Name:
Science Class:
Teacher:
Hand in day:

Y8 Science
Term 1 Homework Booklet
Physics

	Hand in Date	Parents Signature
Waves		
Homework 1		
Homework 2		
Homework 3		
Homework 4		

Heat transfer Homework 1:

Learn the spellings of the following key words/ phrases and their meanings…

Temperature: measure of the average kinetic energy of particles in a substance in ^{o}C

Kelvin: Another unit for temperature starting with 0K at absolute zero.

Absolute zero: the lowest possible temperature where there will be no movement of particles.

Conduction: method of heat energy transfer found mostly in solids based on vibrations being passed from one particle to the next.

Convection: method of heat transfer found in fluids where the movement depends on the changing densities of the fluid.

Infrared radiation: method of heat transfer which does not require particles to transmit.

Absorb: to take in energy into a material.

Transmit: to allow energy to pass through a material.

Latent energy: 'hidden' energy used for bond making resulting in no change in temperature when recording a cooling curve of a substance.

Vacuum: an area lacking any particles including gases e.g. space

Test :

1.

2.

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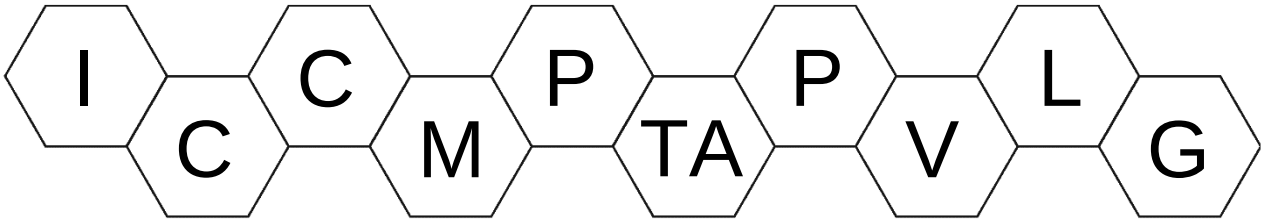
10.

Heat transfer Homework 2:

Task 1

Answer the questions below. The first letter for the answer is given in each question.



1 What I is the name for anything that does not let heat energy flow through it?

_____

2 What C is the name for anything that does let heat energy flow through it?

_____

3 What C is the name for heat flowing through solids? _____

4 What M is a type of material that lets heat flow through it easily?

_____

5 What P is a material that does not let heat flow through it easily?

_____

6 What TA makes something a good insulator?

_____

7 What P is everything made of? _____

8 What V describes the way these things move in solids? _____

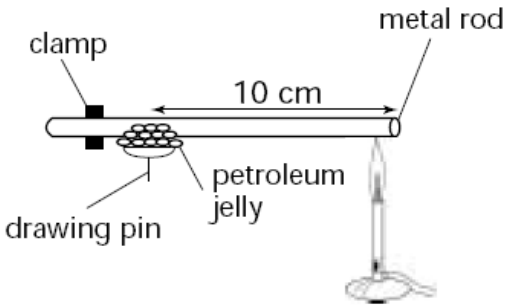
9 What L do not conduct heat very well? _____

10 What G hardly conduct heat at all? _____

Task 2

Joel set up an experiment like the one shown in the diagram.

He used five different rods, all the same length. He heated the rods and timed how long it took for the drawing pin to drop off. He recorded his results in the table shown below.



Rod	Copper	Iron	Glass	Aluminium	Graphite
Time for pin to drop off (s)	23	79	650	26	207

a Which material is the best conductor of heat?

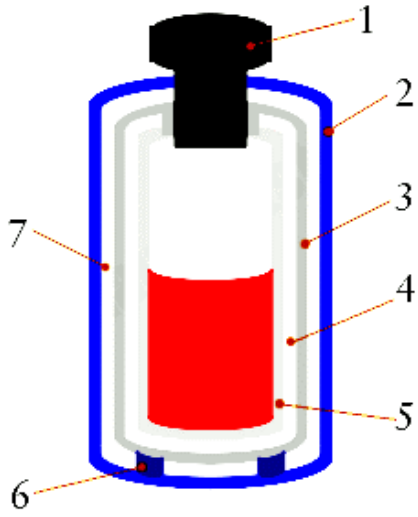
b Which material is the worst conductor of heat?

c The experiment shows that some solids conduct heat much better than others. Using a particle model, explain why all solids conduct heat better than gases.

