Shadow detectives | 40-minute lesson

Learning goals

By the end, learners can name the three parts of a visible-shadow setup, explain a dark shadow using blocked light, predict size changes in the pictured small-source setup, and plan a fair colour comparison.

Prepare and keep safe

Per group: cool white LED torch, three identical opaque red/blue/yellow cards, white card screen, stands or tape, pencil and worksheet. Pre-test in a dim corner with walkways lit. If only one torch is available, run a teacher demonstration. Never shine at eyes. No lasers, flame or direct sunlight are required. Do not darken exits.

Four rotating participation roles

Equipment steward positions safe props; predictor shares a reason before testing; observer describes what is seen; recorder-reporter records and shares. Rotate every trial. Roles are participation choices, not ability labels; invite spoken, drawn or written contributions.

Source and boundaries

NCERT Curiosity Grade 7, Ch. 11, section 11.4; pp. 158-159, with straight-path support p. 157 and position applications p. 166. Focus only on shadow formation, not mirror images or full-chapter mastery.

Assessment and responsive teaching

Listen for light passing through an opaque card or a red shadow from a red card. Ask what evidence would test that idea, then repeat safely. Use the separate key after independent answers; do not display it with the worksheet. If torch beam coverage or room light hides the comparison, report that limitation and reposition before concluding.

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0-4 min | Hook / slide 1 (4 min)

Show three identical opaque coloured cards and one dark shadow. Ask: Which card made it? Take predictions without labelling pupils right or wrong.

4-9 min | Build a model / slide 2 (5 min)

Name the torch, card and screen. Ask learners to trace the blocked path with a finger on the picture. Agree the safety rules.

9-13 min | Predict / slide 3 (4 min)

Groups predict whether swapping only card colour changes the shadow colour. Recorder writes the prediction before the test.

13-23 min | Test / slides 3-4 (10 min)

First swap identical red, blue and yellow opaque cards without changing position. Then use one card: move it towards the screen, then towards the torch. Keep torch and screen fixed. Rotate roles after each trial; record words, not invented measurements.

23-29 min | Explain / slide 5 (6 min)

Compare predictions with observations. Explain dark regions by blocked light. Discuss why opaque card colour cannot be identified from this shadow; mention faint shadows from some transparent objects.

29-37 min | Independent check / slide 6 (8 min)

Use the six-question worksheet. Accept labelled sketches, oral explanations scribed by an adult, or short sentences without changing the science standard.

37-40 min | Exit and next step (3 min)

Ask: What must stay fixed to test colour fairly? Collect a one-sentence explanation. Teacher checks the key and chooses a follow-up; do not claim outcomes before teaching.