**Name.....Index Number...../.....**

**Adm……Class: ……....Candidate's Signature.....Date.....**

**PHYSICS**
**PAPER 1**
(Theory)
**JULY/AUG. 2018**
**2 HOURS**

KIGUMO SUBCOUNTY CLUSTER

**INSTRUCTIONS TO CANDIDATES**

i) *Write your name, admission number and index number in the spaces provided above.*
*ii) Sign and write the date of examination in the spaces provided above*
*iii) This paper consists of **TWO** sections **A** and **B***
*iv) Answer**ALL** the questions in section **A** and **B** in the spaces provided*
*v) All working **MUST** be clearly shown*
*vi) Electronic calculators and mathematical tables may be used.*
*vii) ALL numerical answers must be expressed in decimal notation.*
*viii**) **This paper has 13 pages. It is the responsibility of the candidate to ascertain that all the pages are printed as indicated and that no questions are missing.***
*ix) **Candidates should answer the questions in English.***

**For Examiners Use Only**

| Section | Question | Maximum Score | Candidates Score |
|---|---|---|---|
| **A** | **1 – 13** | **25** | |
| **B** | 14 | **9** | |
| | 15 | **8** | |
| | 16 | **11** | |
| | 17 | **9** | |
| | 18 | **9** | |
| | 19 | **9** | |
| | | **Total = 80** | |

**SECTION A (25 marks)**

**Answer ALL the questions in the spaces provided.**

**1.** The water level in a burette is 30.6cm³, 50 drops of water each of volume 0.2cm³ are added to the water in the burette. What is the final reading of the burette. (2 marks)

