

# Factoring Trinomials $x^2 + bx + c$

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Score: \_\_\_\_\_ / 24

## Quick Review

To factor a trinomial of the form  $x^2 + bx + c$  (with leading coefficient 1), find two numbers that **multiply to  $c$**  and **add to  $b$** . Those two numbers go inside the parentheses:  $x^2 + bx + c = (x + p)(x + q)$  where  $pq = c$  and  $p + q = b$ . **Sign tips:** if  $c > 0$ , both numbers have the same sign (positive if  $b > 0$ , negative if  $b < 0$ ). If  $c < 0$ , the two numbers have opposite signs — the larger absolute value matches the sign of  $b$ . Some trinomials are **prime** — they can't be factored over integers. If no integer pair works, factor over the rationals using the quadratic formula or declare it prime.

## PRACTICE

Factor each trinomial.

- |                     |       |                      |       |
|---------------------|-------|----------------------|-------|
| 1. $x^2 + 5x + 6$   | _____ | 11. $x^2 + 10x + 25$ | _____ |
| 2. $x^2 + 7x + 12$  | _____ | 12. $x^2 - 6x + 9$   | _____ |
| 3. $x^2 - 5x + 6$   | _____ | 13. $x^2 + x + 5$    | _____ |
| 4. $x^2 - x - 12$   | _____ | 14. $x^2 - 16$       | _____ |
| 5. $x^2 + x - 6$    | _____ | 15. $x^2 + 11x + 18$ | _____ |
| 6. $x^2 - 9x + 20$  | _____ | 16. $x^2 - 2x - 24$  | _____ |
| 7. $x^2 + 8x + 15$  | _____ | 17. $x^2 + 6x - 7$   | _____ |
| 8. $x^2 - 3x - 10$  | _____ | 18. $x^2 - 13x + 40$ | _____ |
| 9. $x^2 + 2x - 15$  | _____ | 19. $x^2 + 25$       | _____ |
| 10. $x^2 - 7x + 12$ | _____ | 20. $x^2 - 12x + 36$ | _____ |

## Word Problems

21. A rectangular garden has area  $x^2 + 9x + 20$  ft<sup>2</sup>. Factor the trinomial to find possible length and width expressions.  
\_\_\_\_\_
22. A rectangular label has area  $x^2 - 7x + 10$  square inches. Factor the expression to find possible side lengths.  
\_\_\_\_\_
23. A garden path model leads to  $x^2 - 8x + 15 = 0$  when the area condition is met. Solve by factoring to find the possible values of  $x$ .  
\_\_\_\_\_
24. A small rocket's height model reaches ground level when  $x^2 + 2x - 8 = 0$ . Factor to find the model's two z  
\_\_\_\_\_



## Answer Keys

- |  |   |
|--|---|
| <p>1. <math>(x + 2)(x + 3)</math></p> <p>2. <math>(x + 3)(x + 4)</math></p> <p>3. <math>(x - 2)(x - 3)</math></p> <p>4. <math>(x - 4)(x + 3)</math></p> <p>5. <math>(x + 3)(x - 2)</math></p> <p>6. <math>(x - 4)(x - 5)</math></p> <p>7. <math>(x + 3)(x + 5)</math></p> <p>8. <math>(x - 5)(x + 2)</math></p> <p>9. <math>(x + 5)(x - 3)</math></p> <p>10. <math>(x - 3)(x - 4)</math></p> <p>11. <math>(x + 5)^2</math></p> <p>12. <math>(x - 3)^2</math></p> | <p>13. prime</p> <p>14. <math>(x - 4)(x + 4)</math></p> <p>15. <math>(x + 2)(x + 9)</math></p> <p>16. <math>(x - 6)(x + 4)</math></p> <p>17. <math>(x + 7)(x - 1)</math></p> <p>18. <math>(x - 5)(x - 8)</math></p> <p>19. prime</p> <p>20. <math>(x - 6)^2</math></p> <p>21. <math>(x + 4)(x + 5)</math></p> <p>22. <math>(x - 2)(x - 5)</math></p> <p>23. <math>x = 3</math> or <math>x = 5</math></p> <p>24. <math>x = 2</math> or <math>x = -4</math></p> |
|--|---|

