

Use this margin for rough work only.

Do not use this margin.

Section A: This section carries 40 marks**Question 1:** This question is about heat energy.

- a) The SI unit of thermal energy is the _____ [1]
- b) When heat is supplied to an object its _____ rises. [1]
- c) Increasing the temperature of an object increases its _____. [1]
- d) Temperature is measured by using a _____. [1]
- e) The SI unit for temperature is the _____. [1]
- f) The SI unit for specific heat capacity is the _____. [1]
- g) Black objects are _____ absorbers of heat. [1]
- h) Silvery objects are _____ emitters of heat. [1]

Question 2: This question is about pressure.

- a) Pressure is measured in _____ or in _____. [2]
- b) In solids the pressure increases if the force _____ and if the area _____ [2]
- c) In liquids, the pressure increases if the depth _____ and if the density _____ [2]
- d) The pressure of a fixed mass of gas _____ if the temperature of the gas rises and decreases if the volume _____. [2]

Question 3:

Ruth and her friend Sonia are sitting down, having a conversation.

- a) Ruth, of mass 50 kg, is sitting on a wooden box. The box has a mass of 2 kg and a base area of 0.4 m^2 .
- i) What is the total weight of Ruth and the box?

_____ [2]

Use this margin for rough work only.

Do not use this margin.

ii) What is the pressure exerted by the girl and the box on the ground?

_____ [2]

b) Sonia, of mass 45 kg, is sitting next to Ruth on a chair with four legs having a mass of 3 kg. If each leg has a base area of 0.0006 m^2 find the pressure exerted by Sonia and the chair on the ground.

_____ [3]

c) Why is there such a large difference in the pressure exerted by the two girls on the ground?

_____ [2]

Question 4: This question is about specific heat capacity.

An electric heater of power 50 W was used to heat a metal block of mass 800 g. The heater was switched for 4 minutes and the temperature of the block rose from 21°C to 53°C . Find:

a) the time in seconds during which the heater was switched on.

_____ [1]

b) the mass of the metal block in kg.

_____ [1]

c) the change in temperature during heating.

_____ [1]

d) the energy supplied by the heater.

_____ [2]

e) the specific heat capacity of the metal.

_____ [3]

Use this margin for rough work only.

Do not use this margin.

Question 5: Fill in the blanks.

When an object is stationary, it needs a _____ to make it move. The bigger the mass, the _____ the force needed to start it moving. We say that masses have _____, a reluctance to start moving. In a similar way, moving objects need a _____ to stop them moving. Their _____ tends to keep them moving. [5]

If the forces on a mass are balanced, then:

- If it is at rest,

_____ [1]

- If it is moving,

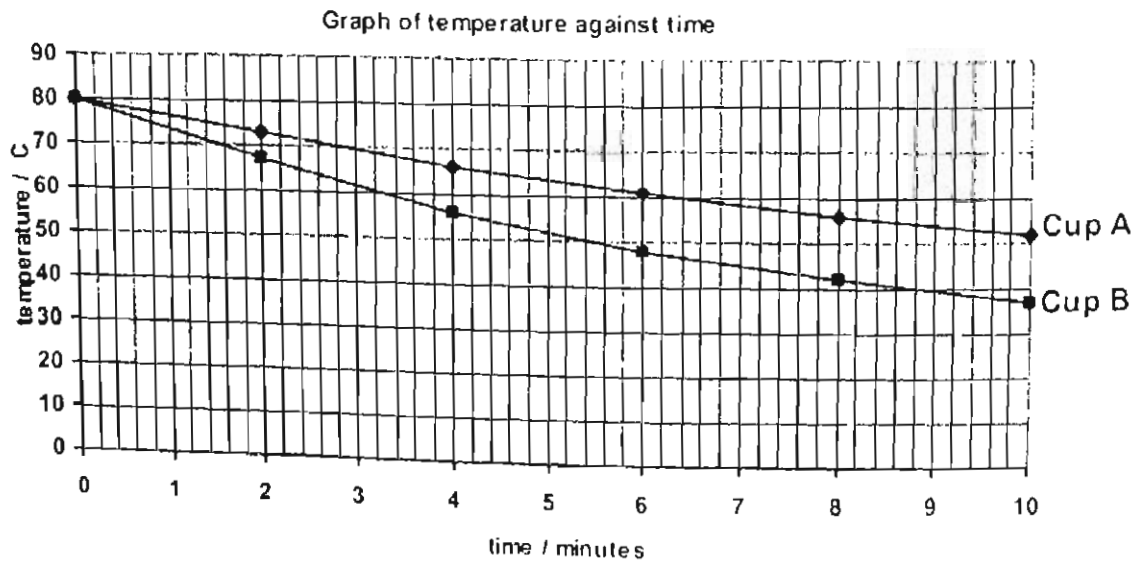
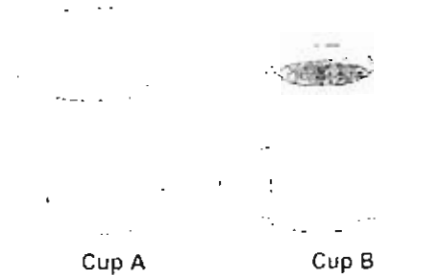
_____ [1]

Section B: This section carries 45 marks

Question 6:

a) The figure shows two freshly poured cups of hot tea. Cup A is covered by a saucer while Cup B is left uncovered.

