Plane mirrors: locating a virtual image

Student activity • investigation and reasoning

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The question

Where is the image formed relative to a plane mirror?

Use two matching unlit objects and a transparent acrylic reflector to locate an image by reducing parallax. No flame is needed.

Equipment

- Thin clear acrylic reflector in a stable holder
- Two matching coloured objects, paper and ruler

Use smooth-edged acrylic, not loose glass. Staff check the holders are stable and edges undamaged. Keep objects away from bench edges. Use unlit objects only; no candle, flame or laser is used.

Course coverage: Shared Physics / Double Award: 3.15, 3.16. Reflection and ray diagrams.

Plan, model or apparatus sketch

Draw the apparatus and wave or ray directions; label the normal or equilibrium position where relevant.

Method and reasoning

Read the whole sequence before starting

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1. Staff secure a clear acrylic sheet upright in a stable holder on paper and mark its reflecting face. Put a small bright coloured object 5 cm in front; keep a matching movable object behind.

2. View through the sheet from the front so that the reflection of the front object and the real rear object are both visible. Move the rear object until the two appear aligned.

3. Move your head a small distance sideways while remaining on the same side of the sheet. Adjust the rear object until relative movement between it and the reflection is minimised.

4. Mark both object positions. Measure perpendicular distances from the marked reflecting face to each object. Repeat with the front object at approximately 10 cm and 15 cm.

5. Draw two reflected rays entering an eye and extend them backwards with dashed lines to locate the virtual image. Apply equal incidence and reflection angles at the surface.

6. Describe image size, orientation and distance. Explain why a screen at the image position does not capture a focused image: the reflected rays only appear to originate there.

Cleanup

- Return objects, wipe acrylic with a suitable soft cloth and store panels in their holders.

Record your evidence

Blank spaces are for your own work

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Reference and task data

The plane-mirror model predicts equal perpendicular object and image distances, an upright image and unit magnification. A thin acrylic sheet gives weak reflections from two surfaces; record residual parallax and uncertainty rather than claiming perfect coincidence.

Nominal object / cm	Measured object / cm	Image / cm
5		
10		
15		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. What is parallax here?

2. How do you reduce it?

3. What distance should be measured?

4. Is the image real or virtual?

5. Why use dashed backward extensions?

6. Where is the predicted image for an object 10 cm in front?