



Physics paper 1

Form 3

MARCH EXAMINATION 2021

1 hr. 30 min

Additional Materials:

- Soft clean eraser
- Soft pencil (type B or HB recommended)

Read these instructions first

This paper contains 2 sections. Answer all questions in the spaces provided.

Do **not** use staples, paper clips, and glue or correction fluid.

Any rough working should be done in the rough work booklet provided.

NAME:

DATE:

SCORE:

TOTAL MARKS:

[Turn over]

SECTION A (25MKS)

Answer all the questions in this section in the spaces provided.

1. Distinguish between density and relative density of a substance (1.mks)

2. A ship of mass 1300 tones floats on sea water:
 - (i) What volume of sea water is displaced (Density of sea water is 1025kg/m^3)
(2mks)

 - (ii) Suppose it sails from sea water to fresh water, what cargo must be removed so that the same volume of water is displaced?(Density of fresh water = 1000kg/m^3) (2mks)

3. Bronze is made by mixing molten copper and tin. If 100 kg of the mixture Contains 80% by mass of copper and 20% by mass of tin, calculate the density of

Bronze. (Density of copper is $8\,900\text{ kgm}^{-3}$ and density of tin $7\,000\text{ kgm}^{-3}$)(3mks)

4. A sphere of diameter 6.0 cm is molded into a thin uniform wire of diameter 0.2 mm. Calculate the length of the wire in meters (3 mks)

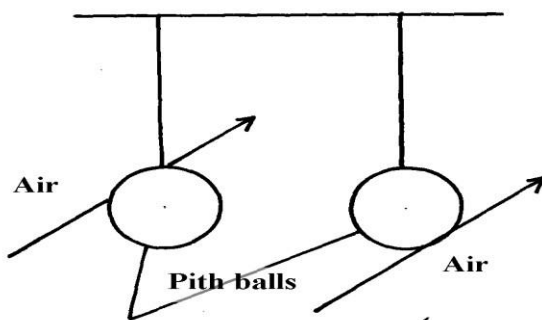
5. State **two** factors that would raise the boiling point of a liquid (2mks)

6. Give a reason why water wets glass while mercury does not. (1mks)

7. The barometric height at sea level is 76cm of mercury while at a point on a highland it is 74cm of mercury. What is the altitude of the point? (Take $g = 10\text{m/s}^2$, density of mercury = 13600kg/m^3 and density of air as 1.25kg/m^3) (3mks)

8. Define pressure and state its SI unit (1mk)

9. The figure below shows two light pith balls arranged as shown.



State and explain what is observed when air is blown on the outer sides of the pith balls.(3mks)

10. Differentiate between basic and derived quantities (1mk)

11. State the kinetic theory of matter (1mk)

12. State two methods of charging an electroscope (1mk)

Section B (55 mks)

13 a) State Hooke's law for a spiral spring (1mk)

b) In an experiment, a spiral spring was hung vertically from a stand and various weights attached in turn to its lower end. The extension of the spring for the various weight was noted. The results were recorded as shown in the following table.

Load(N)	0	0.2	0.4	0.6	0.8	1.0	1.1
Extension (cm)	0	0.95	1.9	2.9	3.9	5.5	7.25

- i. Plot the graph of load (y-axis) against the extension of the spring (5mks)
- ii. From the graph, determine the elastic limit of the spring (1mk)

- iii. From the graph, determine the spring constant within Hooke's law (4mks)

14. State what is meant by streamline flow? (1mk)

- b) The figure below shows the cross section of an aero plane wing (aero foil), with the aero plane moving in the direction shown by the arrow.

