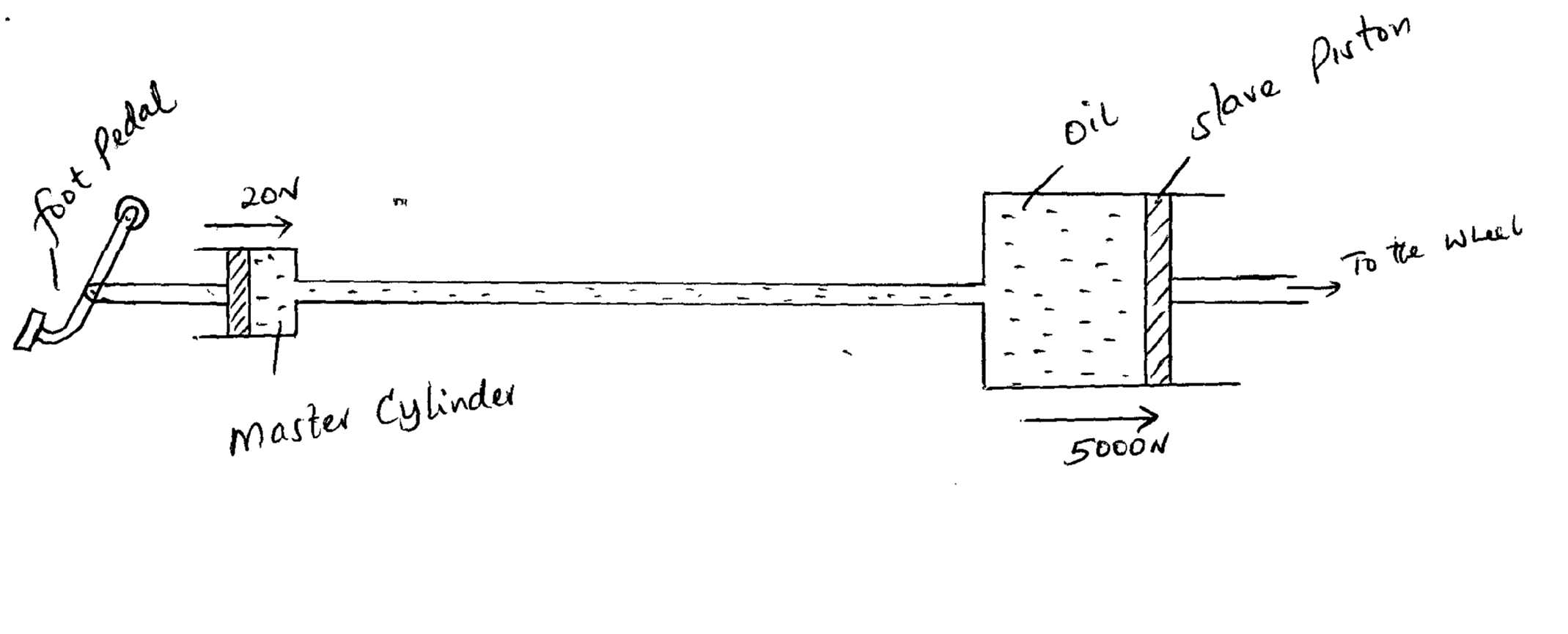


**✓**

**✓**

**✓**

1. The figure below shows a hydraulic brake system.



A force of 20 N is applied on the foot pedal connected to a master piston of area 0.05m2. This causes a stopping force of 500N on one wheel. Calculate.

1. Pressure in the master cylinder (3 Marks)

**✓**

**✓**

**✓**

1. Area of the slave piston. (3 Marks)

**✓**

**✓**

**✓**

1. Velocity ratio of the system. (3 Marks)

**✓**

**✓**

**✓**

1. Give two reasons why oil is used in the hydraulic brake system. (2 Marks)

* **Incompressible ✓1**
* **Does not corrode the system ✓1**

1. State two factors affecting pressure in liquids. (2 Marks)

* **Density**
* **Depth of the liquid** **Each = ✓1**