HEAT TRANSFER

Homework for the Block

1. HEAT TITLE PAGE.
2. Logic Problem.
3. Research.
4. Experiment and Presentation to complete.
5. Read about u-values (from website)
6. Evaluation to complete .

Heat can be transferred in 3 ways.

CONVECTION

CONDUCTION

RADIATION

Usually HEAT is transferred in ALL 3 WAYS at once.

Heat travels from HOT PLACES to COLD PLACES

CONDUCTION

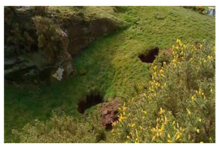
Heat passing through a SOLID

Heat is transferred by making the particles vibrate more passing the heat along the conducting material.

Metals are materials that are GOOD conductors

The opposite of conduction is insulation

INSULATORS will prevent HEAT TRANSFER



What	How	Heat Loss Methods
Paint radiators black	Black surfaces emit more heat than shiny surfaces	cuts down on RADIATION

We can put INSULATORS in the house to prevent HEAT TRANSFER.

In loft- fibre glass, sheepskin, paper pulp

In walls-fibre glass, pulped paper, polystyrene and many new materials

Window Frames- make them of plastic not metal

Under the floor- underlay (made by GATES Rubber in Dumfries)
Use thick carpet to insulate the floors.

Over the windows- close thick lined curtains as soon as it is dark

Window-double or triple glazed windows.
Also buy glass with a good u-value

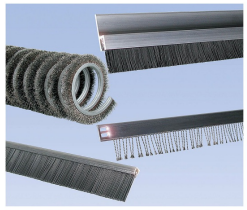
Roof- slates are better insulators than metal
Thatched rooves are better than slate
Turf rooves can be used as a great insulator

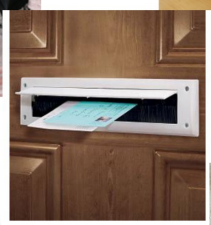
House walls can be made of insulating material such as straw.

CONVECTION

Convection is when the heat causes the particles to spread out, reducing the density (mass for volume) and so the lighter hotter air rises.
Don't say heat rises!

Hot air balloons and thermals (the hot currents that birds use) are examples of convection currents





Insulating the loft is really important as hot air rises and most heat can be lost out of the roof if it is not well insulatea

Convection can only happen in fluids (liquids and gases). If you put in a solid convection cannot occur

Insulating walls as mentioned in conduction also reduces heat loss by convection

Convection currents are responsible for draughts

Fit draught excluders around the doors (sausage dogs etc)

Fit draught strips around window frames

Fit "postman catchers- draught excluders on letter boxes)'

Chimneys- As hot air rises by convection lots of heat can be lost up the chimney when not in use. This can be prevented by boxing in fireplaces and sticking "blow up chimney pillows" in the chimney.

If you don't use the open fire-seal it!

WARNING- don't block up all draughts, you'll suffocate!

RADIATION

This is also called infra-red radiation and travels just like light but has a lower frequency.

Anything that is hotter than it's surroundings will radiate heat.

Radiation is affected by colour. Black surfaces absorb (take in) more radiation but also emit (give out) more heat.

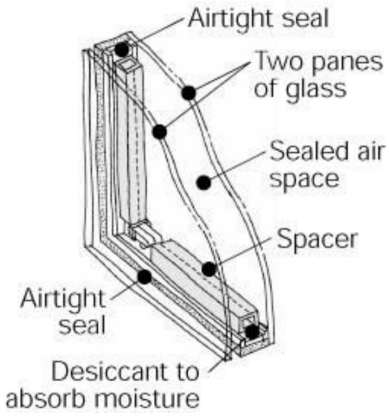
Colour is quite complicated and although black would appear better for taking in heat it is more difficult because it gives out more heat

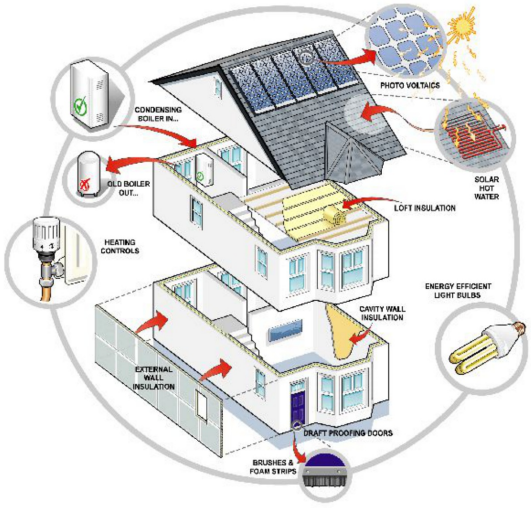
but shiny surfaces reflect more radiation. This makes them suitable around the house.

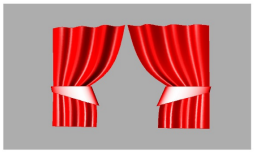
Use foil behind the radiators, the foil will reflect radiation back into the room

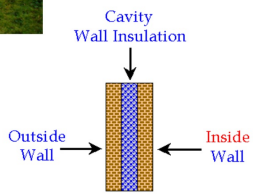
Use foil backed plaster board, again this reflects the radiation although there will be a little more conduction.

