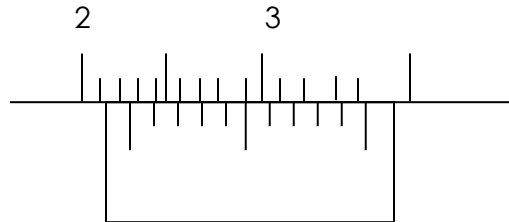


KCSE TRIAL 2021
PHYSICS PAPER 1

SECTION A (25 Marks)

1. Figure below shows part of a scale of a vernier calipers. What is the reading indicated by the scale? (2 marks)



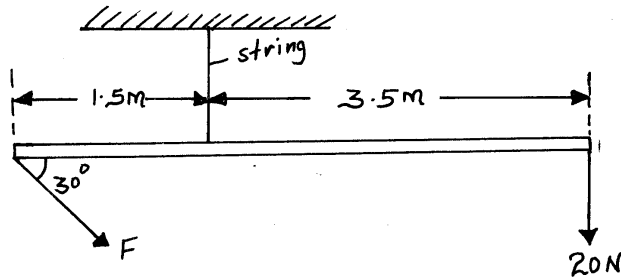
2. A horse pipe of internal diameter 4 cm is connected to a sprinkler with 25 holes each of diameter 0.04 cm, the water in the pipe flows at a speed of 5 cm/s. Determine the velocity with which the water leaves the sprinkler. (3 marks)

.....

.....

.....

3. The figure below shows a uniform bar of weight 8N. It is acted on by two forces as shown.



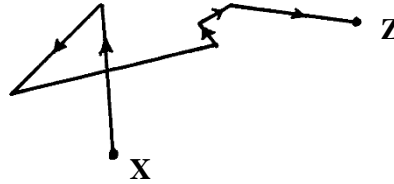
- Determine the value of F . (3 marks)

.....

.....

.....

4. The figure below shows a path taken by a gas molecule moving from point x to z



(a) Explain how this movement can be observed (1 mark)

.....

.....

(b) State in full, the law of motion that governs movement from x to z (1 mark)

.....

.....

5. a) State **one** factor that a bimetallic strip relies on for its working (1 mark)

.....

b) Two objects made of the same material and having the same mass are heated to a temperature of 35°C above that of the atmosphere and then allowed to cool in still air for 30 minutes. State one factor that will determine their final temperature (1 mark)

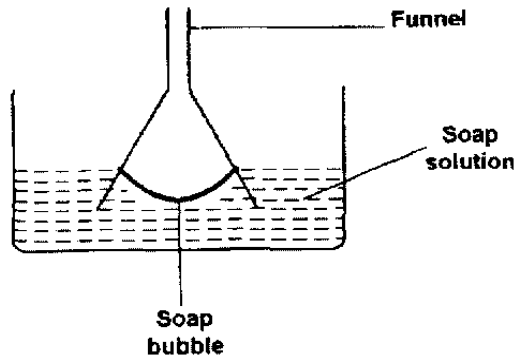
.....

6. (a) What is surface tension? (1 mark)

.....

.....

(b) The figure below shows a funnel dipped into a liquid soap solution.



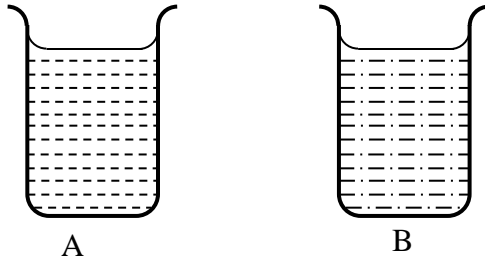
Explain what happens to the soap bubble when the funnel is removed. (2 marks)

.....

.....

SECTION B (55 Marks)

11. (a) The figure below shows two containers filled with two different liquids to the same height.

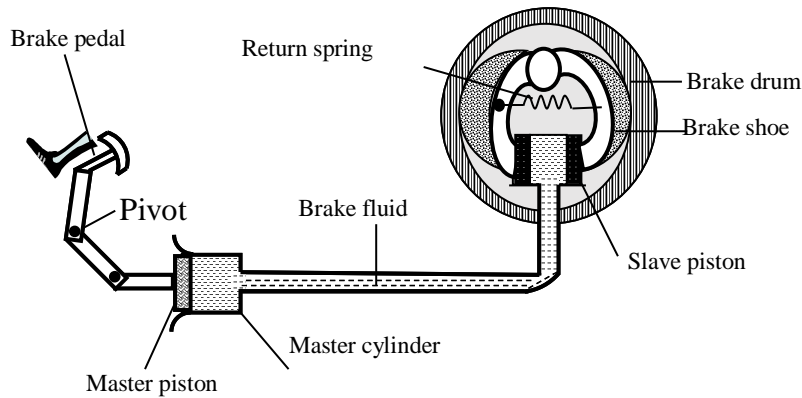


It was found that the pressure at the bottom of A is greater than that at B. Explain (1 mark)

.....

.....

(b) The figure below shows a car braking system. The brake fluid is an oily liquid.



The brake drum rotates with the wheel of the car.

(i) Explain how pushing the brake pedal makes the brake rub against the drum. (4 marks)

.....

.....

.....

.....

.....

.....

(ii) The cross-sectional area of the master piston is 2.0cm^2 . A force of 140N is applied to the master piston.

(I) Calculate the pressure created in the brake fluid by the master piston. (2 marks)

.....
.....
.....

(II) The cross-sectional area of each slave piston is 2.8cm^2 . Calculate the force exerted on each slave piston by the brake fluid. (2 marks)

.....
.....
.....

