HEAT TRANSFER
RADIATION

S2 Physics

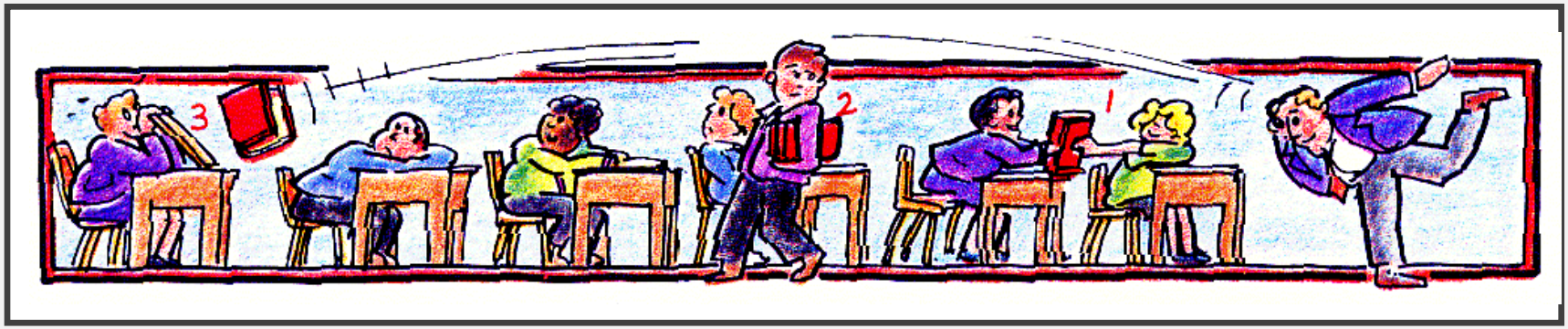
REVIEW

- Heat can be transferred in 3 ways
  - ✓ CONDUCTION
  - ✓ CONVECTION
  - ✓ RADIATION

- Usually heat is transferred in all 3 ways at once.
- Heat ALWAYS travels from Hot places to cold places

REVISION

- Convection occurs in fluids
- fluids are liquids and gases
- To start a convection current
- The substance is heated
- This causes the particles to spread out (don't say expand)
- There are fewer in the space so become less dense
- The less dense fluid rises
- The fluid cools and the spacing decreases
- The cooler fluid becomes more dense and falls

