

Chapter 6 Practice Test

1. Graph each quadratic relation by completing the square. Label the vertex, the axis of symmetry, and two other points.

a) $y = x^2 - 8x + 22$

b) $y = -x^2 - 4x - 11$

c) $y = \frac{1}{2}x^2 - 6x + 21$

2. Explain the process for finding the vertex of a quadratic relation by completing the square. Include an example in your explanation.

3. Solve each quadratic relation by factoring.

a) $x^2 + x - 6 = 0$

b) $4x^2 - 1 = 0$

c) $9b^2 + 12b + 4 = 0$

d) $x^2 = 3x$

e) $x^2 - 63 = 2x$

f) $6m^2 - 11m - 10 = 0$

g) $6x^2 - 21x - 45 = 0$

h) $16d^2 = 25$

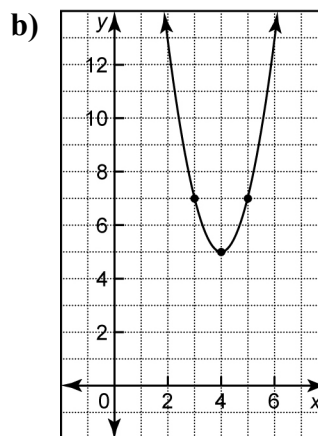
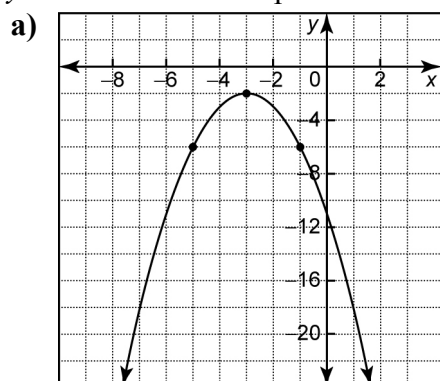
4. Find the x -intercepts, the axis of symmetry, and the vertex of each quadratic relation. Then, graph each relation, labelling fully.

a) $y = 4x^2 - 8x - 5$

b) $y = -x^2 + 2x + 24$

c) $y = -\frac{1}{2}x^2 + 4x$

5. Write an equation in the form $y = ax^2 + bx + c$ to represent each relation.



6. Use the quadratic formula to solve, if possible. Leave your answers as exact roots, if necessary.

a) $3x^2 - 2x + 1 = 0$

b) $2x^2 + 7x + 5 = 0$

c) $3x^2 - 6x - 5 = 0$

d) $-4x^2 + 5x - 1 = 0$

e) $3t^2 - 7 = 2t$

f) $5y^2 + 6y - 7 = 0$

7. Use an appropriate method to find the exact roots of each equation, if possible.

a) $6x^2 + x - 1 = 0$

b) $3x^2 - 5x + 5 = 0$

c) $4x^2 - 16 = 0$

d) $x^2 - 3x + 5 = 0$

e) $x^2 + 5x - 3 = 0$

f) $7x^2 - 9x + 2 = 0$

8. Jennifer is a high jumper. Her path can be modelled by the function $h = -2.5d^2 + 2.5$, where h is her jump height, in metres, and d represents where she started and ended her jump, in metres, with $-1 \leq d \leq 1$.

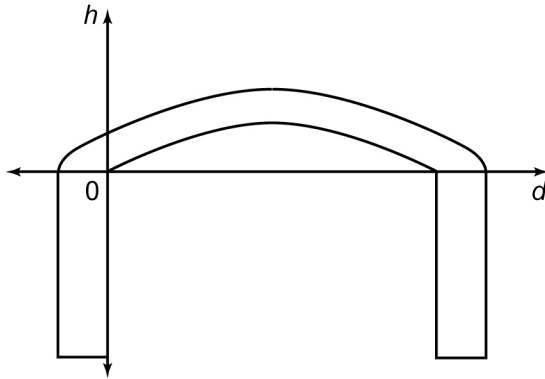
a) Graph her jump path.

b) What is her maximum jump height?

c) Write a relation for a jumper who reached a maximum height of 3 m, but started and ended the jump at the same points as Jennifer.

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9. Two pillars support the archway entrance of a castle. The archway can be modelled by the relation $h = -0.025d^2 + d$, where h represents the height, in feet, of the arch above the top of the pillars and d represents the horizontal distance, in feet, between the pillars.



- How far apart are the pillars?
 - What is the maximum height of the arch above the pillars?
 - If the pillars are 15 ft tall, what is the height of the top of the arch above the ground?
10. The cost, C , in thousands of dollars, to produce items at a clothing manufacturer is given by the relation $C = 2x^2 - 29x + 100$, where x represents the number of items produced, in hundreds. The revenue, R , in thousands of dollars, that these items generate is given by the relation $R = x^2 - 10x + 250$, where x represents the number of items sold, in hundreds.
- Profit is defined as the difference between the revenue and the cost. Using $P = R - C$, develop a profit relation for the company.
 - Determine the zeros of the profit relation.
 - How many items should be produced to maximize profit?
 - What will the maximum profit be?
11. Louise kicked a football that followed a path given by $h = -4.9t^2 + 26t + 0.25$, where h represents the height, in metres, above the ground and t represents the time, in seconds, after she kicked the ball.
- Find the zeros of the relation, to the nearest hundredth, using the quadratic formula. Interpret their meaning.
 - How long after the ball was kicked did it reach its maximum height?
 - What was the maximum height?
12. A rectangle's length is 4 m more than double its width. Find the length and the width if the diagonal of the rectangle measures 26 m.
13. The area of the front cover of a book is 273 cm^2 and the length is 8 cm greater than the width. What are the dimensions of the cover?
14. A rectangular lawn measuring 8 m by 4 m is surrounded by a flower bed of uniform width. The combined area of the lawn and the flower bed is 165 m^2 . What is the width of the flower bed?
15. The height of a triangle is 2 cm more than the base. The area of the triangle is 10 cm^2 . Find the base, to the nearest hundredth of a centimetre.
16. The size of a television screen or a computer monitor is usually stated as the length of the diagonal. A screen has a 38-cm diagonal. The width of the screen is 6 cm more than the height. Find the dimensions of the screen, to the nearest tenth of a centimetre.