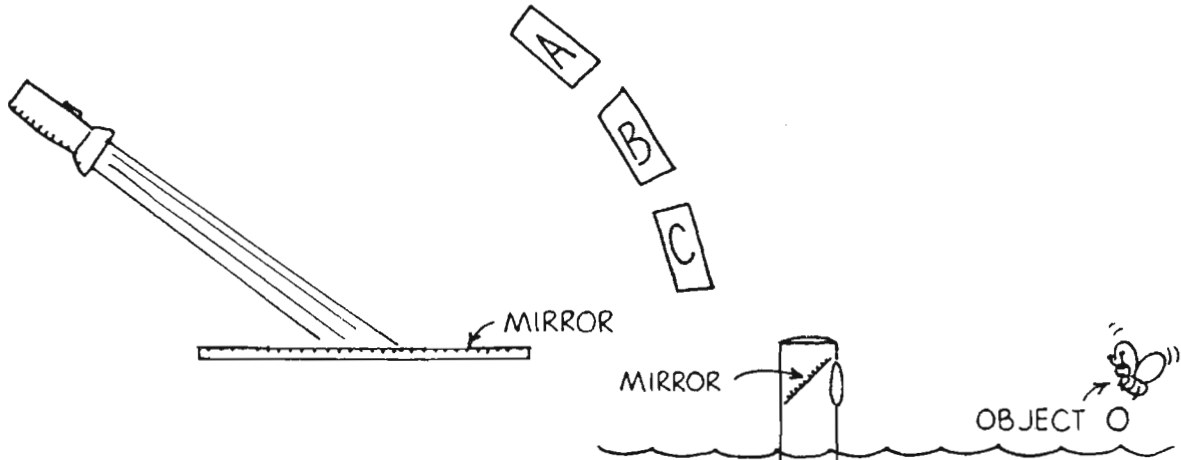


# Concept-Development Practice Page

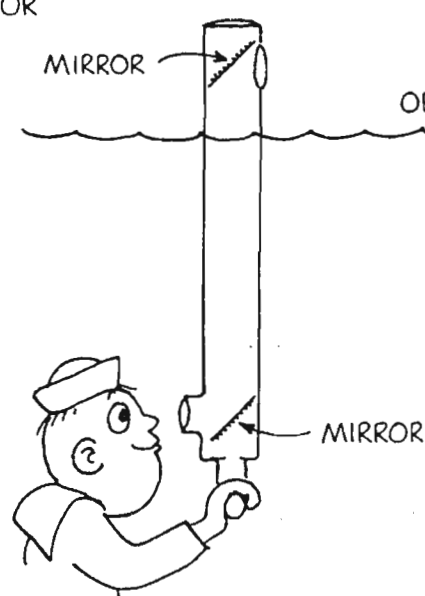
# 29-1

## Reflection

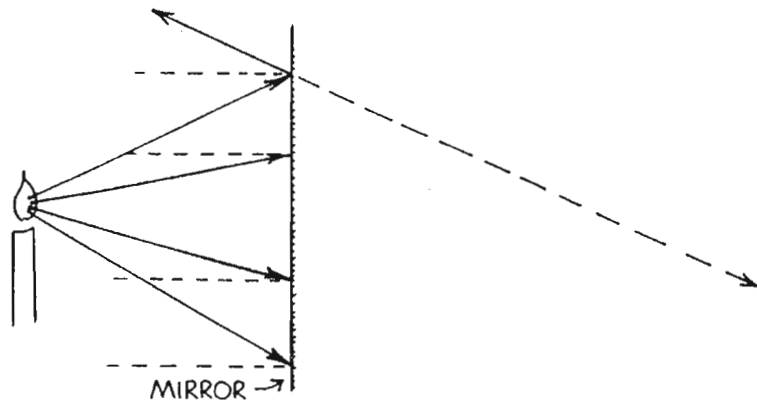
- Light from a flashlight shines on a mirror and illuminates one of the cards. Draw the reflected beam to indicate the illuminated card.



- A periscope has a pair of mirrors in it. Draw the light path from the object "O" to the eye of the observer.



- The ray diagram below shows the extension of one of the reflected rays from the plane mirror. Complete the diagram by (1) carefully drawing the three other reflected rays, and (2) extending them behind the mirror to locate the image of the flame. (Assume the candle and image are viewed by an observer on the left.)

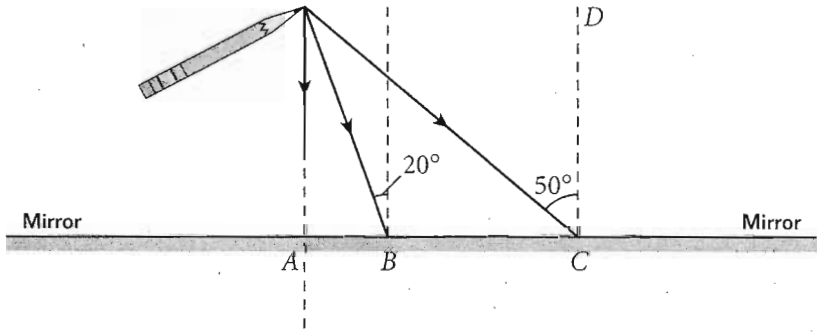


**Light and Reflection**

**HOLT PHYSICS**  
**Diagram Skills**

*Flat Mirrors*

1. The point of a 20.0 cm pencil is placed 25.0 cm from a flat mirror. Its eraser is 15.0 cm from the mirror. Three of the light rays from the pencil's point hit the mirror with incident angles of  $0^\circ$ ,  $20^\circ$ , and  $50^\circ$  at points A, B, and C as shown.