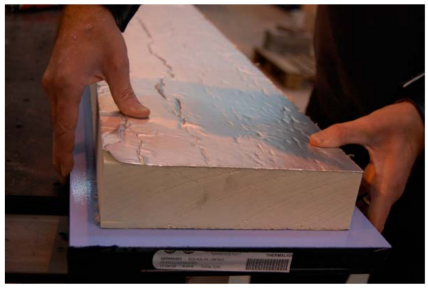
Painting radiators black should make them more efficient.

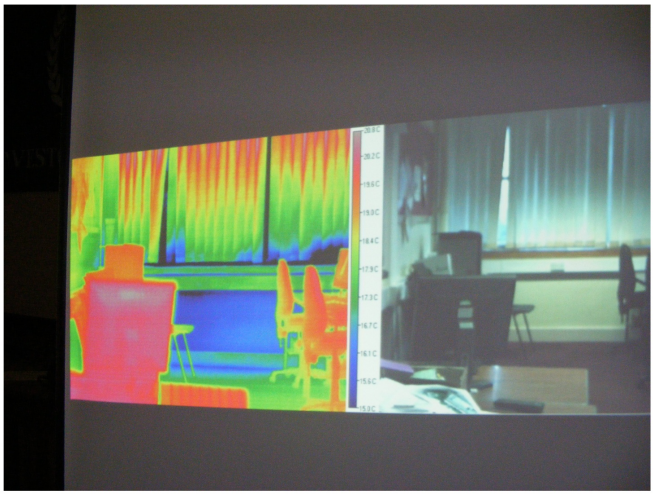


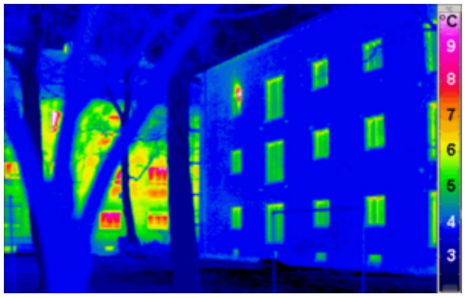


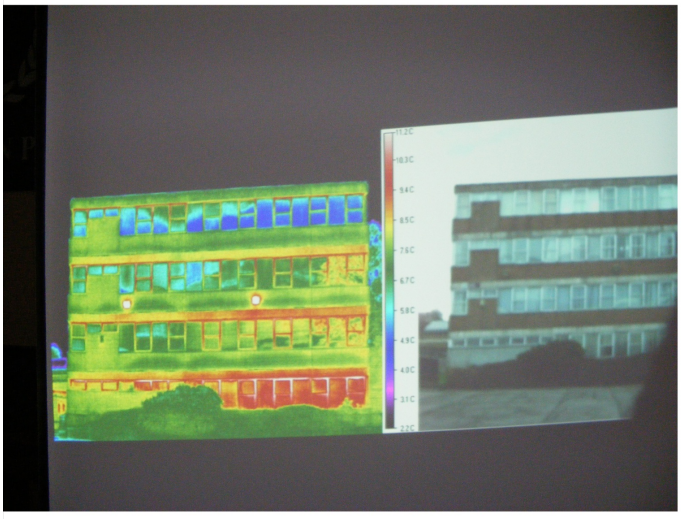


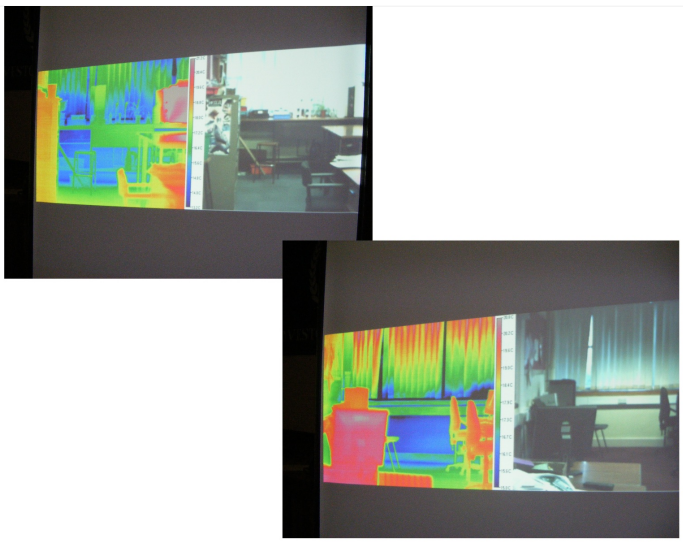


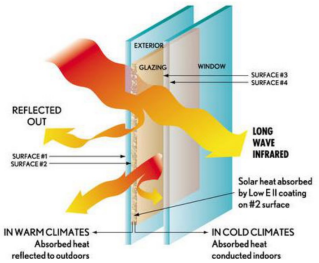





°C
9
8
7
6
5
4
3






EXTERIOR
GLAZING
WINDOW
SURFACE #3
SURFACE #4
REFLECTED
OUT
LONG
WAVE
INFRARED
SURFACE #1
SURFACE #2
Solar heat absorbed
by Low E II coating
on #2 surface
IN WARM CLIMATES
Absorbed heat
reflected to outdoors
IN COLD CLIMATES
Absorbed heat
conducted indoors


Courtesy of Cole & Son