Heat transfer Homework 3:

Explain how a thermos flask keeps the contents warm or cold….

Your answer should include a reason for the choice of each ***part listed*** in the table below, any definitions of scientific words used and an explanation of the relevant heat transfer processes.



Parts:

1. ***Insulating stopper***
2. Double wall
3. ***Vacuum***
4. ***Silvered inner wall***
5. ***Insulated supports***
6. ***Air/ insulation***

_____

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Heat transfer Homework 4:

Task 1

Describe the properties which each material in these objects have in terms of heat transfer….

Item:	Material:	Property and reason for choice:
Handle of a pan	Plastic	
Quilt	Feathers and down	
carpet	Wool and polyester	
Radiator	Iron and water inside	
Cooking spoon	Wood	
Poker for the fire	Iron	

Task 2

Q1.

(a) In an iron rod the particles vibrate. If one end of an iron rod is heated, the vibrating particles transfer energy to neighbouring particles which are **not** vibrating so violently.
What is this process called?

……..……

1 mark

(b) An electric immersion heater is put at the bottom of a large tank of water.

The water next to the heater becomes warm.

(i) What will happen to the warmed water next to the heater?
Give a reason for your answer.

……

……

……

2 marks

(ii) Why can heat **not** be transferred in this way in an iron rod?

……

……

1 mark

(c) In a liquid, some of the particles have enough kinetic energy to escape from the surface.
This process happens even when the liquid is well below its boiling point.

(i) What is this process called?
…….

1 mark

(ii) How will this affect the temperature of the liquid left in the container?

……

1 mark

Maximum 6 marks

Knowledge Organiser: Heat Transfer

Energy and temperature

When we know the **temperature** of something, we know how hot it is, not how much **thermal (heat) energy** is in it.

Temperature is measured in **degrees Celsius (°C)**.

0^oC = 273 **Kelvin** (**K**)

Absolute zero is the lowest possible temperature where there is no movement of the particles (zero Kelvin or -273^oC)

Thermal (heat) energy is measured in **joules (J)**.

The amount of thermal energy stored in something depends on:

- how hot it is (its temperature)
- the material it is made from
- its mass.

When two objects are at different temperatures, energy will be transferred ***from the hotter one*** to ***the cooler one*** until they are at the same temperature.

Observations after raising the temperature of an object:

- Chemical reactions like ***combustion*** (burning).
- ***Radiates*** heat which we can feel on our skin without touching it.
- Raises the temperature of the surroundings.
- Causes fluids surrounding it to move and circulate.
- Causes other substances nearby to ***expand***.

Transferring energy by heating

Energy can be transferred by heating in 3 different ways.

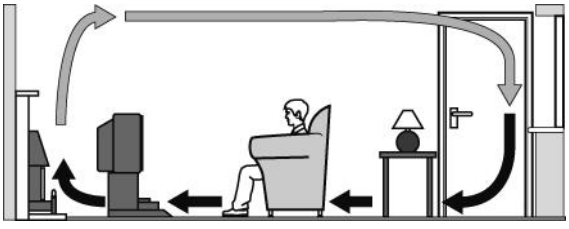
Conduction: solids (mostly). The particles in a solid are held together tightly. When they gain energy they vibrate faster and further, and the ***vibrations are passed on***. Metals are the best conductors. Most other solids are poor conductors (***insulators***).

Particles are not as close in a liquid, so conduction is not very good.

Particles are a long way apart in gases, so gases hardly conduct heat at all.

Something that does not conduct heat very well is a thermal insulator. Liquids, gases, and solids that contain a lot of ***trapped air*** are insulators.

