

Infrared

All answers to calculations should be to 2 significant figures.

1. Describe what Infrared is

Infrared exists as an electromagnetic wave that can transfer heat energy

2. Give three examples of objects that can emit infrared radiation

As all objects emit Infrared, any three objects can be used.

4. Describe the relationship between temperature of an object and the amount of infrared radiation that is emitted.

As the temperature of an object increases, more infrared radiation is emitted.

5. State 3 uses for Infrared Radiation

a) TV remote controls

b) Transfer of information in a fibre optic cable

c) Cooking

6. Sound needs particles in order to travel, does Infrared need particles in order to travel?

No, IR is an electromagnetic wave, so it can travel through a vacuum.

7. The distance between a Star and a planet is 1.5×10^{10} m. Infrared travels at 3×10^8 m/s. Calculate how long it will take infrared to travel between the star and the planet.

$$\text{Time} = \frac{\text{distance}}{\text{speed}}$$

$$\text{Time} = \frac{1.5 \times 10^{10}}{3 \times 10^8}$$

$$\text{Time} = 50 \text{ seconds}$$

8. In the Greek Island of Santorini the houses are mostly painted white as shown in the diagram below:



Suggest a reason why the houses are painted white

White is a good reflector of IR

The white houses reflect most of the IR, and do not absorb much IR

This helps to keep houses cooler

8. Radiators are mostly painted white in houses. Anita said to her teacher that we should paint radiators black. Explain the advantage of a black radiator compared to a white radiator.

Black is a good emitter of infrared, so the black will radiate more heat energy to the room, to warm the room quicker compared to a white radiator.

9. Two cans that are identical in size and volume, but are different only in appearance. One is shiny, the other is black.



Design an experiment to find out which can the shiny one, or the black one will cool down fastest when they are both filled with hot water. Remember to write a clear method and describe what data you would record.

Both cans should be filled with the same volume of hot water, using hot water that has the same temperature.

Record the temperature of the water in both cans every 30 seconds for 20 minutes.

9a. In the space below, draw a data table to show how you would present the data collected. You do not need to include actual data values, just t

Time (seconds)	Temperature of water in shiny can (°C)	Temperature of water in black can (°C)
0		
30		
60		
90		
120		
150		
180		
210		
240		
250		

The heading of the columns are the most important part. The number of rows down is less important.