

Refraction Lenses and Prisms

KS3 Physics · Follows the national curriculum

Name _____ Class _____ Date _____

1. Worked example

Why does a straw look bent in a glass of water?

Step 1 · What happens

Light from the straw under water travels up into the air.

Step 2 · Refraction

At the water surface the light speeds up and bends away from the normal.

Step 3 · Our brain

We assume light travels in straight lines, so the underwater part looks higher than it is.

Answer: Refraction at the water surface

Check: The same effect makes pools look shallower than they are.

2. Now try one with the steps

Light goes from air into a glass block at 30° to the normal. Which way does it bend?

Step 1 · Speed

Step 2 · Rule

Step 3 · Size

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. What is refraction? [1]

2. What causes refraction? [1]

3. When light passes from air into glass, does it bend towards or away from the normal? [1]

4. When light passes from glass into air, does it bend towards or away from the normal? [1]
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5. A ray enters a glass block along the normal. What is the angle of refraction, in degrees? [1]
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6. Is a convex lens converging or diverging? [1]
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7. What is the focal point of a convex lens? [1]
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8. Explain why a swimming pool looks shallower than it really is. [2]
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9. What is the name for white light splitting into colours in a prism? [1]
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10. Which colour of light is refracted most by a prism? [1]
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11. Results for light entering glass: $i = 20^\circ$, $r = 13^\circ$; $i = 40^\circ$, $r = 25^\circ$; $i = 60^\circ$, $r = 35^\circ$. At $i = 60^\circ$, how many degrees has the ray turned ($i - r$)? [1]
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12. Describe the pattern in the results in the last question. [2]
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13. What does a concave lens do to parallel rays of light? [1]
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14. Explain why a magnifying glass can set paper on fire in strong sunlight (do NOT try this). [2]
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4. Before you hand it in

"Light bends at the edge of the block for no reason."

Light changes speed when it enters a new material; that is what makes it change direction.

Bending the ray the wrong way at the boundary.

Into a denser material (slower) → towards the normal. Out of it (faster) → away from the normal.

"A prism adds colour to white light."

The prism separates (disperses) the colours because each refracts by a different amount.