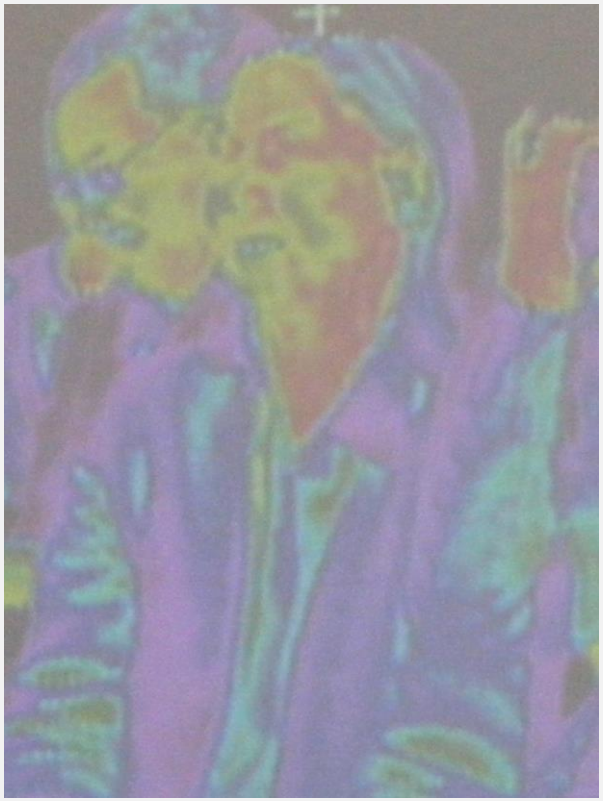


book is like heat energy

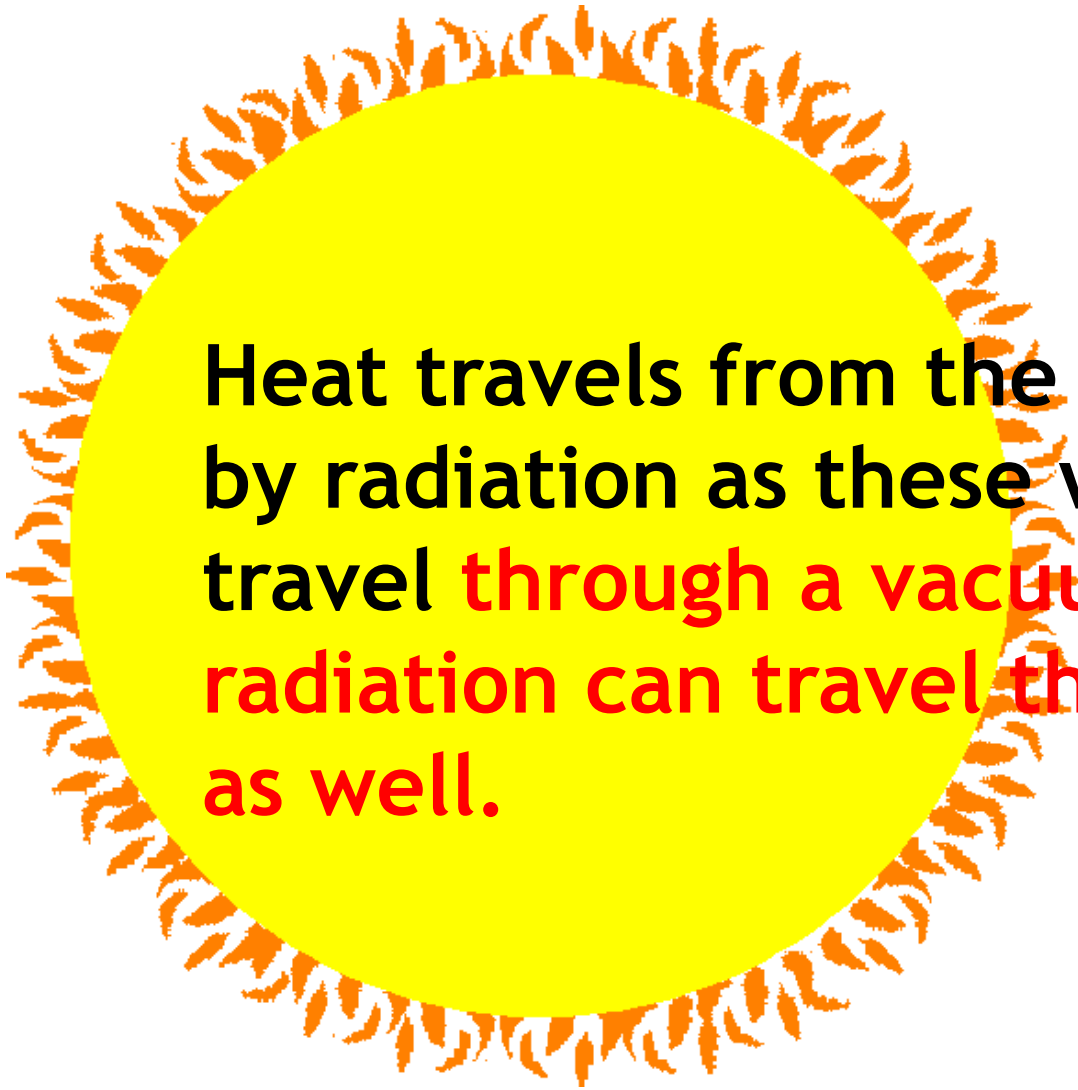
3. RADIATION – book thrown to the back of the room.
   The energy does not need particles to transfer the energy.

RADIATION

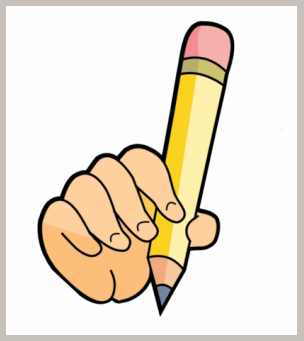
Radiation also called INFRA-RED (IR) radiation or thermal radiation, is heat travelling as waves.



The waves are similar to light.



Heat travels from the Sun to Earth by radiation as these waves can travel through a vacuum, but radiation can travel through gases as well.



