Infrared emission: black and shiny surfaces

Teacher / technician

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Staff preparation and answer guidance. Keep separate from student sheets. The detector comparison depends on background radiation, viewing angle and common surface temperature; no absolute emissivity measurement is claimed.

Coverage and delivery

Shared Physics / Double Award: 4.6, 4.8, 4.9. Radiation and surface properties.

Allow about 60 minutes. Follow the student sequence and use the answers to check reasoning.

Requisition • class of 30, one staff demonstration

Item	Per pair / setup	Class total
Leslie cube and tray	Staff demonstration	1 each
Infrared detector with stand	Staff demonstration	1
Contact thermometer and ruler	Staff demonstration	1 each
Warm water, maximum 60 °C	Manufacturer fill level	1 cube fill
Booklets	1 per learner	30

Immediate safety

Staff fill and handle the warm cube on a stable tray. Avoid contact with hot surfaces; allow cooling before draining. Keep electrical detector connections dry. No open flame or radiant heater is used.

Preparation and delivery

Read alongside the student method

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1. Pilot the detector response at or below 60 °C and choose a fixed distance giving a clear unsaturated reading. Use a radiation detector, not an unqualified apparent-temperature comparison.

2. Check the cube for leaks and follow its filling instructions. Use one projected demonstration; record actual detector units and background conditions.

Close of lesson

• Staff allow the cube to cool before draining. Dry the tray and store the detector.

Check before teaching

Check the cards, reference data and quantities against this requisition. Keep the staff answer guide separate until the checking stage. Supplied numerical practice datasets are labelled examples; they are not class measurements.

Answers and teaching notes

Expected explanations • do not give as experimental observations

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- Their temperatures are close, helping control temperature.
- The matt black face at the same temperature.
- Geometry affects the detected signal.
- No; electromagnetic radiation travels through a vacuum.
- A shiny face can reflect their radiation into the detector.
- No; convection and conduction contribute too.

References and provenance

Pearson Physics specification

IOP: thermal transfers

Prepared 22 November 2026. Original wording, tables and questions. Sources inform the concepts and technique; the lesson scope and classroom quantities are explicitly described here. No laboratory trial or final school risk approval is claimed.