**OBJECTIVE** Comparing the expenses and income of a carnival to determine profitability

**MATERIALS** paper, pencil, graphing calculator or computer (optional)

**INVESTIGATION**

You are on a planning committee for a one-day school carnival. Your committee must decide what activities to include and what to charge. You are considering two options.

1. List the activities you would like to include. Your list should have:
   - at least 10 activities, including food booths, games, and perhaps rides
   - a good variety that would appeal to a range of people in the community
   - a total cost that stays within the $500 limit you have been given

   You will need to do a rough estimate of the costs. The table shows sample costs for some possible one-day rentals. Also, think about items that people might donate and costs for activities you can make, such as a coin toss.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Option 1</th>
<th>Option 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>cotton candy machine</td>
<td>$50</td>
<td></td>
</tr>
<tr>
<td>spin art machine</td>
<td></td>
<td>$40</td>
</tr>
<tr>
<td>dunk tank</td>
<td></td>
<td>$135</td>
</tr>
<tr>
<td>inflatable bungee run</td>
<td></td>
<td>$350</td>
</tr>
</tbody>
</table>

2. Profit equals income (the money taken in) minus expenses. For each option, write an equation to find the profit $y$ of selling $x$ tickets.

   Assume that 200 people will attend and use $500 as your expenses.

3. Graph the equations. For which number of tickets sold are the two options equal? What is the profit or loss for this number of tickets?

4. Use your graph to decide which option is better. Explain. With the better option, how many tickets must you sell to pay for the activities?

5. Conduct a survey to estimate how many people would attend and the average number of tickets each would buy. How many tickets could you reasonably expect to sell?

6. If your estimate for attendance is not 200, then revise your equations and graph the new equations. Would you still choose the same option? Explain. (Hint: Keep in mind the number of tickets you expect to sell.)

7. Use your estimates for attendance and ticket sales and your equations (the revised ones if necessary) to estimate the total income possible from the carnival. Would your carnival make a profit?

**PRESENT YOUR RESULTS**

Write a report to your principal or student council recommending that your school offer or not offer a carnival. Present your activities and discuss why you think they meet the requirements. Show your estimates of income and profit or loss and how you reached them. Provide all supporting evidence including any equations, graphs, and survey data.
**Project: Teacher’s Notes**

For use with Chapter 4

**Goals**
- Write a linear equation to model a real-life situation.
- Graph and interpret a linear equation in slope-intercept form to solve real-life problems.
- Use a survey to make predictions about a population from a sample.

**Managing the Project**

You may wish to have students work in small groups to simulate a carnival committee. Encourage groups to make collective decisions and to prepare the final report jointly. If necessary, you can break the report into parts and require each student to write the first draft of one part.

You may want to discuss with students how to structure the survey to get useful information. Important points to address are: including specific questions based on the activities being considered, avoiding bias in the wording, and trying to get a sample that is representative of the community.

**Rubric**

The following rubric can be used to assess student work.

**4** The choice of activities shows attention to variety and to the $500 limit. The student writes and graphs appropriate equations to model the two pricing options, analyzes the models, and modifies them correctly. Students conduct a survey which is unbiased and representative and use it to make reasonable estimates. The report presents an appropriate decision about holding a carnival and makes a clear and convincing case for it that shows all supporting evidence including any expense information gathered, equations, graphs, and survey data.

**3** The student chooses at least ten activities and discusses the choice, writes and graphs equations to model the two options, interprets the graph to answer all the questions, and uses a survey to make estimates. However, the student may not perform all calculations accurately or may not fully address the issues when choosing activities or when designing and predicting from the survey. The report gives and supports an appropriate decision about holding a carnival, but the presentation may not be as convincing as possible.

**2** The student chooses and discusses activities, writes and graphs equations to model the two pricing options, answers questions from the graph, and conducts a survey. However, work may be incomplete or reflect misunderstandings. For example, the student may not subtract expenses in the profit equations or may not revise equations based on the survey. The report may indicate a limited grasp of certain ideas or may lack key supporting evidence.

**1** Equations, graphs, interpretations of graphs, and predictions using a survey are missing or do not show an understanding of key ideas. The report doesn’t give a reasonable decision or fails to support the decision.