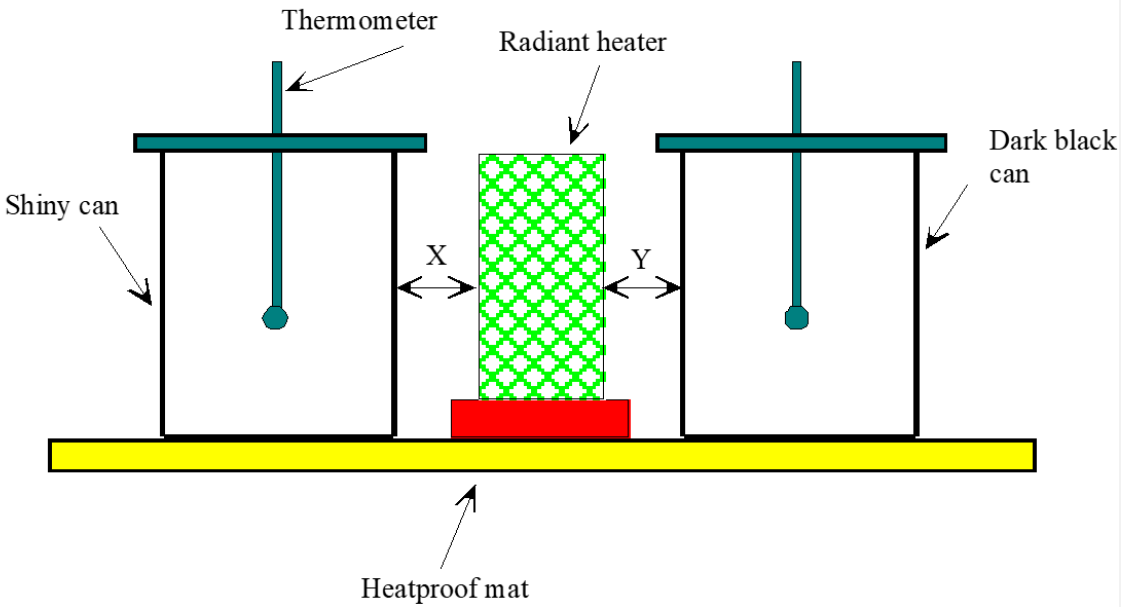
RADIATION IS AFFECTED BY BLACK AND SHINY SURFACES.

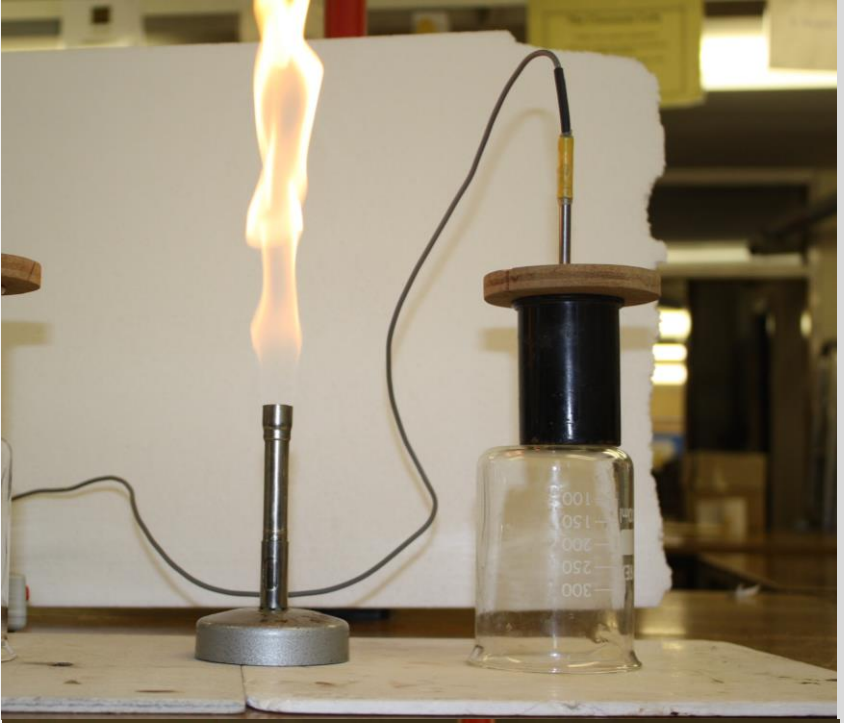
Black surfaces absorb radiation better than shiny ones.