Convection takes place in ***fluids*** (liquids and gases). When part of a fluid is heated, the particles spread further apart and the fluid becomes less dense. This makes it rise. As it rises it meets cooler fluid and passes the energy on. More cool fluid



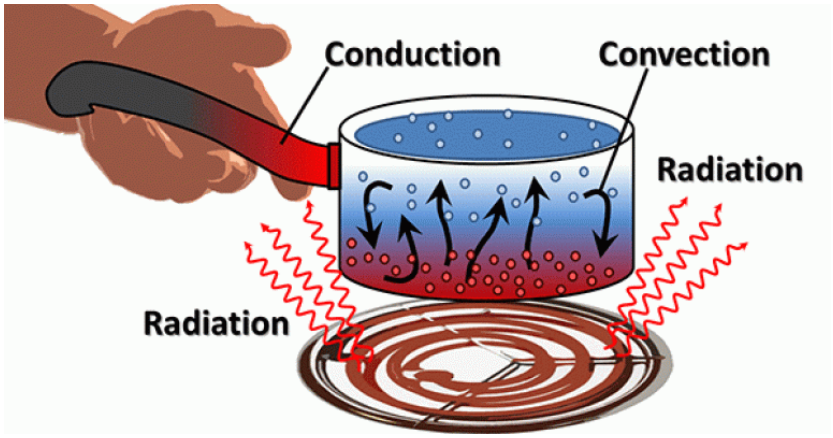
moves in to replace the rising fluid, setting up a **convection current**.

Infrared radiation: no need for particles so can transfer energy through empty space at the same speed as light. All objects emit radiation but hotter ones emit much more and a much wider range.

When something takes in energy from radiation, it is said to ***absorb*** it. ***Black bodies*** absorb **all** radiation and can emit a range of radiation too.

Different surfaces act differently with radiation…

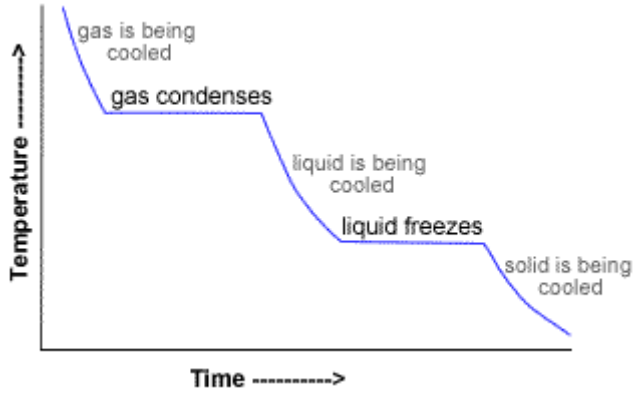
- ***Shiny/ white surfaces*** absorb less radiation (they ***reflect*** a lot of it)
- ***Black/ dull surfaces*** absorb more radiation
- ***Transparent surfaces*** transmit (allow it to go through) radiation



Extension section:

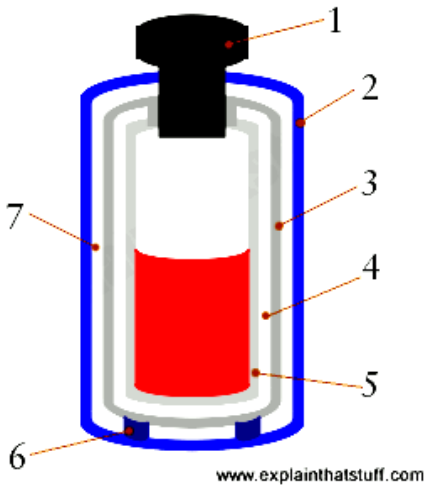
Shiny/ white surfaces are poor absorbers and emitters of radiation; black/ dull are good absorbers/ emitters.

Evaporation of liquids will absorb a lot of heat energy cooling the surrounding area- this is how sweating works to cool us down after exercise!



Latent heat: The 'hidden' heat involved in ***bond making*** (during cooling) or ***bond breaking*** (during heating) which gives flat areas of cooling curve graphs at the changes of state. These flat areas will tell us the ***melting point*** (MP) and ***boiling point*** (BP) of the substance e.g. for water MP= 0ºC, BP=100ºC.

Thermos flasks:



7. ***Insulating stopper*** prevents conduction and convection
8. Outer shell- to look nice and to protect; also contains air or insulation which a poor conductor (see 7).
9. Part of ***double wall*** containing a vacuum (see 4)
10. ***Vacuum***- prevents conduction and convection
11. Inner part of double wall- ***silvered*** to reduce heat loss by radiation.
12. Insulated supports- prevent heat loss by conduction.
13. Air/ insulation- poor conductor of heat.