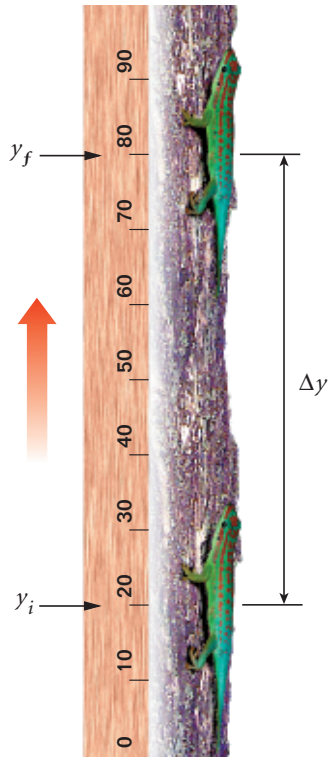


Figure 3
When the gecko is climbing a tree, the displacement is measured on the *y*-axis. Again, the gecko's position is determined by the position of the same point on its body.

Now suppose the gecko runs up a tree, as shown in **Figure 3.** In this case, we place the measuring stick parallel to the tree. The measuring stick can serve as the *y*-axis of our coordinate system. The gecko's initial and final positions are indicated by y_i and y_f, respectively, and the gecko's displacement is denoted as Δy.

Displacement is not always equal to the distance traveled

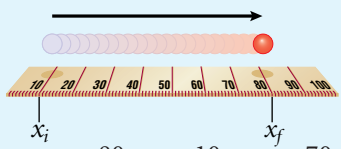
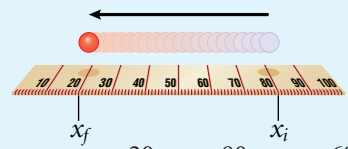
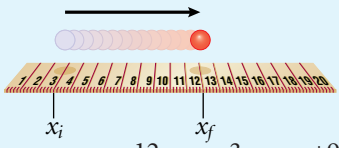
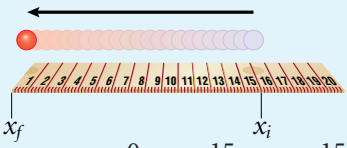
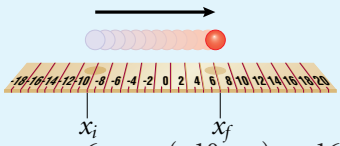
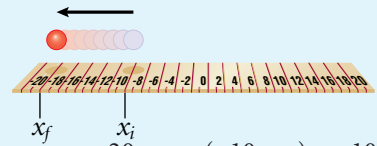
Displacement does not always tell you the distance an object has moved. For example, what if the gecko in **Figure 3** runs up the tree from the 20 cm marker (its initial position) to the 80 cm marker. After that, it retreats down the tree to the 50 cm marker (its final position). It has traveled a total distance of 90 cm. However, its displacement is only 30 cm ($y_f - y_i = 50\text{ cm} - 20\text{ cm} = 30\text{ cm}$). If the gecko were to return to its starting point, its displacement would be zero because its initial position and final position would be the same.

Displacement can be positive or negative

Displacement also includes a description of the direction of motion. In one-dimensional motion, there are only two directions in which an object can move, and these directions can be described as positive or negative.

In this book, unless otherwise stated, the right (or east) will be considered the positive direction and the left (or west) will be considered the negative direction. Similarly, upward (or north) will be considered positive and downward (or south) will be considered negative. **Table 1** gives examples of determining displacements for a variety of situations.

Table 1 Positive and Negative Displacements

Positive	Negative
 $\Delta x = x_f - x_i = 80\text{ cm} - 10\text{ cm} = +70\text{ cm}$	 $\Delta x = x_f - x_i = 20\text{ cm} - 80\text{ cm} = -60\text{ cm}$
 $\Delta x = x_f - x_i = 12\text{ cm} - 3\text{ cm} = +9\text{ cm}$	 $\Delta x = x_f - x_i = 0\text{ cm} - 15\text{ cm} = -15\text{ cm}$
 $\Delta x = x_f - x_i = 6\text{ cm} - (-10\text{ cm}) = +16\text{ cm}$	 $\Delta x = x_f - x_i = -20\text{ cm} - (-10\text{ cm}) = -10\text{ cm}$