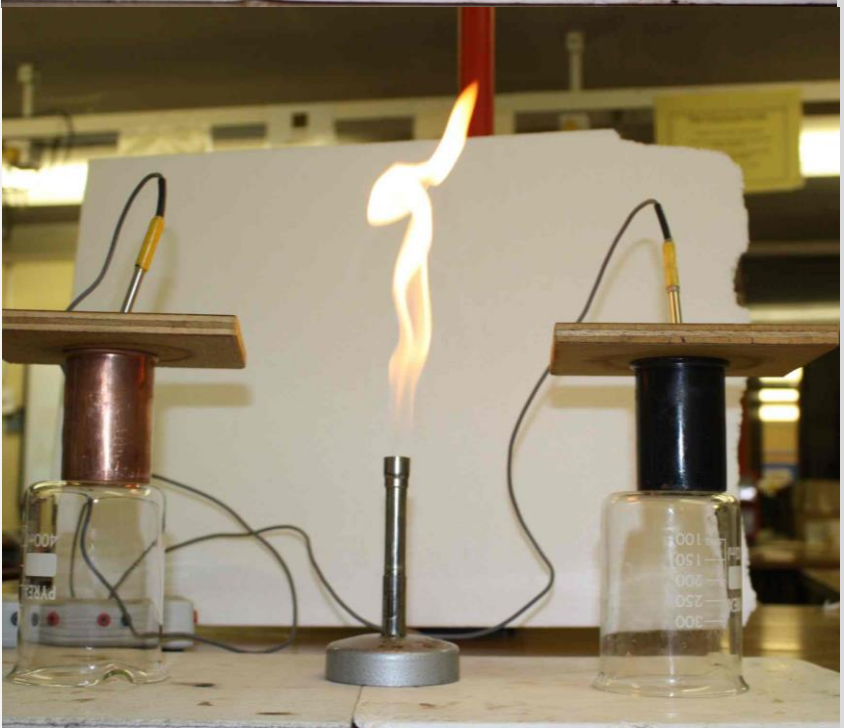
Black surfaces give out (emit) radiation better than shiny ones.

Shiny surfaces reflect radiation better than black.

