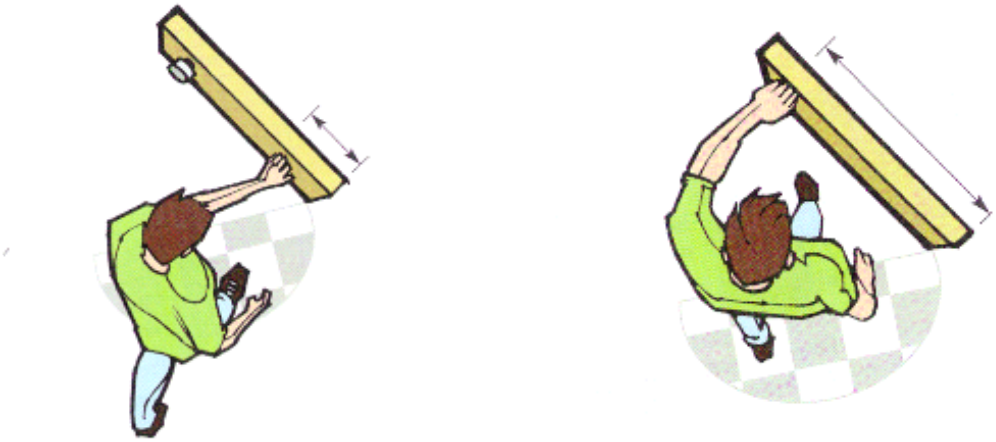
Developing an Understanding for Inverse Functions

In the past investigation you noticed that as one quantity increased the other quantity that was related to it also increased.

Name some of the relationships we have studied so far where this is true.

Now think about this situation.
Suppose you opened your classroom door by pushing on it close to the hinges.
Then suppose you opened the same door by pushing on it farther from the hinges.



As the distance from the hinge increases, the force needed to open the door decreases. This is an example of an inverse relationship.

- Set up the course by marking a starting line and finish line 2.0 meters apart. Be sure you have acquired the *Inverse* Program.
- Run the *Inverse* Program and follow the directions on the calculator screen.
- To begin the walker stands at the starting line and the CBR holder stands 1 meter behind the starting line, facing the walker.
- The CBR holder presses the TRIGGER on the CBR and the walker starts walking about 1 second later.
- The walker walks from the starting line to the finish line at a constant rate. The walker stops at the finish line and stands still until the 10 seconds is over.
- When the walk is complete press ENTER.
- Isolate the part of the graph that shows the walker moving.
- From the screen record the total time for the walk and the average

speed of the walker. Record this on the chart.

- Switch jobs and collect additional information until you have 5 sets of data.
- Enter the total time in L1 and average speed in L2. Create a graph of the data.
- Complete steps 7 and 8. Enter an equation in y1 that is of the form y=a/x that is a good model for the relationship between the total time and the average speed.
- What does the value of *a* represent in this problem?
- Return to the lists and enter L3=L1●L2. What do you notice about L3?
- Since

$$\text{first walk total time} \bullet \text{first walk speed} = \text{second walk total time} \bullet \text{second walk speed}$$

we can also write

$$\frac{\text{first walk total time}}{\text{second walk total time}} = \frac{\text{second walk speed}}{\text{first walk speed}}$$

or

$$\frac{\text{first walk total time}}{\text{second walk speed}} = \frac{\text{second walk total time}}{\text{first walk speed}}$$

Show that all three expressions are the same.