**2.** Figure 1 shows a graph showing the behaviour of a helical spring.

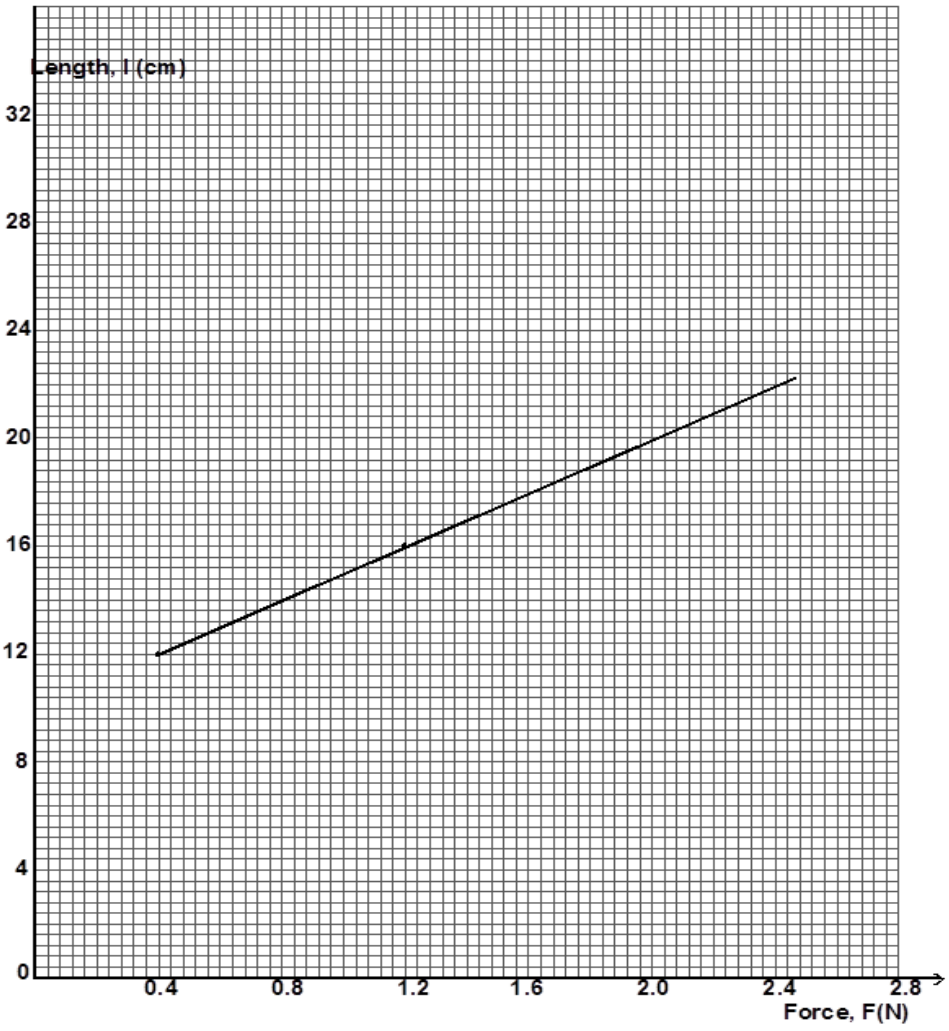



Fig 1

Determine the spring constant in SI units. (3 marks)

**3.** Two forces are acting on a body as shown in figure 2.

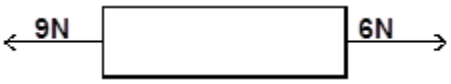
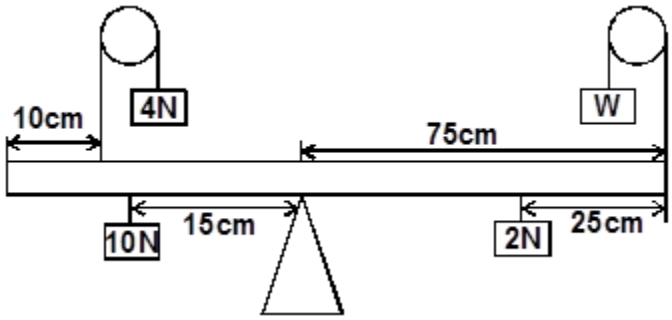



Fig 2

By use of a vector, draw the body and show the resultant force. (1 mark)

**4.** Two identical beakers A and B containing equal volumes of water are placed on a bench. The water in A is cold while in B is warm. Identical pieces of potassium permanganate are placed gently at the bottom of each beaker inside the water. It is observed that the spread of colour in B is faster than in A. Explain this observation. (2 marks)

**5.** Figure below shows a uniform bar of weight 5N and length 1.1m pivoted at a point and in equilibrium under the action of the forces shown.

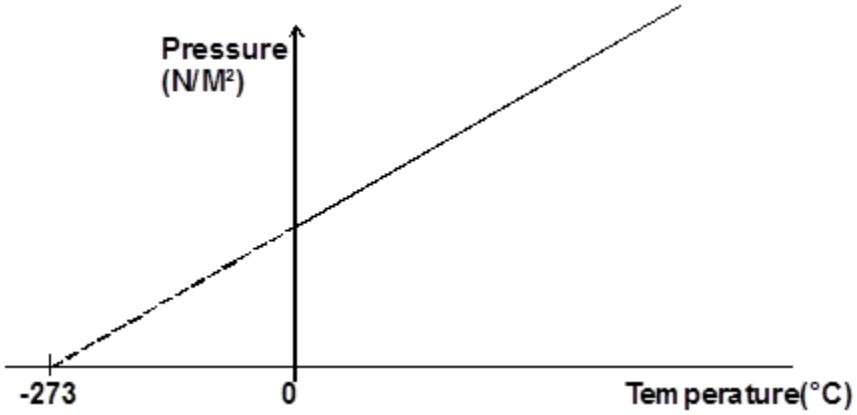



Determine the value of weight W. (3 marks)