BEST ABSORBERS

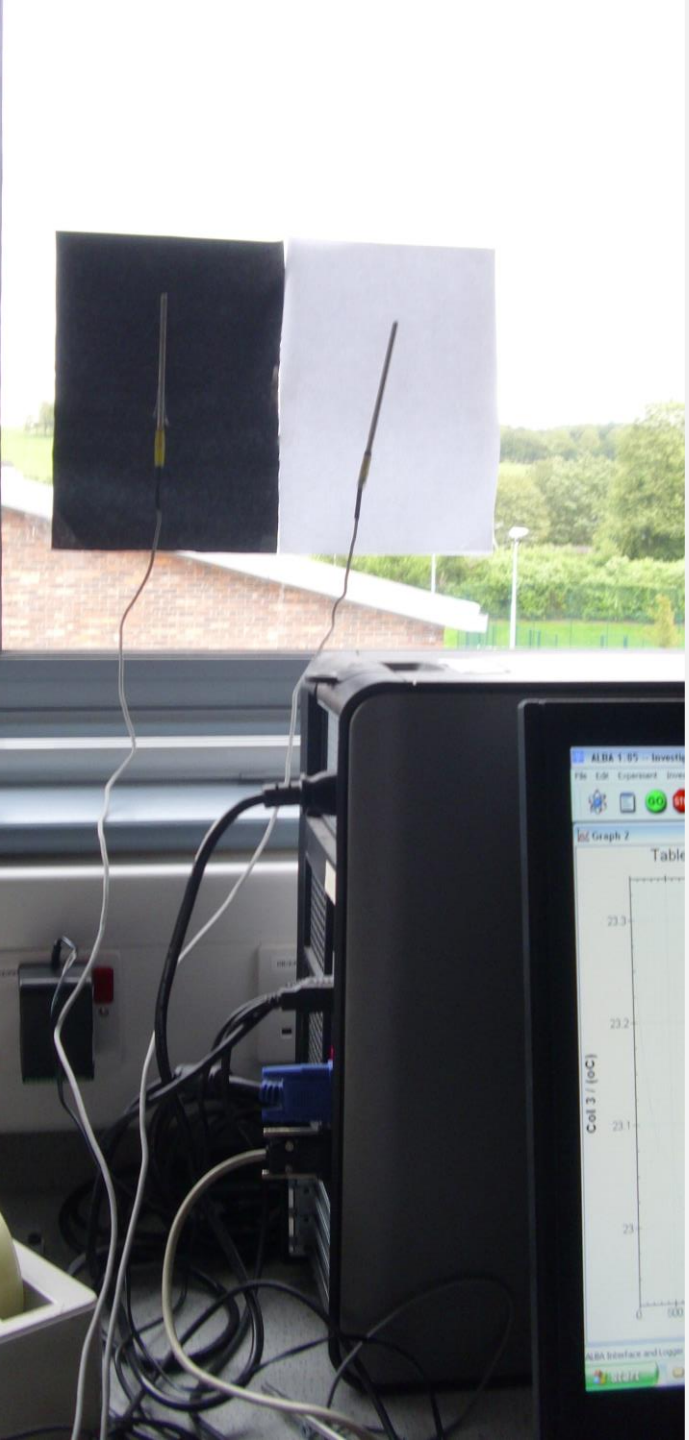




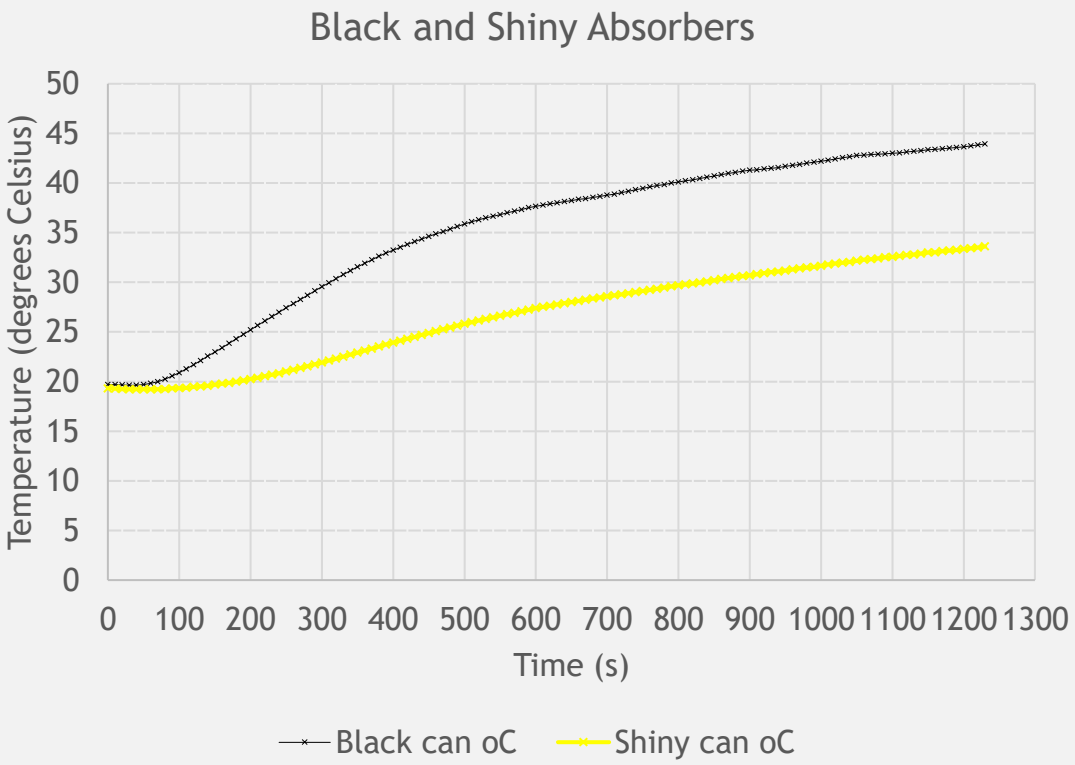


BLACK OR SHINY ABSORBERS

- How to make it a fair test?
- What results would we expect?
- How will we know?



