

# Solving Quadratics by Factoring

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Score: \_\_\_\_\_ / 24

## Q Quick Review

To solve  $ax^2 + bx + c = 0$  by factoring: **(1)** move everything to one side so the other side is 0; **(2)** factor; **(3)** use the **Zero Product Property** — if a product is 0, at least one factor is 0 — and set each factor equal to 0; **(4)** solve each factor. A quadratic can have 2, 1 (double root from a perfect square), or 0 real solutions. If you can't factor, use the quadratic formula or completing the square. Factoring is fastest when the numbers are friendly.

## PRACTICE

Solve each by factoring.

1.  $x^2 - 7x + 12 = 0$  \_\_\_\_\_

2.  $x^2 + 4x - 5 = 0$  \_\_\_\_\_

3.  $x^2 - 9 = 0$  \_\_\_\_\_

4.  $x^2 + 6x + 9 = 0$  \_\_\_\_\_

5.  $x^2 - x - 12 = 0$  \_\_\_\_\_

6.  $x^2 + x - 6 = 0$  \_\_\_\_\_

7.  $2x^2 + 5x + 3 = 0$  \_\_\_\_\_

8.  $x^2 + 8x + 16 = 0$  \_\_\_\_\_

9.  $x^2 - 4x = 0$  \_\_\_\_\_

10.  $x^2 = 25$  \_\_\_\_\_

11.  $x^2 + 2x = 8$  \_\_\_\_\_

12.  $3x^2 - 12 = 0$  \_\_\_\_\_

13.  $x^2 - 10x + 25 = 0$  \_\_\_\_\_

14.  $x^2 + 7x = 0$  \_\_\_\_\_

15.  $2x^2 - 8 = 0$  \_\_\_\_\_

16.  $x^2 - x - 20 = 0$  \_\_\_\_\_

17.  $6x^2 - x - 1 = 0$  \_\_\_\_\_

18.  $x(x - 3) = 10$  \_\_\_\_\_

19.  $4x^2 - 1 = 0$  \_\_\_\_\_

20.  $x^2 - 2x - 15 = 0$  \_\_\_\_\_

## ◆ Word Problems

21. A ball is launched from the ground with height model  $h(t) = -16t^2 + 32t$ . Besides the launch time, when does it hit the ground again?

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22. A rectangular garden has area 40 square feet, and its length is 3 feet more than its width. Find the garden's dimensions.

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23. A number puzzle says two consecutive even integers have a product of 48. Find the possible integers.

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24. A small business uses the model  $P = x^2 - 10x$  for profit, where negative values mean a loss. Find the break-even values where profit is zero.

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## Answer Keys

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. <math>x = 3, 4</math></li> <li>2. <math>x = -5, 1</math></li> <li>3. <math>x = \pm 3</math></li> <li>4. <math>x = -3</math></li> <li>5. <math>x = 4, -3</math></li> <li>6. <math>x = -3, 2</math></li> <li>7. <math>x = -1, -\frac{3}{2}</math></li> <li>8. <math>x = -4</math></li> <li>9. <math>x = 0, 4</math></li> <li>10. <math>x = \pm 5</math></li> <li>11. <math>x = 2, -4</math></li> <li>12. <math>x = \pm 2</math></li> </ol> | <ol style="list-style-type: none"> <li>13. <math>x = 5</math></li> <li>14. <math>x = 0, -7</math></li> <li>15. <math>x = \pm 2</math></li> <li>16. <math>x = 5, -4</math></li> <li>17. <math>x = \frac{1}{2}, -\frac{1}{3}</math></li> <li>18. <math>x = 5, -2</math></li> <li>19. <math>x = \pm \frac{1}{2}</math></li> <li>20. <math>x = 5, -3</math></li> <li>21. <math>t = 2 \text{ sec}</math></li> <li>22. <math>w = 5, \ell = 8</math></li> <li>23. 6 and 8 (or <math>-8, -6</math>)</li> <li>24. <math>x = 0 \text{ or } x = 10</math></li> </ol> |
|--|---|

