

Chapters 4 to 6 Review

Chapter 4 Quadratic Relations

1. Use finite differences to determine whether each relation is linear, quadratic, or neither.

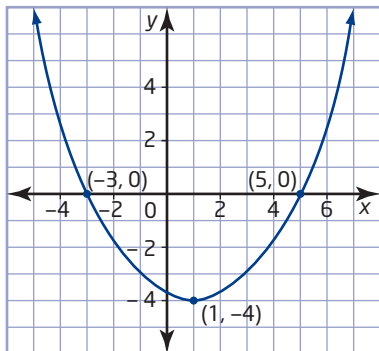
a)

x	y
-2	9
-1	7
0	5
1	3
2	1

b)

x	y
-2	-3
-1	3
0	5
1	3
2	-3

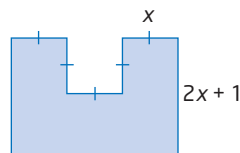
2. Sketch the graph of each quadratic relation. Describe the transformation from the graph of $y = x^2$.
- $y = x^2 + 2$
 - $y = (x + 3)^2$
 - $y = -\frac{1}{4}x^2$
3. Dianne dove from the 10-m diving board. Her height h , in metres, above the water when she is x metres away from the end of the board is given by $h = -(x - 1)^2 + 11$.
- Sketch a graph of her dive.
 - What was her maximum height above the water?
 - What horizontal distance had she travelled when she entered the water? Answer to the nearest tenth of a metre.
4. Determine an equation to represent the parabola in the form $y = a(x - r)(x - s)$.



5. Evaluate.
- 2^{-4}
 - $(-3)^{-2}$
 - 25^0
 - 8^{-1}
 - $(-1)^{12}$
 - $\left(\frac{3}{4}\right)^{-3}$
6. Cobalt-60 is a radioactive element that is used to sterilize medical equipment. Cobalt-60 decays to $\frac{1}{2}$, or 2^{-1} , of its original amount after every 5.2 years. Determine the remaining mass of 20 g of cobalt-60 after
- 20.8 years
 - 36.4 years

Chapter 5 Quadratic Expressions

7. Write an algebraic expression to represent the area of the figure. Expand and simplify.



8. Expand and simplify.
- $(n + 3)(n - 3)$
 - $(h + 5)^2$
 - $(d - 4)(d - 2)$
 - $(m + 3)(m + 7)$
 - $(3t - 5)(3t + 5)$
 - $(x - 7)^2$
9. Expand and simplify.
- $x(3x + 1)(2x - 5)$
 - $(2k + 3)^2 - (k + 2)(k - 2)$
 - $5(y - 4)(3y + 1) + (3y - 4)^2$
 - $3(2a + 3b)(3a - 2b)$
10. The area of a rectangle is given by the expression $8x^2 + 4x$. Draw diagrams to show the possible rectangles, labelling the length and width of each.

11. Factor, if possible.

- a) $y^2 + 12y + 27$
- b) $x^2 + 2x - 3$
- c) $n^2 + 22n + 21$
- d) $p^2 - 8p + 15$
- e) $x^2 + 2x - 15$
- f) $k^2 - 5k + 24$

12. Factor.

- a) $p^2 + 12p + 36$
- b) $9d^2 - 6d + 1$
- c) $x^2 - 49$
- d) $4a^2 - 20a + 25$
- e) $8t^2 - 18$
- f) $a^2 - 4b^2$

13. Find the value of k so that each trinomial can be factored over the integers.

- a) $m^2 + km + 10$
- b) $9a^2 - ka + 4$

14. The area of a circle is given by the expression $\pi(4x^2 + 36x + 81)$. What expression represents the diameter of this circle?

Chapter 6 Quadratic Equations

15. Complete the square to rewrite each relation in the form $y = a(x - h)^2 + k$. Then, sketch a graph of each parabola, labelling the vertex, the axis of symmetry, and two other points.

- a) $y = x^2 + 6x - 16$
- b) $y = x^2 - 8x + 7$
- c) $y = x^2 + 4x + 10$
- d) $y = -x^2 + 6x - 8$
- e) $y = 2x^2 + 8x + 5$
- f) $y = -2x^2 - 12x - 7$

16. Solve by factoring. Check your solutions.

- a) $x^2 - 14x + 24 = 0$
- b) $n^2 + 4n - 21 = 0$
- c) $m^2 - 16 = 0$
- d) $2y^2 + 5y + 2 = 0$
- e) $7t^2 = 70t - 175$

17. Find the x -intercepts and the vertex of each parabola. Then, sketch its graph.

- a) $y = x^2 - 3x + 2$
- b) $y = x^2 - 16$
- c) $y = 2x^2 - 5x - 12$
- d) $y = -x^2 - 7x - 12$
- e) $y = -3x^2 + 6x$

18. A quadratic relation has roots 0 and -6 and a maximum at $(-3, 4)$. Determine the equation of the relation.

19. Find the exact roots of each equation.

- a) $x^2 - 6x + 1 = 0$
- b) $3x^2 - 5x + 1 = 0$
- c) $3.2x^2 - 5.6x - 7.1 = 0$
- d) $2x^2 + 5x = 9$
- e) $3x^2 - 8x = -3$

20. The perimeter of a rectangle is 8 m and its area is 2 m^2 . Find the length and width of the rectangle to the nearest tenth of a metre.

21. A ferry operator takes tourists to an island. The operator carries an average of 500 people per day for a round-trip fare of \$20. The operator estimates that for each \$1 increase in fare, 20 fewer people will take the trip. What fare will maximize the number of people taking the ferry?