- a. Use a protractor to draw the reflected rays from points A, B, and C.
- b. Where do reflected rays or their extensions intersect?  
\_\_\_\_\_
- c. What is the distance between the pencil's head and its image?  
\_\_\_\_\_
- d. Would a person's eye located at point D perceive one of the reflected rays you drew? Will the person be able to see the image? Explain.  
\_\_\_\_\_  
\_\_\_\_\_
- e. What if the eye is located at point E?  
\_\_\_\_\_
- f. Draw incident rays from the eraser of the pencil to point A and to point B. Measure their incident angles and write them on the line below.  
\_\_\_\_\_
- g. Draw the reflected rays and locate the image of the eraser. Draw the pencil's image.

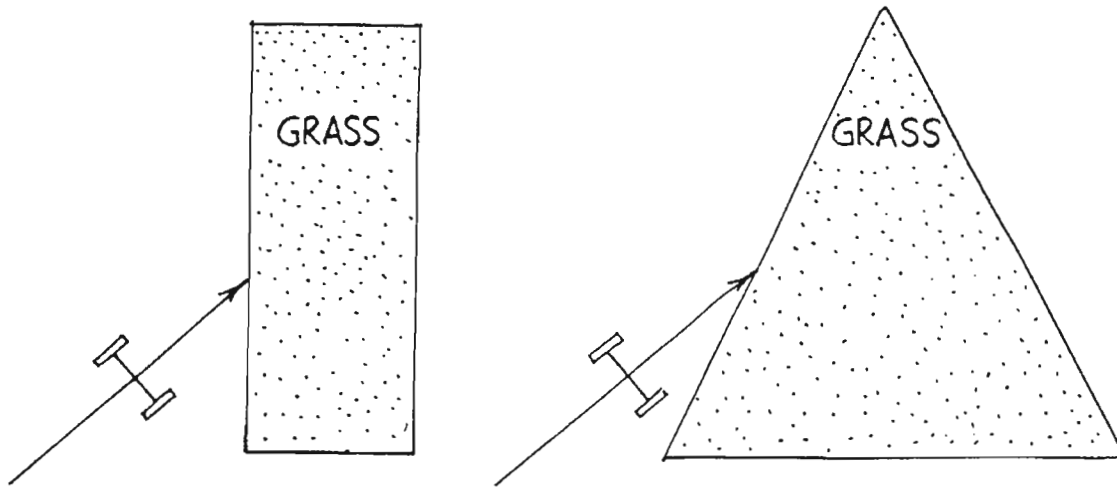
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## Concept-Development Practice Page

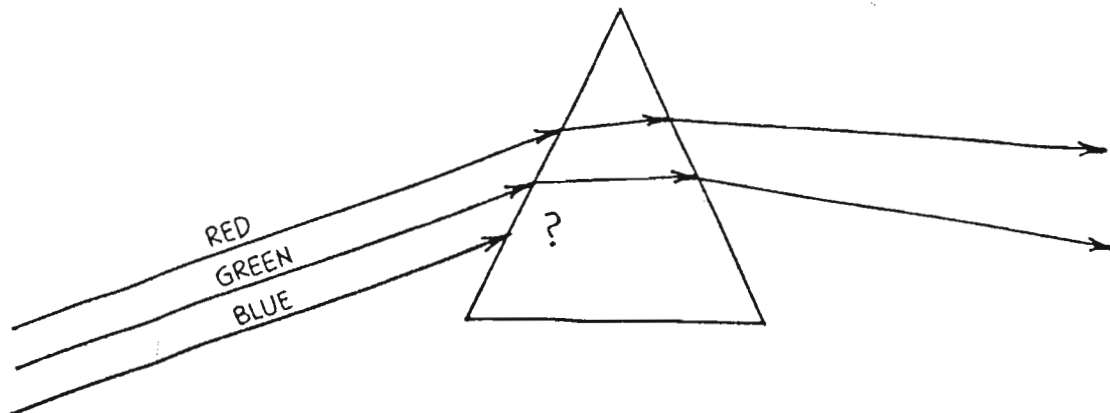
# 29-3

### Refraction

1. A pair of toy cart wheels are rolled obliquely from a smooth surface onto two plots of grass — a rectangular plot as shown at the left, and a triangular plot as shown at the right. The ground is on a slight incline so that after slowing down in the grass, the wheels speed up again when emerging on the smooth surface. Finish each sketch and show some positions of the wheels inside the plots and on the other side. Clearly indicate their paths and directions of travel.