### Step-by-Step Tutor Notes

1. Take it one clear step at a time and keep the original question in mind.  $(x - 3)(x - 4) = 0$ . So the answer is  $x = 3, 4$ .
2. Focus on the main idea of the problem, then simplify carefully.  $(x + 5)(x - 1) = 0$ . So the answer is  $x = -5, 1$ .
3. Focus on the main idea of the problem, then simplify carefully.  $(x - 3)(x + 3) = 0$ . So the answer is  $x = \pm 3$ .
4. Focus on the main idea of the problem, then simplify carefully.  $(x + 3)^2 = 0$ , double root. So the answer is  $x = -3$ .
5. This is a good place to slow down, check the notation, and simplify cleanly.  $(x - 4)(x + 3) = 0$ . So the answer is  $x = 4, -3$ .
6. Start with the definition the problem is testing, then apply it directly.  $(x + 3)(x - 2) = 0$ . So the answer is  $x = -3, 2$ .
7. Focus on the main idea of the problem, then simplify carefully.  $(2x + 3)(x + 1) = 0$ . So the answer is  $x = -1, -\frac{3}{2}$ .
8. This is a good place to slow down, check the notation, and simplify cleanly.  $(x + 4)^2 = 0$ . So the answer is  $x = -4$ .
9. Take it one clear step at a time and keep the original question in mind.  $x(x - 4) = 0$ . So the answer is  $x = 0, 4$ .
10. This is a good place to slow down, check the notation, and simplify cleanly.  $x^2 - 25 = (x - 5)(x + 5) = 0$ . So the answer is  $x = \pm 5$ .
11. Move all to one side:  $x^2 + 2x - 8 = 0$ . Factor:  $(x + 4)(x - 2) = 0$ .
12. Start with the definition the problem is testing, then apply it directly.  $x^2 = 4$ . So the answer is  $x = \pm 2$ .
13. Use the clue in the question first, then let the arithmetic finish the job. Perfect square. So the answer is  $x = 5$ .
14. Start with the definition the problem is testing, then apply it directly.  $x(x + 7) = 0$ . So the answer is  $x = 0, -7$ .
15. Start with the definition the problem is testing, then apply it directly.  $x^2 = 4$ . So the answer is  $x = \pm 2$ .
16. Use the clue in the question first, then let the arithmetic finish the job.  $(x - 5)(x + 4) = 0$ . So the answer is  $x = 5, -4$ .
17. Use the clue in the question first, then let the arithmetic finish the job.  $(2x - 1)(3x + 1) = 0$ . So the answer is  $x = \frac{1}{2}, -\frac{1}{3}$ .
18. Read the table by matching the correct row and column first, then use the count or total that fits the question.  $x^2 - 3x - 10 = 0 \Rightarrow (x - 5)(x + 2) = 0$ . This gives  $x = 5, -2$ .
19. Start with the definition the problem is testing, then apply it directly.  $(2x - 1)(2x + 1) = 0$ . So the answer is  $x = \pm \frac{1}{2}$ .
20. Take it one clear step at a time and keep the original question in mind.  $(x - 5)(x + 3) = 0$ . So the answer is  $x = 5, -3$ .
21.  $-16t^2 + 32t = 0 \Rightarrow -16t(t - 2) = 0$ . So  $t = 0$  (start) or  $t = 2$ . Lands at  $t = 2$ .
22.  $w(w + 3) = 40 \Rightarrow w^2 + 3w - 40 = 0 \Rightarrow (w + 8)(w - 5) = 0$ . Positive:  $w = 5, \ell = 8$ .
23.  $n(n + 2) = 48 \Rightarrow n^2 + 2n - 48 = 0 \Rightarrow (n + 8)(n - 6) = 0$ . Positive pair: 6 and 8.
24. Name the quantities first so the model is easy to read.  $x(x - 10) = 0$ . Two break-even points.



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