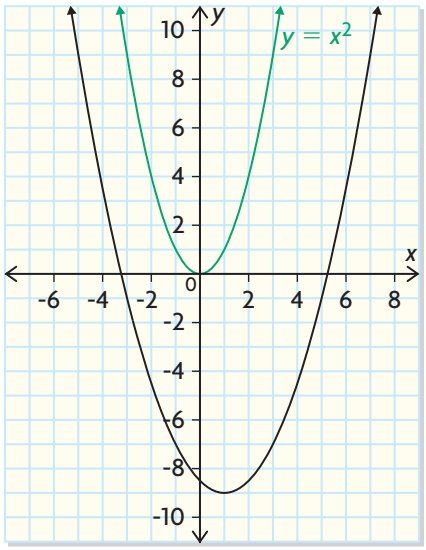
5 Chapter Self-Test



1. **a)** The **black** graph at the left resulted from transforming the **green** graph of $y = x^2$. Determine the equation of the black graph. Explain your reasoning.

b) State the transformations that were applied to the graph of $y = x^2$ to result in the black graph.

2. Determine the equation of each quadratic relation in vertex form.

a) vertex at (7, 5), opens downward, vertical stretch of 4

b) zeros at 1 and 5, minimum value of -12, passes through (6, 15)

3. Sketch each quadratic relation by applying the correct sequence of transformations to the graph of $y = x^2$.

a) $y = -2(x - 3)^2 + 8$ **b)** $y = 0.5(x + 2)^2 - 5$

4. The parabola $y = x^2$ is compressed vertically and translated down and right. The point $(4, -10)$ is on the new graph. What is a possible equation for the new graph?

5. Accountants for the HiTech Shoe Company have determined that the quadratic relation $P = -2x^2 + 24x - 54$ models the company's profit for the next quarter. In this relation, P represents the profit (in \$100 000s) and x represents the number of pairs of shoes sold (in 100 000s).

a) Express the equation in factored form.

b) What are the zeros of the relation? What do they represent in this context?

c) Determine the number of pairs of shoes that the company must sell to maximize its profit. How much would the maximum profit be?

6. A toy rocket that is sitting on a tower is launched vertically upward. The table shows the height, h, of the rocket in centimetres at t seconds after its launch.

t (s)	0	1	2	3	4	5	6	7
h (cm)	88	107	116	115	104	83	52	11

a) Using a graphing calculator, create a scatter plot to display the data.

b) Estimate the vertex of your model. Then write the equation of the model in vertex form and standard form.

c) Use the regression feature on the graphing calculator to create a quadratic model for the data. Compare this model with the model you created for part b).

d) What is the maximum height of the rocket? When does the rocket reach this maximum height?

e) When will the rocket hit the ground?

Process ***Checklist***

- ✔ Question 2: Did you **connect** the information about each parabola to the appropriate form of the relation?
- ✔ Question 4: Did you apply **reasoning** skills as you developed a possible equation for the graph?
- ✔ Questions 5 and 6: Did you **reflect** on your thinking to assess the appropriateness of your strategies as you solved the problems?
- ✔ Question 6: Did you relate the numeric, algebraic, graphical, and verbal **representations** of the situation?