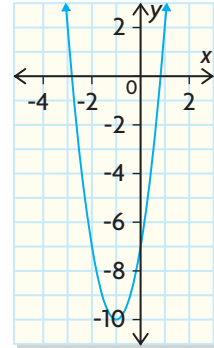


Round all answers to two decimal places where necessary.

- Use the graph of  $y = 3x^2 + 6x - 7$  at the right to estimate the solutions to each equation.
  - $3x^2 + 6x - 7 = 0$
  - $3x^2 + 6x - 7 = -7$
  - $3x^2 + 6x - 9 = 0$
- Determine the roots of each equation.
  - $x^2 + 5x - 14 = 0$
  - $5x^2 - 9x + 1 = 0$
  - $2x^2 - 8 = 24$
  - $2(x - 1)^2 - 5 = 0$
- Complete the square to determine the vertex of each parabola.
  - $y = 2x^2 + 12x - 14$
  - $y = 3x^2 - 15x - 24$
- Can all quadratic relations be written in vertex form by completing the square? Justify your answer.
- Without solving, determine the number of real roots that each relation has. Justify your answers.
  - $y = 2x^2 - 4x + 7$
  - $y = 3(x - 4)(x - 4)$
  - $y = (x - 3)^2$
- April sells specialty teddy bears at various summer festivals. Her profit for a week,  $P$ , in dollars, can be modelled by  $P = -0.1n^2 + 30n - 1200$ , where  $n$  is the number of teddy bears she sells during the week.
  - According to this model, could April ever earn a profit of \$2000 in one week? Explain.
  - How many teddy bears would she have to sell to break even?
  - How many teddy bears would she have to sell to earn \$500?
  - How many teddy bears would she have to sell to maximize her profit?
- Serge and Francine have 24 m of fencing to enclose a vegetable garden at the back of their house. Determine the dimensions of the largest rectangular garden they could enclose, using the back of their house as one of the sides of the rectangle.
- Give two reasons why  $3x^2 + 6x + 6$  cannot be a perfect square.
- A rapid-transit company has 5000 passengers daily, each currently paying a \$2.25 fare. For each \$0.50 increase, the company estimates that it will lose 150 passengers daily. If the company must be paid at least \$15 275 each day to stay in business, what minimum fare must they charge to produce this amount of revenue?



$$y = 3x^2 + 6x - 7$$

### Process Checklist

- ✓ Question 1: Did you compare the algebraic and graphical **representations** to help you estimate?
- ✓ Questions 4 and 5: Did you **communicate** using correct mathematical vocabulary as you justified your answers?
- ✓ Question 6: Did you make **connections** between the quadratic equation and the situation that it is modelling?

