

Unit: Algebra of Quadratics

Topic: Unit Review

📅 *homework check:* FCM 11 p. 281 # 1 – 15 (odds)

📅 *unit review:* FCM 11 p. 286 # 1 – 15
p. 288 # 1 – 12

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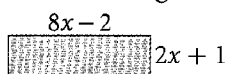
Review

5.1 Expand Binomials, pages 234–241

1. Expand and simplify.

- a) $(x + 5)(x + 8)$
- b) $(2x + 9)(7x - 10)$
- c) $(x + 13)^2$
- d) $(x - 7)(x + 7)$

2. Write a simplified expression for the area of the rectangle.



5.2 Change Quadratic Relations From Vertex Form to Standard Form, pages 242–247

3. Write each relation in standard form.

- a) $y = 5(x + 10)^2 + 7$
- b) $y = -0.5(x + 8)^2 + 4$
- c) $y = 9(x - 8)^2 - 4$
- d) $y = 2(x + 1)^2 - 6$

4. Find the y intercept for each relation in question 3.

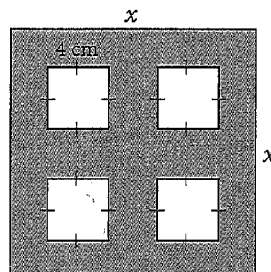
5. A ball is kicked straight up. Its path is modelled by the relation $h = -4.9t^2 + v_0t + h_0$, where h is the ball's height in metres, h_0 is the ball's initial height, in metres, t is the time in seconds, and v_0 is the ball's initial velocity, in metres per second. The ball reaches a maximum height of 45 m after 3 s. Determine the ball's initial velocity and initial height.

5.3 Factor Trinomials of the Form $x^2 + bx + c$, pages 248–255

6. Factor.

- a) $x^2 + 15x$
- b) $x^2 + 13x + 40$
- c) $x^2 + 10x + 25$
- d) $x^2 - 81$
- e) $x^2 + 2x - 24$
- f) $x^2 - 12x + 35$
- g) $x^2 - 100$
- h) $x^2 - 11x - 12$

7. a) Write a factored expression for the area of the shaded region of this figure.



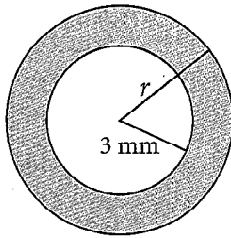
b) Calculate the area of the shaded region when $x = 30$ cm.

5.4 Factor Trinomials of the Form $ax^2 + bx + c$, pages 256–263

8. Factor fully.

- a) $4x^2 + 72x + 308$
- b) $12x^2 + 96x$
- c) $3x^2 - 12x - 135$
- d) $-2x^2 - 24x - 72$
- e) $-8x^2 + 200$
- f) $10x^2 - 80x - 200$

9. a) Write a factored expression for the area of the shaded region of this figure.



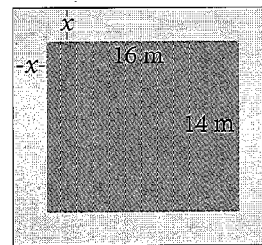
- b) Suppose $r = 15$ mm. Find the area of the shaded region.

5.5 The x-Intercepts of a Quadratic Relation, pages 264–275

10. Find the zeros of each quadratic relation.
- $y = x^2 - 16x$
 - $y = x^2 - 16$
 - $y = 6x^2 + 24x - 192$
11. Write each quadratic relation in standard form, then find the zeros.
- $y = 3(x - 1)^2 - 147$
 - $y = -4(x + 6)^2 + 36$
12. The path of a soccer ball can be modelled by the relation $h = -0.1d^2 + 0.5d + 0.6$, where h is the ball's height and d is the horizontal distance from the kicker.
- Find the zeros of the relation.
 - What do the zeros mean in this context?

5.6 Solve Problems Involving Quadratic Relations, pages 276–285

13. For each quadratic relation, find the zeros and the maximum or minimum.
- $y = x^2 + 16x + 39$
 - $y = 5x^2 - 50x - 120$
 - $y = -2x^2 - 28x + 64$
 - $y = 6x^2 + 36x - 42$
14. A garden is to be surrounded by a paved border of uniform width.



- Write a simplified expression for the area of the border.
 - The border is to have an area of 216 m^2 . Find the width of the border.
15. A rider on a mountain bike jumps off a ledge. Her path is modelled by the relation $h = -0.3d^2 + 1.2d + 1.5$, where h is her height above the ground and d is her horizontal distance from the ledge, both in metres.
- What is the height of the ledge?
 - How far was the rider from the ledge when she landed?

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Practice Test

For questions 1 to 6, choose the best answer.

1. Which expression is equivalent to $(2x + 9)(2x + 9)$?

A $4x^2 + 81$
 B $4x^2 - 81$
 C $4x^2 + 18x + 81$
 D $4x^2 + 36x + 81$

2. Which expression is the result of expanding and simplifying $(5x - 7)(3x + 5)$?

A $15x^2 + 46x + 35$
 B $15x^2 + 4x - 35$
 C $8x^2 + 20x + 13$
 D $8x^2 - 13$

3. Which relation represents the same parabola as $y = 5(x - 6)^2 - 20$?

A $y = 5x^2 - 6x - 20$
 B $y = 5x^2 - 12x + 16$
 C $y = 5x^2 - 60x + 160$
 D $y = 5x^2 - 12x + 160$

4. Which expression is the factored form of $x^2 - 8x - 20$?

A $(x - 8)(x - 20)$
 B $(x - 10)(x + 2)$
 C $(x + 8)(x + 20)$
 D $(x - 2)(x + 10)$

5. Which is the equation of the axis of symmetry for the quadratic relation $y = (x - 7)(x + 17)$?

A $x = -5$ B $x = 7$
 C $x = 12$ D $x = 17$

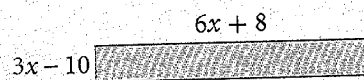
6. Which are the zeros for the quadratic relation $y = 5x^2 - 1125$?

A $x = 0$
 B $x = 5, x = 15$
 C $x = -15, x = 5$
 D $x = -15, x = 15$

7. Which expression is the factored form of $4x^2 - 44x - 240$?

A $4(x - 44)(x - 240)$
 B $4(x - 4)(x - 60)$
 C $4(x - 15)(x + 4)$
 D $4(x - 11)(x - 60)$

8. a) Write an expression, in simplified form, for the area of the rectangle.



- b) Find the area of the rectangle when $x = 5$ cm.

9. Write each quadratic relation in standard form.

a) $y = 13(x + 7)^2 + 11$
 b) $y = -4(x - 3)^2 + 16$
 c) $y = 5.6(x - 1.2)^2 - 8.2$

10. Find the zeros of each quadratic relation.

a) $y = x^2 - 2x - 35$
 b) $y = 3x^2 + 12x - 96$
 c) $y = -2.5x^2 - 40x - 70$

11. The curve of a cable on a suspension bridge can be modelled by the relation $h = 0.0025(d - 100)^2 + 25$ where h is the cable's height above the ground and d is the horizontal distance from the tower, both in metres.



- a) At what height does the cable meet the tower?
- b) What is the least height of the cable above the ground?

12. A circus acrobat jumps off a raised platform. He lands on a trampoline at stage level below. His path can be modelled by the relation $h = -0.7d^2 + 0.7d + 4.2$, where h is his height above the stage and d is his horizontal distance from the edge of a platform, both in metres.

- a) What is the height of the platform?
- b) How far from the edge of the platform did the acrobat land?
- c) What was the acrobat's maximum height above the stage?