

# Mini-Lab 13 Linear Relationships

## Purpose

To investigate a situation involving a linear relationship between two variables.

## Background

**Definition:** Two changing quantities  $x$  and  $y$  are **linearly related** if  $y = ax + b$  where  $a$  and  $b$  are real number constants.

**Problem Situation:** You know, from actual driving data, that your car gets 17 miles per gallon when your average speed is 45 m.p.h., but only 14 m.p.g. when you average 60 m.p.h. A friend tells you that mileage  $g$  is almost **linearly related** to average speed  $v$  when  $v$  is between 30 m.p.h. and 100 m.p.h. That is, for these speeds  $g$  can be approximated as a linear function of  $v$ .

## Investigations

1. Write the two ordered pairs defined by the given data.
2. Find the slope of the line defined by the linear relationship. Show your work.
3. Write the linear relationship described by the given data. Show your work.
4. Use the relationship from investigation 3 to create a table on the TI-82 that displays the gas mileage for each value of speed from 50 m.p.h. to 80 m.p.h. in increments of 5 m.p.h.

average speed $v$ (m.p.h.)	gas mileage $g$ (m.p.g.)

Table 1: Average speed versus gas mileage