**6.** State the contribution physics has made to the entertainment industry. (1 mark)

**7.** State one limitation of the micrometer screw gauge. (1 mark)

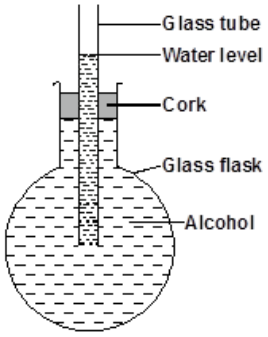
**8.**




State the law represented in figure above. (1 mark)

**9.** Alcohol was placed in a flask fitted with an air tight cork as shown in figure 5.

Fig 5

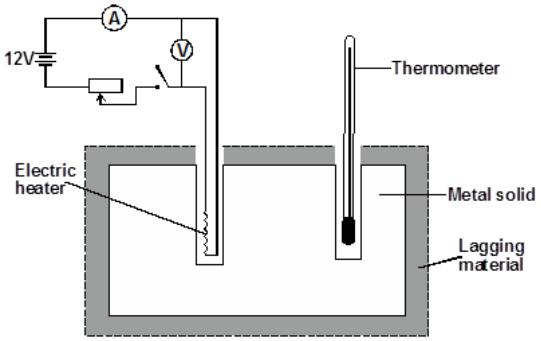



State and explain what would be observed if the flask was cooled. (3 marks)

**10.** A boy poured some boiling water into a plastic can and placed an air-tight cork on its open end. He then ran some cold water on it for about 20 seconds after which he shook the can vigorously. State and explain what he observed. (3 marks)

**11.** Water flows along a horizontal pipe of cross-sectional area 30cm². The speed of the water is 4m/s but it reaches 7.5m/s in a constriction in the pipe. Calculate the area of the constriction in m² (3 marks)

1**2.** The arrangement in figure below was used to determine the specific heat capacity of the metal.




State the precautions that need to be taken. (2 marks)

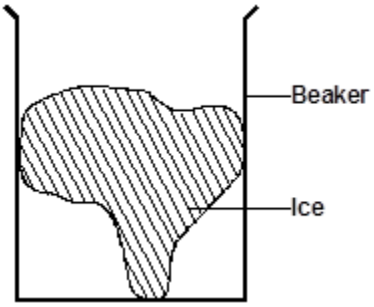
**13.** State Newton's second law of motion. (1 mark)

**SECTION B : (55 marks)**

**Answer ALL questions in this section.**

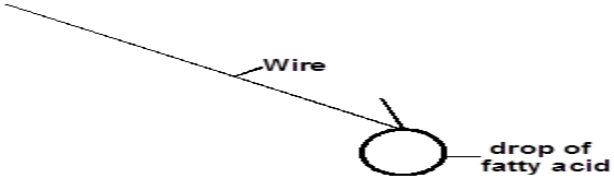
**14.** a) i)State two conditions necessary for equilibrium of a body acted upon by a number of forces.(2 marks)

ii) Figure below shows beaker containing a block of ice.




State and explain the change in stability when the ice melts. (3 marks)

b) Figure below shows a drop of fatty acid on a wire of diameter 1.4mm



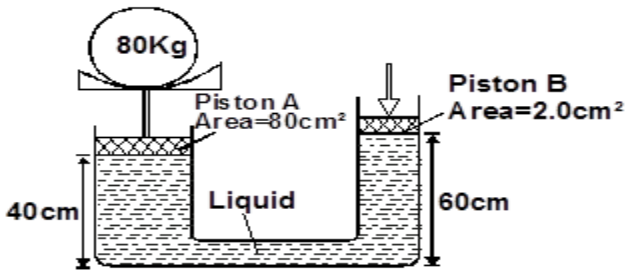

When the drop of the fatty acid was placed on clean water surface it formed a circular patch of diameter 91cm.

i) Estimate the length of the molecule of the fatty acid. (3 marks)

ii) State the assumption made in part (i) above. (1 mark)

**15.** a) State the principle of transmission of pressure in liquids. (1 mark)

b)A mass of 80kg is being lifted by a force F applied on the other piston of the machine as shown in figure below




