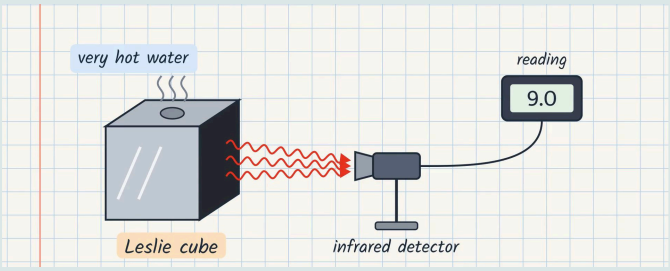
# Required practical 21

*Infrared and surfaces*

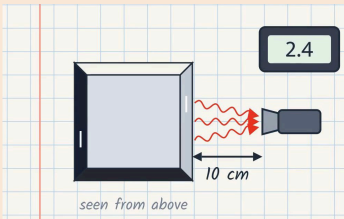


## 1 Apparatus




- Everything gives off **infrared**; hotter objects give off more.
- A **Leslie cube** is a hollow metal cube with four different faces. Filled with very hot water, all four faces are at the **same temperature**. An **infrared detector** measures what each face gives off.

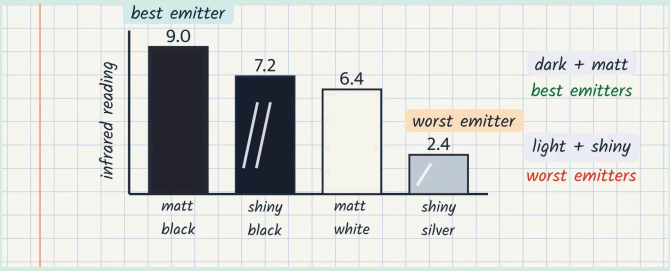
## 2 Method and variables




| surface | reading |
|---|---|
| matt black | 9.0 |
| shiny black | 7.2 |
| matt white | 6.4 |
| shiny silver | 2.4 |

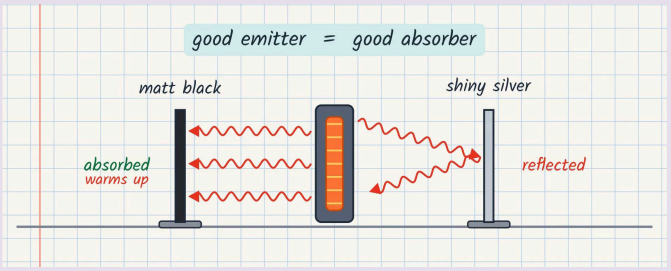
- Point the detector at one face from a **fixed distance** (e.g. 10 cm), record the reading, then turn the cube and repeat.
- Independent: **type of surface**. Dependent: **infrared reading**. Control: same distance, same water temperature (read quickly). Safety: heatproof mat; don't move the full cube.

## 3 Results




- **Matt black** gives the highest reading; **shiny silver** the lowest; the other two are in between.
- Dark, matt surfaces are the **best emitters** of infrared; light, shiny surfaces are the worst.

## 4 Absorption




- Two plates at equal distances from a heater, a pin waxed to the back of each: the pin on the **matt black** plate drops first.
- Good emitters are also **good absorbers**. Shiny surfaces **reflect** most of the infrared that hits them.

### Exam tip

Method question? Give a control variable with a reason: "Same distance from each face, because the reading changes with distance" scores better than "same distance".

## Check yourself

- 1 Why are the faces of a Leslie cube all at the same temperature?
- 2 Which colour should a solar water panel be painted, and why?

Answers: 1. The same hot water fills the whole cube 2. Matt black: it absorbs infrared best