**.**

**CONDUCTION**

1. Explain why in cold weather the metal blade of a knife feels colder that the wooden handle. **(1mk)**
2. Why are metals good conductors of heat? (2mks)
3. Fire fighter puts in suits made of asbestos material. State the property of asbestos that make it suitable for the services of extinguishing fires.(1mk)
4. A wooden bench and a metal bench are both left in the sun for a long time. Explain why the metal bench feels hotter to touch **(2mks)**
5. Explain why walking on a tiled surface feels cold than carpeted surface.
6. A metal pail feels colder to touch than a plastic pail on a cold morning even though both have the same temperature. Explain this observation. (2mk)
7. Explain why it is safe to hold the other end of a burning match stick.(1mk)
8. State one feature of a solar heater that enable it to absorb and retain more heat.  (1 mk
9. State two variables that must be controlled in an experiment for

 comparing the thermal conductivities of different metal rods of the same

 diameter. (2mk)

1. The Fig shows a hot water bath with metal rods inserted through one of its sides. Some wax is fixed at the end of each rod.

**Metal rods**

**Wax**

1. What property of metals could be tested using this set-up? (1mk)
2. Besides the length of the rods that is kept constant, what else should be kept constant when comparing the property for the different metal rods. (2mk)
3. Figure below shows a metal rod of uniform thickness being heated. The ends of the rod are dipped In water and mercury with wax at the bottom

**Copper rod**

**Water**

**Wax**

**Mercury**

**Wax**

**Heat**

State and explain the observation made  **(2mks)**

1. The Figure below shows a copper rod of uniform thickness being heated. The ends of the rod are dipped In water and mercury with wax at the bottom.

**Copper rod**

**Water**

**Wax**

**Mercury**

**Wax**

**Asbestos shields**

1. State the use of asbestos shields. (1mk)
2. State two observations made in this experiment. (2mk)
3. What conclusion can be made from the experiment above. (1mk)
4. Two rods of copper **A** and **B** of the same length but different thickness with

candle wax attached to either end are heated as shown below.

**Heat**

**Wax**

**Wax**

**A**

**B**

State and explain the observation made. (2mK)

1. Two identical rods are placed as shown in the figure below. One rests on a metal block and the other on a wooden block. The protruding ends are heated on a Bunsen burner as shown.

**Wax**

**Wax**

**Wooden block**

**Metal block**

 State with a reason on which rod wax is likely to melt sooner. **(2mk)**

1. The figure below shows a piece of wood fitted into a copper pipe and a piece of paper wrapped tightly around the junction.

**Copper pipe**

**Paper**

**Wood**

It is observed that when a flame is applied around the paper at the junction, the side of the paper around the wood burns first. Explain this observation. (2mk)

1. The figure below shows an experiment carried out by form one students.

**Thin iron rod**

 **Hot water**

**Thick iron rod**

**Wax**

(i) The students dipped two iron rods of the same length but different thickness into a beaker of hot water at the same time. What was the experiment about? (1mk)

(ii) State and explain the observations made after about 10 minutes. (2mk)

(iii) If the **two** rods were much longer, state and explain any difference from C (ii) above that would be made in the observation. (2mk)

1. The figure below shows four brass pins pressed on a cooking stuck until

they are flat on the wood. A white gummed paper was then stuck on the wood covering the pins. The stick was then passed over a Bunsen flame a few times.

**Brass pins**

**Wood**

**Gummed paper**

It was observed that the paper got charred leaving four white spots. Explain this observation. (3mk)

1. Figure below shows the glass shade of a lamp with a copper wire wound round it. It was observed that the glass is less likely to crack than when there is no copper wire wound around it.

**Glass**

**Copper wire**

**Explain** the above observation (2mks)

1. When a Bunsen burner is lit below wire gauze, it is noted that the flame initially burns below the gauze as shown in figure 4 below. After sometime the flame burns below as well as above the gauze.

