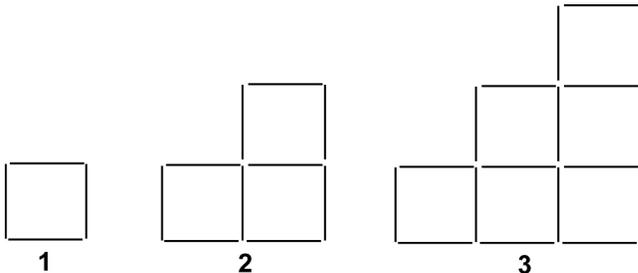


Chapter 6 Test

- Graph each quadratic relation by completing the square. Label the vertex and the axis of symmetry.
 - $y = x^2 + 8x - 5$
 - $y = 3x^2 - 12x + 8$
 - $y = 5x^2 + 10x - 1$
 - $y = \frac{1}{2}x^2 + 6x + 3$
- Find an equation for the axis of symmetry for each quadratic relation.
 - $y = 2x^2 - 12x - 1$
 - $y = 2x^2 - 12x + 13$
 - $y = 2x^2 - 12x - 22$
- Compare your answers in question 2.
- Solve each quadratic equation by factoring.
 - $x^2 + 2x - 15 = 0$
 - $2x^2 + 5x - 3 = 0$
 - $6x^2 + 13x - 5 = 0$
 - $-12x^2 + 90x - 42 = 0$
- Solve each quadratic equation, if possible, writing your solutions as exact values and to two decimal places. Check your answers using a graphing calculator.
 - $2x^2 - 7x + 4 = 0$
 - $3x^2 + 5x - 1 = 0$
 - $x^2 - 3x = 7$
 - $5x^2 - 6 = -2x$
 - $2x^2 + 2x = -1$
 - $0 = 18x^2 + 9x - 4$
 - $12x^2 = 5x + 4$
 - $3 = -7x - 5x^2$
- Write an equation in the form $y = ax^2 + bx + c$ to represent each relation.
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- A right triangle has a hypotenuse of 58 cm, with legs that differ by 2 cm. Find the length of each leg.

8. Write a quadratic equation in the form $ax^2 + bx + c = 0$, where a , b , and c are integers, for each situation.
- The roots of the equation are -6 and $\frac{3}{4}$.
 - The roots of the equation are $\frac{2}{3}$ and $-\frac{1}{2}$.
9. How many x -intercepts does each relation have? Explain your answer.
- $y = 3(x - 2)^2 - 4$
 - $y = -2(x + 4)^2 - 2$
 - $y = -(x + 1)^2 + 3$
 - $y = \frac{1}{2}(x + 4)^2$
10. Use an appropriate method to find the roots of each equation. Round your answers to the nearest tenth.
- $3x^2 + 2x - 11 = 0$
 - $-2x^2 + x + 4 = 0$
 - $5x^2 - 6x - 5 = 0$
 - $-x^2 + x + 7 = 0$
11. The Ambassador Bridge in Windsor, Ontario, uses suspension cables that cause the roadway to have a parabola shape. The road surface spans a length of 2800 m and has a maximum height of 46 m above the road surface at each end.
- Sketch a graph of the relation that can be used to describe the roadway, using the y -axis as the axis of symmetry and placing the highest point of the roadway at the origin.
 - Determine an equation for the quadratic relation that describes the road surface.
 - If the road surface is to pass each of two support pillars at a height of 30 m, how far from each end should the supports be placed, to the nearest metre?
12. The height, h , in metres, of a football is given by the relation $h = -0.02d^2 + d$, where d represents the horizontal distance, in metres, that the ball travels.
- How far does the ball travel before it hits the ground?
 - At what horizontal distance is the ball at its maximum height?
 - What is the maximum height?
 - If the kick is to go through the goal posts for a field goal, the ball needs to be at a height of at least 3 m when it reaches the goal posts. Will the kick be successful if the kicker is 42 m away?
 - What is the maximum distance away from the goal posts the kicker can be and still have a successful kick, to the nearest tenth of a metre?
13. Each figure is made using toothpicks.
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- Figure 1: A single square.
- Figure 2: Two squares sharing a vertical side.
- Figure 3: Three squares in a row, with a fourth square on top of the middle square.
- An expression for the number of toothpicks in terms of the figure number, n , is $n(n + 3)$. If the pattern continues, what is the figure number of the figure with 270 toothpicks?
 - Can there be a figure in the pattern with 380 toothpicks?
 - An expression for the number of small squares in terms of the figure number is $\frac{n(n-1)}{2}$. If the pattern continues, what is the figure number of the figure with 630 squares?
 - Can there be a figure in the pattern with 170 squares?