ABSORBERS OF RADIATION

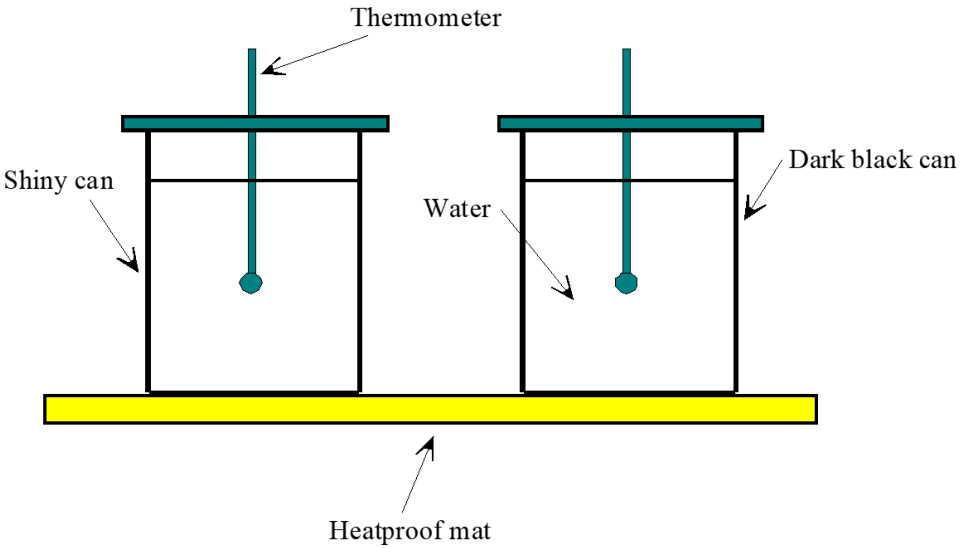


BLACK OR SHINY EMITTERS

How to make it a fair test?

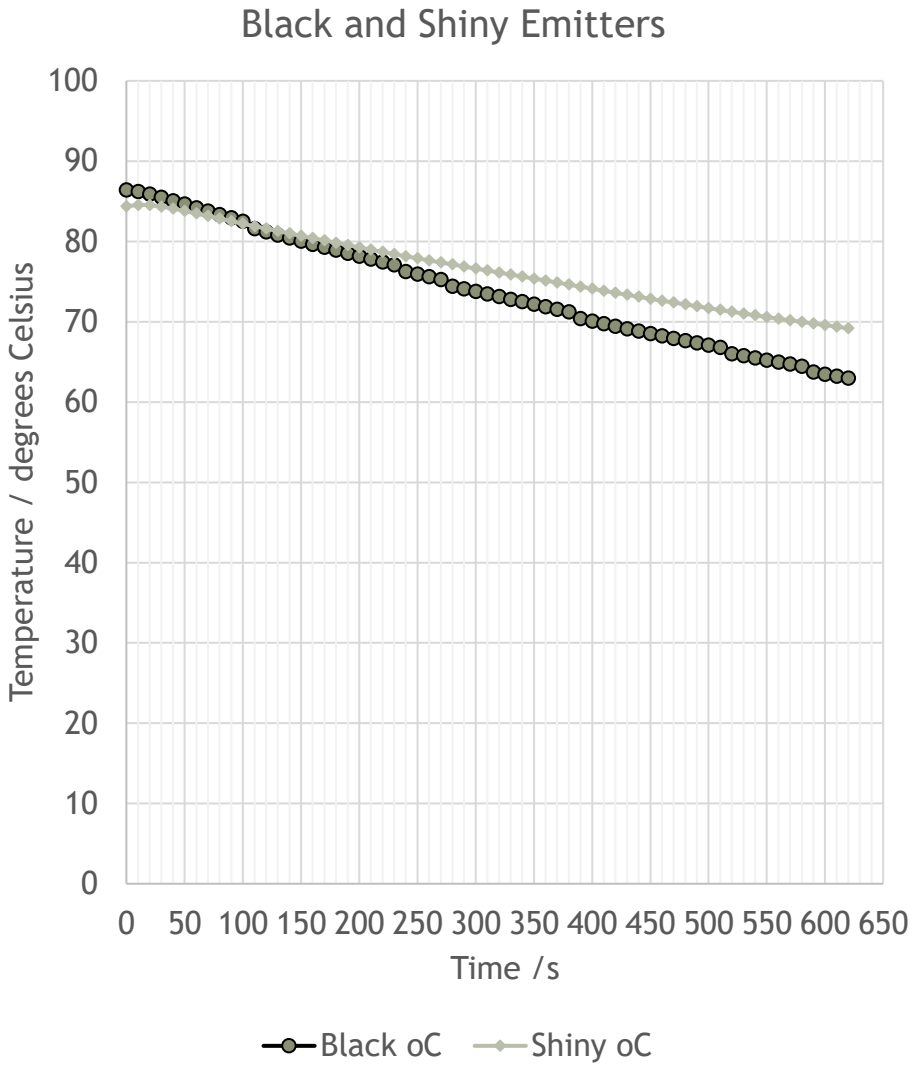
What results would we expect?