**After some time**

**Wire gauze**

**Flame**

 **Bunsen burner**

 Explain this observation (3mk)

***The wire gauze conducts the heat away from the upper region of the wire gauze, but after some time the gas above reaches its ignition temperature and hence the flame starts showing on the upper region.***

1. The set up below shows water being heated at the top.

**Water**

**Heat**

**Boiling tube**

**Ice wrapped in wire gauze**

State and explain the observation made. (3mK)

1. In the set up shown in the figure below, water near the top of the boiling tube boils while at the bottom remained cold.

**Heat**

**Cold water**

**Water boiling**

**Boiling tube**

Explain this observation

1. The figure below shows a glass tube with water fitted with two identical thermometers A and B. it is heated as shown.

**A**

**B**

**Heat**

**Water**

State the reason which one of the two thermometers shows a higher temperature.

1. A car radiator has ***several thin blackened copper fins***. Explain. (2mk

**CONVECTION**

1. A paper vane in a horizontal axis was placed above a Bunsen burner as shown below. When the burner was lit, the paper vane begun to rotate. Explain the observation. (2mks)

**Lighting Candle**

1. The figure below shows a paddle wheel made of light material. Show on the diagram the direction of its rotation when heat is applied at one end of the container as shown.

**Paddle**

**Water**

**Heat**

1. The figure shows a hot water system.

**Heating coil**

**WATER**

**Pipe A**

**Pipe B**

 a) From which pipe is the hot water drawn.

 b) Explain your answer in (a) (1mk)

1. The figure below shows two identical beakers **H** and **K** full of water at **90ºC**. Two similar cold wet clothes are wrapped, one around the top of **H** and the other around the bottom of **K**.

**Cold Wet cloth**

**Cold Wet cloth**

**Water**

**K**

**H**

 State with a reason, the beaker in which the water cools faster. 2mks

1. Figure below shows two setups by a student using identical lamps and thermometers.

***(i)***

**Lamp**

**Lamp**

**Thermometer**

**Thermometer**

***(ii)***

If the lamps are switched on for the same duration, state and explain which setup is thermometer reading a higher temperature? (2mk)

1. The figure below shows a smoke box with a candle inside below chimney **X** and a smoking rug on top of chimney **Y**.

**Y**

**X**

**Candle**

**Smoking rug**

 State and explain the observation made. (2mk)

1. The set-up below was used to demonstrate heat transfer in liquids

**Tube**

**Liquid**

**Heat**

Mark as **X** position where the heater should be placed to make the liquid in the tube to move anti -clockwise direction (1mk)

1. Rooms that are well ventilated have ventilations close to the ceiling and some close to the Floor. Explain why (1mk)
2. Give two reasons why liquids are poor conductors of heat compared to solids.

(2mk)

1. The Figure below shows a desk lamp. The lamp has small holes near the top of the metal lampshade. The inner surface of the lampshade is also whitened.

**Hole**

**Whitened inner surface**

**Hole**

**a)** Explain why the inner surface of the lampshade is whitened. **(1mk)**

**b)** State the purpose of the small holes near the top of the metal lampshade (1mk)

11. The figure below shows how an underground room was ventilated. It had

two vents, one at A and other at B. A fire was lit at point C.

**C**

**Vent B**

**Vent A**

Explain what happened to the ventilation when the fire was lit. (3mk)

**RADIATION**

1. Highlight **two** facts which shows that heat from the sun does not reach the earth surface by convection.
2. Figure below shows two identical balloons **A** and **B**. The balloons were filled with equal amounts of the same type of gas. The balloons are suspended at distances **X1** and **X2** from a metal cube filled with boiling water.

**Metal cube**

**B**

**X1**

**X2**

**A**

1. State the mode by which heat travels from the cube to the balloons **(1 mk)**
2. The face of the cube towards **A** is bright and shiny and the face towards **B** is dull black. State and explain which balloon is likely to burst first. **(2mk)**
3. State with reason the adjustments that should be made on the distances **X1** and **X2** so that the rate of change of temperature in both balloons is the same. (1mk)
4. Figure shows two corks **P** and **Q** fixed on a polished and a dull surface with wax.