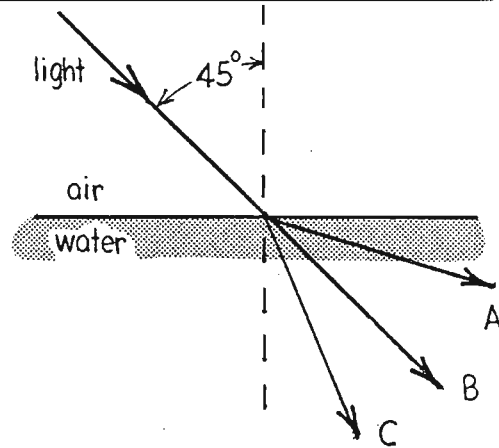
2. Red, green, and blue rays of light are incident upon a glass prism as shown. The average speed of red light in the glass is less than in air, so the red ray is refracted. When it emerges into the air it regains its original speed and travels in the direction shown. Green light takes longer to get through the glass. Because of its slower speed it is refracted as shown. Blue light travels even slower in glass. Complete the diagram by estimating the path of the blue ray.



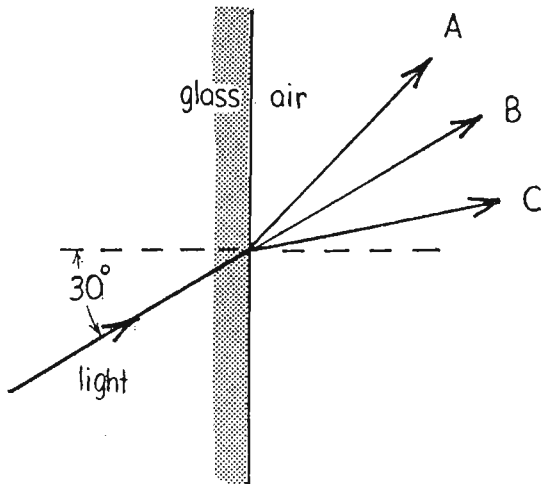
**Concept-Development Practice Page 29-4**

**Refraction**

1. The sketch to the right shows a light ray moving from air into water, at  $45^\circ$  to the normal. Which of the three rays indicated with capital letters is most likely the light ray that continues inside the water?



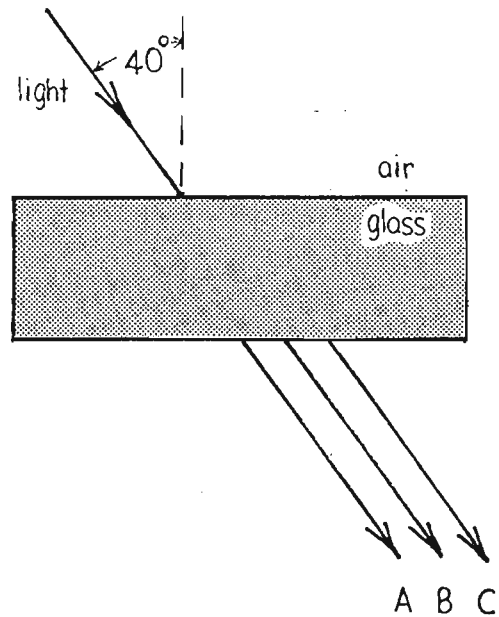
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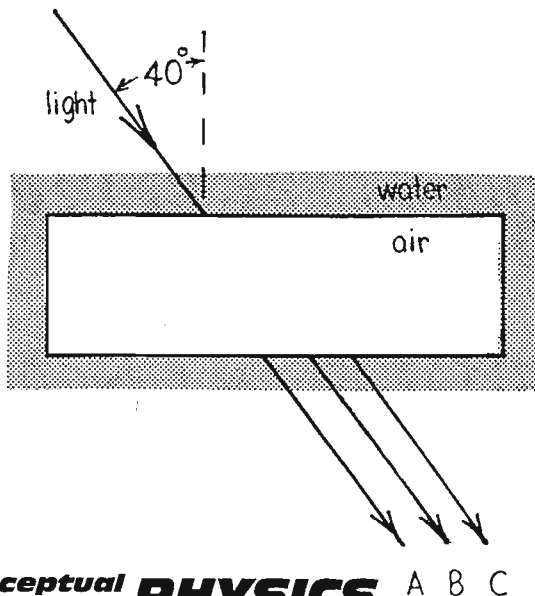
2. The sketch on the left shows a light ray moving from glass into air, at  $30^\circ$  to the normal. Which of the three is most likely the light ray that continues in the air?

\_\_\_\_\_

3. To the right, a light ray is shown moving from air into a glass block, at  $40^\circ$  to the normal. Which of the three rays is most likely the light ray that travels in the air after emerging from the opposite side of the block?



Sketch the path the light would take inside the glass.



4. To the left, a light ray is shown moving from water into a rectangular block of air (inside a thin-walled plastic box), at  $40^\circ$  to the normal. Which of the three rays is most likely the light ray that continues into the water on the opposite side of the block?

\_\_\_\_\_

Sketch the path the light would take inside the air.