The graphs below show how the temperature of the tea in Cup A and the temperature of the tea in Cup B drops with time.



- The temperature of the tea in cup A after 8 minutes is _____ °C [1]
- The temperature of the tea in cup B after 8 minutes is _____ °C [1]

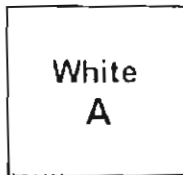
Use this margin for rough work only.

Do not use this margin

- iii. The difference in temperature between the tea in cup A and that in cup B after 8 minutes is _____ °C. [1]
- iv. The temperature of the tea in cup A drops to 60 °C in about _____ minutes. [1]
- v. The temperature of the tea in cup B drops to 60 °C in about _____ minutes. [1]
- vi. The temperature of the tea in cup A takes _____ minutes longer than the tea in cup B to drop to 60 °C. [1]
- vii. Why does the tea in cup A take a longer time to cool than that of B?

 _____ [2]
- viii. Heat is lost through the cups by _____. [2]
- ix. Use the graph to find how long you could leave the uncovered cup of tea before drinking the tea at a temperature of 45 °C. _____. [2]

2b. The figures below represent three sheets of copper A, B and C, painted in different colours.



- i. Surface _____ absorbs heat energy very quickly. [1]
- ii. Surface _____ is a very good emitter of thermal radiation. [1]
- iii. Surface _____ is the best reflector of heat energy. [1]

Question 7:

a) The diagram shows an instrument consisting of a long glass tube containing mercury. This instrument is used to measure atmospheric pressure.

i) What is this instrument called?

_____ [1]

ii) What is the space labelled X?

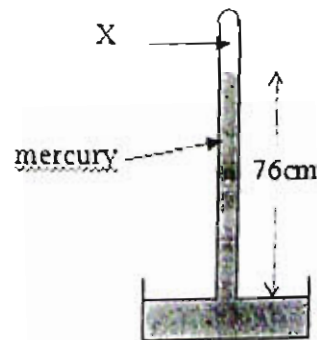
_____ [1]

iii) What keeps the mercury in the tube?

_____ [1]

iv) Calculate the atmospheric pressure if the height of the mercury in the tube is 76 cm and the density of mercury is 13600 kg/m³.

 _____ [2]



Use this margin for rough work only.

Do not use this margin.

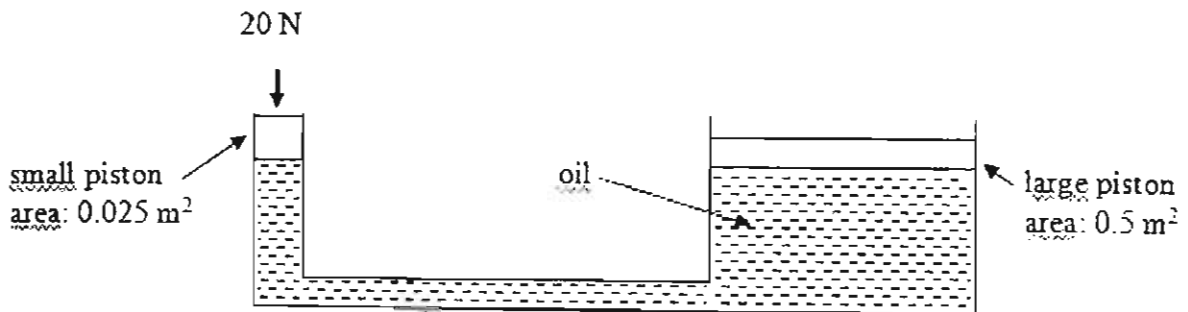
- v) What would happen to the height of the mercury in the tube if the instrument were taken up on a high mountain? Give a reason.

[2]

- vi) How is the mercury height affected if the weather changes from fine to stormy?

[1]

- b) The diagram shows a hydraulic machine. A force of 20 N is applied to the small piston having an area of 0.025 m^2 . The area of the large piston is 0.5 m^2 . The space between the two pistons is filled with oil.



- i) Calculate the pressure applied by the small piston on the oil.

[2]

- ii) What pressure is applied by the oil to the large piston?

[1]

- iii) What load could be lifted by the large piston when the force applied to the small piston is 20 N?

[2]

- iv) Can the space between the pistons be filled with air instead of oil? Explain.

[2]

Question 8:

A force of 5N is exerted on wooden blocks of different masses. The acceleration produced was found each time. The table below gives the acceleration produced on the different masses:

Mass (kg)	0.2	0.4	0.6	0.8	1.0
Acceleration (m/s^2)	25.0	12.5	8.33	6.25	5.00
1/mass (1/kg)	5.0				

- a) Workout the value of $1/m$ ($1 \div \text{mass}$) for each mass. Write your answers in the spaces provided in the table above. [2]
- b) On the graph paper draw a graph of acceleration on the y-axis against $1/\text{mass}$ on the x-axis. [6]
- c) What is the acceleration on a block when its $1/\text{mass}$ is $4/\text{kg}$?
_____ [1]
- d) What is the $1/\text{mass}$ of a block with an acceleration of 10 m/s^2 ?
_____ [1]
- e) What would be the mass of the wooden block so that the 5N force can produce an acceleration of 15 m/s^2 .

_____ [2]
- f) What is the relationship between the acceleration produced and the mass of the blocks?

_____ [2]
- g) Give a reason for your answer.

_____ [1]

Use this margin for rough work only.

Do not use this margin.