

## Chapter 8 Project

## Demand and It Shall Be Supplied

An activity to demonstrate the use of linear equations and linear inequalities in real life.

In economics, the demand for a product is the number of units of the product that the market is willing to absorb at a certain price. That is, the demand is the number of units of the product that sells at any given time. The most basic model for the demand  $d$  as a function of the price  $p$  is given by a linear equation

$$d = b + mp,$$

where  $m$  and  $b$  are real numbers.

1. The owner of a T-shirt company believes that the demand  $d$  (in units) for their Stranger Things T-shirt follows the linear demand model from the introduction, where  $p$  is the price of one T-shirt and  $m$  and  $b$  are real numbers. The company owner knows that they can sell 300 Stranger Things T-shirts for \$20 each but only 250 T-shirts at \$25 each.
  - a. Explain why it is reasonable to believe that the demand of T-shirts decreases as the price increases.
  - b. Compute the value of the real number  $m$ . How would you interpret the value you have found?
  - c. Compute the value of the real number  $b$ . How would you interpret the value you have found?
  - d. Write the demand equation using your answers from parts b. and c.

The supply for a product is the number of units of a product that the manufacturer can make available at a certain price. The most basic model for the supply  $s$  as a function of the price  $p$  is given by a linear equation

$$s = b + mp,$$

where  $m$  and  $b$  are real numbers.

2. The T-shirt company from Problem 1 can produce 275 shirts when the price is \$20. If the price is raised to \$25, they can produce 300 shirts.
  - a. Explain why it is reasonable to believe that the supply of T-shirts increases as the price increases.
  - b. Compute the value of the real number  $m$ . How would you interpret the value you have found?
  - c. Compute the value of the real number  $b$ . How would you interpret the value you have found?
  - d. Write the supply equation using your answers from parts b. and c.
3. The equilibrium price is the price for which the demand is equal to the supply. At this price, the number of units produced is exactly the number of units absorbed by the market.
  - a. Graph the demand and supply equations for the T-shirt company on the same coordinate plane. Recall that the  $x$ -axis should represent price.
  - b. Find the equilibrium price rounded to the nearest cent and explain what it means in words.
4. Some products have a demand that is not sensitive to changes in price. That is, a large variation in price will not produce a corresponding large variation in demand. This phenomenon is defined as inelastic demand. Perform an internet search to find an example of a product with an inelastic demand. Explain why the demand for the product is inelastic.