MAXIMUM PROFIT

The Widget Company was trying to sell a widget for $24, but no one was buying. They decided to try to attract customers by reducing their prices. They found that for every $1 they lowered the price, they attracted ten customers.

Price Reduction	Price	# of Customers	Gross Profit
$0	$24	0	$0
$1	$23	10	$230
$2	$22	20	$440

1. a. Copy and extend the table for at least eight possible price reductions.
   b. If the price is $14, how many people will buy a widget? What will the gross profit be?
   c. If the price is lowered by $x, how many people will buy a widget? What will the gross profit be?
   d. Make a graph showing how the gross profit depends on the price reduction. Put the price reduction on the x-axis and the profit on the y-axis.
   e. Interpret your graph. What price gives the most profit? Explain.
   f. Write an equation for your graph.

The Widget Company was trying to sell an item for P dollars, and no one was buying it. They found that for every $1 they lower the price, they gain C customers.

2. If they lower the cost by x and the gross profit is y, write an equation for y in terms of x.

3. Write an algebraic expression for:
   a. the amount by which the price should be reduced in order to maximize the profit;
   b. the maximum profit possible.

MINIMUM COST

The Widget Company would like to ship 2000 widgets. They must be packaged in boxes of equal weight. (Each widget weighs one pound.) The L.A. Barge Company charges a basic rate of $100 per box for shipping. It also adds a surcharge to the total cost of the shipment that depends on the weight of the individual boxes, at the rate of $1 per pound.

> **Example:** If the widgets are packed in 10 boxes, each will weigh 200 lbs.
>
> | Basic charge | Surcharge | Total |
> |---|---|---|
> | 10 boxes · $100 per box | $200 | $1200 |

4. Explain, using examples of possible ways to package the 2000 widgets, how the L.A. Barge Company's policy guarantees that customers will not ship their goods in too many boxes, or in boxes that are too heavy.

5. Write an algebraic expression for the cost of shipping the 2000 widgets, in terms of the number of boxes.

6. What is the number of boxes that would be the cheapest way to ship the widgets? Explain how you get your answer. (Hint: You may use trial and error or graphing.)

7. Using the cheapest way, how much does it cost per widget?

8. **Report** Imagine you work for the Widget Company. Prepare an illustrated report to other employees about:
   a. the pricing of widgets and how to maximize profits, and
   b. the shipping of widgets and how to minimize cost.