Determine the value of F needed to just lift the 80kg mass given the density of the liquid is 1.2g/cm³. (4 marks)

c) Give one reason why a lift pump raises water to heights less than 10m. (1 mark)

d) In an experiment, it was observed that soapy water placed on a wet smooth surface displaced the particles

of non-soapy water. Sate and explain this observation. (2 marks)

**16. a)** A block of metal of mass 250g at 100°C is dropped into a lagged calorimeter of heat capacity $40JK^{-1}$ containing 100g of water at 25°C. The temperature of the resulting mixture was found to be 40°C. Determine; ($C_w = 4200Jk^{-1}$)

i) Heat gained by calorimeter. (2 marks)

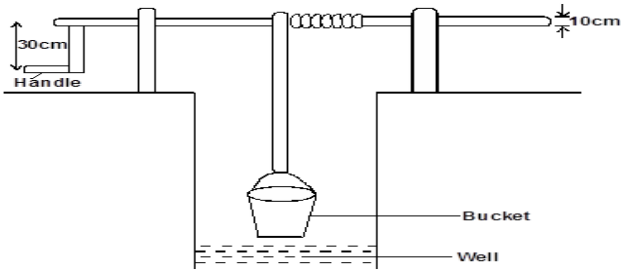
ii) Heat gained by water. (2 marks)

iii) Heat lost by the block. (2 marks)

iv) Specific heat capacity of the metal block. (3 marks)

**b)** Hot milk in a bottle cools faster when wrapped in a wet cloth than when the bottle is immersed in cold water in a bucket. Explain. (2 marks)

**17.a)** The machine represented in the diagram can be used to lift water from a well.



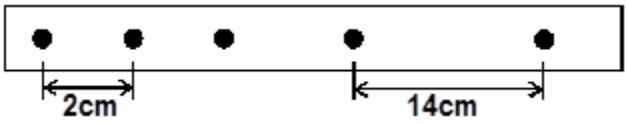

A force of 50N applied on the handle lifts water of weight 180N

i) Calculate the efficiency of the machine. (4 marks)

ii) Give a reason why the efficiency is less than 100%. (1 mark)

**b)**The five-tick tape shown below was produced by a ticker timer connected to mains supply of 50Hz when a

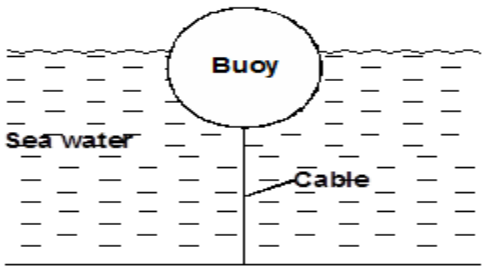
force pulls the trolley.




Determine the acceleration of the trolley. (4 marks)

**18. a)**i) State Archimede's principle. (1 mark)

ii) Figure below shows a buoy, M, of volume 120 litres and mass 60kg. It is held in position in sea water of density 1.04g/cm³ by a light cable fixed to the bottom so that ¾ of the volume of the buoy is below the surface of the sea water.




Determine the tension T in the cable. (4 marks)

**b)**i) During cold season boys looking after cattle lit a fire in a Kimbo tin and whirl it round vertically without its contents falling out. Explain. (1 mark)

ii)A particle is moving in a circular path of radius 0.4m with velocity of 7.5m/s. Determine its angular velocity. (3 marks)

**19. a)** State a condition which should be attained by a body in a viscous fluid to have terminal velocity. (1 mark)

ii)A block of metal having a mass of 30kg requires a horizontal force of 100N to move it with uniform velocity along a horizontal surface. Calculate the co-efficient of friction. (3 marks

b)i) State Charles' law. (1 mark)

ii) Give **three** reasons why gas laws do not hold at low temperatures. (3 marks)

c) Distinguish between elastic and inelastic collisions. (1 mark)