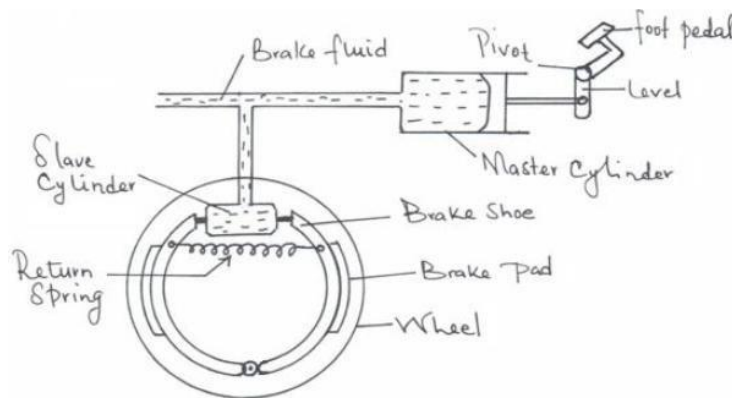


- i. Sketch streamlines to show how air flow fast the with as the aeroplane moves (1mk)
- ii. Explain how dynamic lift of the aeroplane is caused by the wing. (3mks)

- c) A water pipe of diameter 5.2cm is connected to another pipe of diameter 1.3cm. The speed of the water in the smaller pipe is 3ms^{-1} . What is the speed of the water in the larger pipe? (3mks)

- 15a) Explain how a person is able to draw milk from a glass using a straw (2mks)

- b) The following diagram shows a simplified hydraulic braking system of a car.



I. State the property of the liquid (oil) that makes it more suitable for use as a brake fluid than a gas (1mk)

II. Explain how the system works, starting from when the driver presses the foot pedal (4mks)

III. Why would the system not function properly if air leak into the cylinder? (1mk)

16. a) In an experiment to demonstrate Brownian motion, smoke was placed in an air cell and observed under a microscope, Smoke particles were observed to move randomly in the cell.

i. Explain the observation (1mk)

- ii. Give a reason for those of smoke in this experiment (1mk)

 - iii. What would be the most likely observation if the temperature in the smoke cell was raised? (1mk)
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- b) An oil drop of average diameter 0.7mm spreads out into a circular patch of diameter 75cm on the surface of water in trough.
- i. Calculate the average thickness of a molecule of oil (4mks)

- ii. State two assumptions made in (i) above when calculating the thickness of the oil molecule (2mks)

17. (a) Distinguish between natural and forced convection currents (2mks)

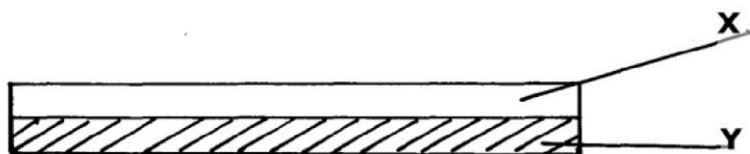
(b) Draw the cross-section of a basic solar heating panel that uses heat from the sun to warm Water which flows through pipes (3ks)

(b) Explain the following as regards to the solar heater:-

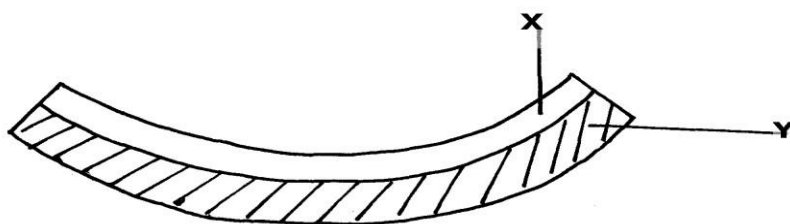
(i) Why the pipe is made of copper (1mk)

(ii) How the greenhouse effect occurs and aids the working of the panel (3mk)

18 a) the figure below represents a bimetallic strip of metals **X** and **Y** at room temperature



The figure below shows its shape when dipped into crushed ice



Sketch a diagram in the space given below to show the shape when the strip is heated to a temperature above the room temperature (2mks)

b) Give a reason why a concrete beam reinforced with steel does not crack when subjected to Changes in temperature. (1)