**Cork fixed with wax**

**Cork fixed with wax**

**Polished surface**

**Dull surface**

**Heater**

State and Explain the observation, when the heater is switched on for a short time given that the heater is equidistant from the two surfaces. (2mk)

1. Equal amount of hot water at **1000C** is poured into vessels **P** and **Q** as shown below and left to cool up to room temperature. **P** is painted black and **Q** is polished.

 **Q**

**P**

The readings of temperature are taken at intervals of five minutes. On the same axes sketch the graph of temperature against time. (2mk)

1. The figure below shows **two** glass bulbs **A** and **B** of the same size. Bulb **A** is painted dull black and a hot metal ball is placed equidistant from the two bulbs.

**X**

**Y**

**Water**

**Polished bulb**

**Dull black bulb**

**A**

**B**

 **Hot metal**

**Air**

**(i)** State and explain what will happen to the levels of the liquid after some time (2 mk)

**(ii)** After the apparatus has cooled and the levels in **X** and **Y** are again equal, the hot

ball is placed nearer to the polished bulb in such a position that there is no difference in the levels of **X** and **Y** although the bulbs are heated. State and explain what will happen to the levels of the liquid in the manometer when the metal ball is removed (2 mk)

**(iii)** State how the heat from the hot metal ball reaches bulb **A** and **B** (1 mk)

1. The figure below shows a source of heat placed at equal distances form two identical flasks X and Y containing air. The surface of X is painted black while Y is clear.

**Water**

**U- tube**

**Y**

**S**

**T**

**X**

**Source of heat**

**X** and **Y** are linked by a U-tube filled with water whose level **S** and **T** are initially the same. State and explain the observation made after heating. (3mk)

1. Two similar cans are partly filled with equal quantities of water. Each holds a thermometer and are placed at equal distances from a radiant heater as shown in the figure below.

**Can painted**

**black**

**Silvered**

**can**

**Thermometers**

State with reason, the container in which the thermometer is likely to be higher after a few minutes. (2mk)

1. Explain why plants in greenhouse, experience higher temperature than the ones outside.
2. The figures below shows two identical flasks **A** and **B** filled with water. Show the levels of water one minute after the bulb placed in between the flasks is switched on

**B**

**A**

**Blackened surface**

**Bulb**

**Shinny**

**surface**

 Explain your observations (2mks)

1. Give a reason why fuel tanks of Kenya Pipeline Company are silvery painted.

(1mk)

1. An electric heater is placed at equal distances from two similar cans **A** and **B** filled with water at room temperature. The outer surface of can **A** is shiny while that of can **B** is dull black. State with reasons, which of the cans will be at higher temperature after the heater is switched on for some time.
2. **Give** a reason why heat transfer by radiation is faster than heat transfer by conduction
3. Explain briefly how the temperature in a green house is kept higher than outside.

**THERMOS FLASK**

1. (a) The diagram below shows a vacuum flask.

 **X**

 **Z**

**Y**

1. Name the parts labelled **X, Y** and **Z.** (3mk)
2. Name the material the part labelled **Y** is made of. (1mk)
3. State how the thermos flask minimizes heat loss. (3mk)
4. Draw a well labeled diagram of a vacuum flask
5. Describe how the vacuum flask is adapted to its function **(2mk)**
6. With the aid of a well labeled diagram of a vacuum flask, describe how thermos flask minimizes heat loss. (6mk)
7. In a vacuum flask, the walls enclosing the vacuum are silvered on the inside. State the reason for this.
8. In a vacuum flask how is heat loss by radiation minimized. **(1mk)**
9. Stating the specific parts in the flask explain how heat loss is reduced through:

**(i)** Conduction

**(ii)** Convection

**(iii)** Radiation