

## Staging a Profitable Production

After participating in the Festival théâtre jeunesse de l'Alberta, Patrice and his friends formed a drama club. They asked for help from l'UniThéâtre's treasurer for their budget. The treasurer determined the revenue,  $R$ , that the club can expect to generate for its next production as a function of the ticket price,  $t$ . This relationship is shown in the following table.

Ticket Price, $t$ (\$)	Revenue, $R$ (\$)
0	0
1	350
2	600
3	750
4	800
5	750
6	600
7	350
8	0

The cost to produce a free show is \$650. However, increasing the quality of the show will increase the cost to stage it. To cover the higher cost, the drama club can increase the ticket price, requiring the audience to pay for the performance. For each \$1 increase in the ticket price, the club can spend \$25 more on staging the production.



**?** What range of ticket prices will earn Patrice's drama club a profit for the production?

- A. Create a **scatter plot** to show the revenue data, with ticket price,  $t$ , on the  $x$ -axis and revenue,  $R$ , on the  $y$ -axis. Describe the trend you see. What type of function might model this trend?
- B. Determine a possible equation for the revenue function.
- C. Make a table of values to show the relationship between the cost of the production,  $C$ , and the ticket price,  $t$ .
- D. Graph the cost function you determined in part C on the same grid. Describe the trend you see. What type of function might model this trend?
- E. Determine a possible equation for the cost function.
- F. Are the revenue function and the cost function **polynomial functions**? Explain.
- G. To earn a profit, the revenue must be more than the cost of staging the production. Use your graphs or equations to determine the range of ticket prices necessary to earn a profit.

#### **scatter plot**

A set of points on a grid, used to visualize a relationship or possible trend in the data.

#### **polynomial function**

A function that contains only the operations of multiplication and addition with real-number coefficients, whole-number exponents, and two variables; for example,

$$f(x) = 5x^3 - 3x + 7$$

which can also be written as

$$f(x) = 5(x)(x)(x) + (-3)x + 7$$

## **WHAT DO You Think?**

Decide whether you agree or disagree with each statement. Explain your decision.

1. Polynomial functions can be used to model many real-life situations.
2. Polynomial models can be used to predict accurately data points that have not been measured.
3. Polynomial functions can be graphed as either straight lines or parabolas.