(III) The force exerted on the master piston is greater than the force applied by the foot on the brake pedal. Using the principle of moments, explain this. (2 marks)

.....
.....
.....

12. (a) State two factors that affect the magnitude of centripetal force of an object moving along a curved path. (2 marks)

.....
.....

(b) A stone is tied to a light string of length 0.5m . If the stone has a mass of 20g and is swung in a vertical circle with a uniform angular velocity of 6 revolutions per second, determine.

(i) The period T . (2 marks)

.....
.....
.....
.....
.....
.....
.....
.....
.....

(ii) The tension of the string when the stone is at
I. The bottom of the swing. (3 marks)

.....
.....
.....

II. The top of the swing. (2 marks)

.....
.....
.....

III. The linear velocity. (3 marks)

.....
.....
.....

13. a) Define the term uniform acceleration. (1 mark)

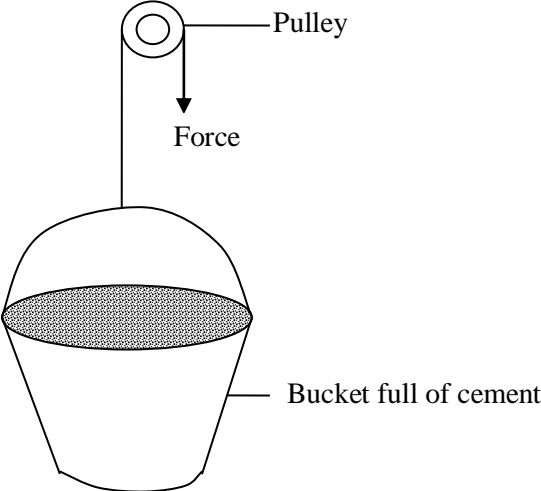
.....
.....

b) A rocket was launched vertically upwards with uniform acceleration of 100ms^{-2} for 20 seconds. After this the rocket was acted upon only by a constant gravitational force.

(i) Calculate the maximum height reached by the rocket (3 marks)

.....
.....
.....
.....
.....
.....
.....
.....
.....

14. A worker on a building site raises a bucket full of cement at a slow steady speed using the pulley as shown below.



The weight of the bucket and cement is 200N. The force F exerted by the worker is 210N

a) State why F is bigger than the weight of the bucket and cement. (1 mark)

.....

b) The bucket is raised through a height by 4m. Determine the distance through which the worker pulls the rope. (1 mark)

.....

c) How much work is done on the bucket and cement? (2 marks)

.....

d) State the kind of energy gained by the bucket. (1 mark)

.....

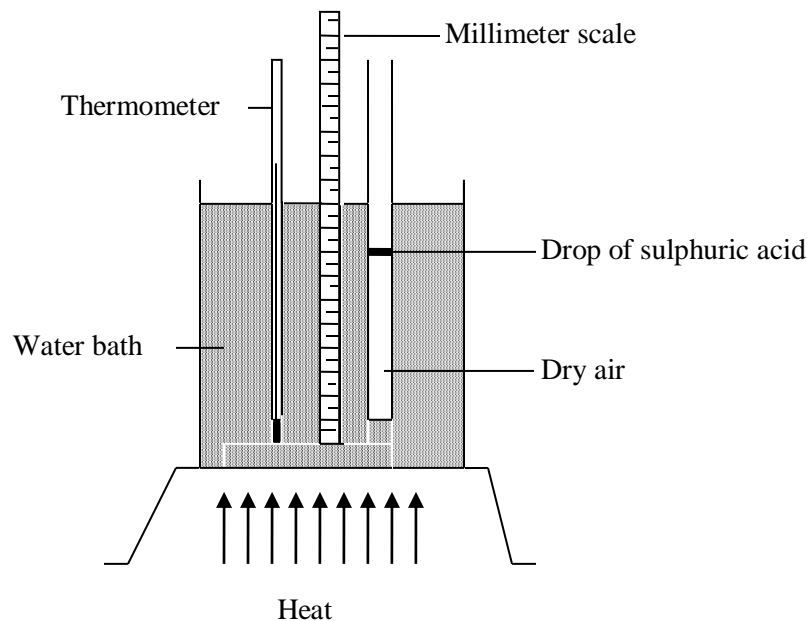
e) Determine the total work done by the worker. (3 marks)

.....

f) Calculate the efficiency of the machine used by the water. (2 marks)

.....
.....

15. (a) The figure below shows a set-up that may be used to verify Charles' law.



(i) State the measurements that should be taken in the experiment. (2 marks)

.....
.....
.....
.....
.....

(ii) Explain how the measurements taken in (i) above may be used to verify Charles' law. (2 marks)

.....
.....
.....
.....
.....

(iii) A certain mass of hydrogen gas occupies a volume of 1.6cm^3 at a pressure of $1.5 \times 10^5 \text{ pa}$ and temperature of 12°C . Determine its volume when the temperature is 0°C at a pressure of $1.0 \times 10^5 \text{ pa}$. (2 marks)

.....

.....

.....

.....

(b) (i) An electric kettle connected to a 250V mains supply draws a current of 4.0A. It contains 1 litre of water with 1 kg of ice, all at 0°C . Neglecting all heat losses, including heat absorbed by the kettle, find the time taken for all the ice to be just melted. (Take specific latent heat of fusion to be $3.34 \times 10^5 \text{ J/kg}$ and latent heat of vaporization is $2.26 \times 10^6 \text{ J/kg}$ Specific heat capacity of water is 4.2J/g). (2 marks)

.....

.....

.....

.....

(ii) Determine the time taken until half the contents of the kettle boils away. (3 marks)

.....

.....

.....

.....

.....