How will we know?



NB lids required, why?

WHICH EMITS MORE RADIATION?



REFLECTORS OF RADIATION

- Could you design an experiment with a radiant heater, a black and shiny surface to determine which surface REFLECTS more radiation?

- Where would you place the detector?
- What might you use as a detector?

INFRA RED DETECTORS

RADIATION

heat travelling as waves

- also called infra red (IR) or thermal radiation

the way heat reaches us from the sun

does not require a medium (particles)

black surfaces good emitters and absorbers of radiation.

shiny surfaces good reflectors of radiation

RADIATION SUMMARY

Radiation or Infrared radiation is when heat travels as a wave.

The wave travels at the speed of light through the air. (This speed is 300 000 000 m/s or the equivalent of 7.5 x around the Earth every second)

Black surfaces ABSORB more radiation than SHINY surfaces.

Black surfaces EMIT (give out) more radiation than SHINY surfaces.

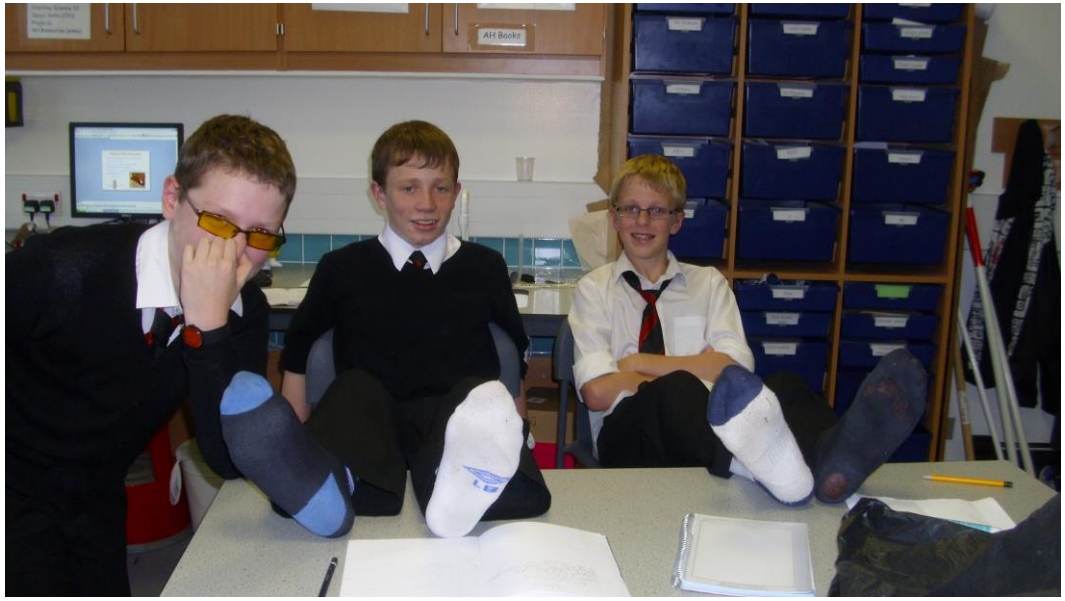
Shiny surfaces REFLECT more radiation than BLACK surfaces

3 STATES IN ONE TUBE- HOW?

BLACK OR WHITE ABSORBERS

- Mrs Hargreaves has a theory that
- black socks absorb more heat than white socks so are smellier at the end of the day.
- could you design an experiment to prove it?

FAIR TEST?



HEAT LOSS FROM HOUSES

- How is heat lost from houses?
- How can we test this in the lab?
- How would it depend on ambient (air) temperature?
- Can we do a fair test to find out?