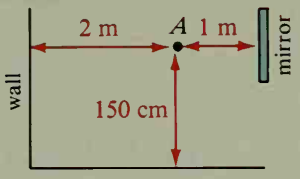
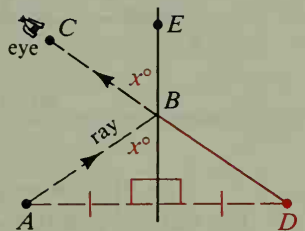
Exercises

1. What are the measures of the angles that the initial light ray and the reflected light rays make with the mirrors in the diagram of the periscope on the previous page?
2. If you can see the eyes of someone when you look into a mirror, can the other person see your eyes in that same mirror?
3. A person with eyes at A, 150 cm above the floor, faces a mirror 1 m away. The mirror extends 30 cm above eye level. How high can the person see on a wall 2 m behind point A?



Ex. 3

4. Prove that you can see all of yourself in a mirror that is only half as tall as you are. (*Hint*: Study the diagram on page 582.)
5. Prove that the point D which is as far behind the mirror as the object A is in front of the mirror lies on $\overleftrightarrow{BC}$. (*Hint*: Show that $\angle CBE$ and $\angle EBD$ are supplementary.)
6. Show that the light ray follows the shortest possible path from A to C via the mirror by proving that for any point E on the mirror (other than B) $AE + EC > AB + BC$. (*Hint*: See the Application: Finding the Shortest Path, on page 224.)



Exs. 5, 6

14-3 *Translations and Glide Reflections*

The photograph at the right suggests the transformation called a *translation*, or *glide*. The skate blades of the figure-skating pair move in identical ways when the pair is skating together. A transformation that glides all points of the plane the same distance in the same direction is called a **translation.**

If a transformation maps A to A', B to B', and C to C', points A, B, and C glide along parallel or collinear segments and $AA' = BB' = CC'$. Any of the vectors $\overrightarrow{AA'}$, $\overrightarrow{BB'}$, or $\overrightarrow{CC'}$ could describe this translation.

Each vector has the same magnitude of $\sqrt{1^2 + 3^2}$, or $\sqrt{10}$, and each vector has the same direction as indicated by its slope of $\frac{1}{3}$. Note that we don't need to know the coordinates of points A, B, or C to describe the translation. All that is important is the change in the x-coordinate and y-coordinate of each point.