### Step-by-Step Tutor Notes

1. Start with the definition the problem is testing, then apply it directly.  $2 \cdot 3 = 6$ ,  $2 + 3 = 5$ . So the answer is  $(x + 2)(x + 3)$ .
2. Use the clue in the question first, then let the arithmetic finish the job.  $3 \cdot 4 = 12$ ,  $3 + 4 = 7$ . So the answer is  $(x + 3)(x + 4)$ .
3. Focus on the main idea of the problem, then simplify carefully. Both negative:  $-2$ ,  $-3$ . So the answer is  $(x - 2)(x - 3)$ .
4. This is a good place to slow down, check the notation, and simplify cleanly.  $-4 \cdot 3 = -12$ ,  $-4 + 3 = -1$ . So the answer is  $(x - 4)(x + 3)$ .
5. Start with the definition the problem is testing, then apply it directly.  $3$ ,  $-2$ . So the answer is  $(x + 3)(x - 2)$ .
6. This is a good place to slow down, check the notation, and simplify cleanly. Both negative. So the answer is  $(x - 4)(x - 5)$ .
7. This is a good place to slow down, check the notation, and simplify cleanly.  $3$ ,  $5$ . So the answer is  $(x + 3)(x + 5)$ .
8. This is a good place to slow down, check the notation, and simplify cleanly.  $-5$ ,  $2$ . So the answer is  $(x - 5)(x + 2)$ .
9. Take it one clear step at a time and keep the original question in mind.  $5$ ,  $-3$ . So the answer is  $(x + 5)(x - 3)$ .
10. Take it one clear step at a time and keep the original question in mind.  $-3$ ,  $-4$ . So the answer is  $(x - 3)(x - 4)$ .
11. Start with the definition the problem is testing, then apply it directly. Perfect square:  $5 \cdot 5 = 25$ ,  $5 + 5 = 10$ . So the answer is  $(x + 5)^2$ .
12. Focus on the main idea of the problem, then simplify carefully. Perfect square: both  $-3$ . So the answer is  $(x - 3)^2$ .
13. Work one inverse operation at a time and keep both sides balanced. No integer pair multiplies to 5 and adds to 1. After simplifying, the answer is prime.
14. This is a good place to slow down, check the notation, and simplify cleanly. Difference of squares (no middle term). So the answer is  $(x - 4)(x + 4)$ .
15. Start with the definition the problem is testing, then apply it directly.  $2$ ,  $9$ . So the answer is  $(x + 2)(x + 9)$ .
16. Start with the definition the problem is testing, then apply it directly.  $-6$ ,  $4$ . So the answer is  $(x - 6)(x + 4)$ .
17. Take it one clear step at a time and keep the original question in mind.  $7$ ,  $-1$ . So the answer is  $(x + 7)(x - 1)$ .
18. Use the clue in the question first, then let the arithmetic finish the job.  $-5$ ,  $-8$ . So the answer is  $(x - 5)(x - 8)$ .
19. First identify the feature of the graph or equation that matches the wording of the question. Sum of squares doesn't factor over reals. That leads to prime.
20. Take it one clear step at a time and keep the original question in mind. Perfect square. So the answer is  $(x - 6)^2$ .
21. Name the quantities first so the model is easy to read.  $4 \cdot 5 = 20$ ,  $4 + 5 = 9$ . So  $(x + 4)(x + 5)$ .
22. Look for two numbers that multiply to 10 and add to  $-7$ :  $-2$  and  $-5$ . So the side expressions can be  $x - 2$  and  $x - 5$ .
23. First identify the feature of the graph or equation that matches the wording of the question. Factor:  $(x - 3)(x - 5) = 0$ . Zero-product:  $x = 3$  or  $x = 5$ . That leads to  $x = 3$  or  $x = 5$ .
24. First identify the feature of the graph or equation that matches the wording of the question.  $(x + 4)(x - 2) = 0$ . Zero-product gives  $x = -4$  or  $x = 2$ . That leads to  $x = 2$  or  $x = -4$ .



Scan Me

# Want a Full Algebra 1 Textbook? Try Our New Hampshire NH SAS Made Simple Book!



## New Hampshire NH SAS Algebra I Made Ridiculously Simple

The friendly, step-by-step Algebra 1 textbook  
Plain-English explanations, guided practice, and  
review support.



Scan Me

Full Lessons Inside

**Concepts**  
**Practice**  
**Mastery**

**Important:** All our test books contain **unique, completely different tests** from each other! Each book offers fresh practice questions—no repeats!

### 5 Practice Tests

- ✓ 5 complete practice tests with detailed explanations
- ✓ Perfect foundation for NH SAS test preparation
- ✓ Builds confidence and test-taking skills
- ✓ High-quality questions aligned with state standards

**Start your practice journey!**

### 6 Practice Tests

- ✓ 6 complete practice tests with detailed explanations
- ✓ **Unique tests**—different from the 5 tests book
- ✓ Perfect for more practice after mastering 5 tests
- ✓ Builds even more confidence and test-taking skills
- ✓ Same high-quality questions aligned with standards

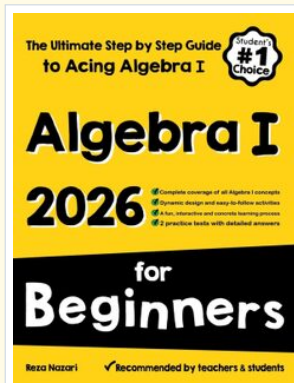
**Take your practice to the next level!**

### 7 Practice Tests

- ✓ 7 complete practice tests for maximum preparation
- ✓ **Unique tests**—different from 5 and 6 tests books
- ✓ The most comprehensive practice for Algebra 1
- ✓ Ideal for students aiming for top scores
- ✓ Extensive practice builds mastery and confidence

**Go all the way with comprehensive practice!**

## STUDENT FAVORITE • Master Algebra I From the Ground Up



### Algebra I for Beginners

Written by a top math teacher & aligned with national and state Algebra I courses. From linear equations to graphing quadratics — explained the easy way.

- ✓ **Complete coverage** of every Algebra I concept — perfect companion to these worksheets
- ✓ **Step-by-step explanations** with worked examples on every topic
- ✓ **QR codes in every chapter** for free video lessons & bonus practice
- ✓ **2 full-length practice tests** with detailed answer keys

- ✓ 100% Guaranteed
- ✓ Lifetime Support
- ✓ Trusted by Teachers

**Start Your Algebra Journey Today! →**

★ **STUDENT'S #1 CHOICE** ★

Teacher-recommended • 12,000+ Happy Students

PDF EDITION



Scan Me

Instant download • any device

PAPERBACK



Scan Me

Paperback on Amazon

Hold it in your hands

Pair these free worksheets with *Algebra I for Beginners* and you have a complete self-paced course — concept lessons, daily practice, and full exam-style reviews, all in one path. →

[EffortlessMath.com/product/algebra-i-for-beginners](https://EffortlessMath.com/product/algebra-i-for-beginners)