# Factoring Trinomials

| Name: _____ | Date: _____ | Score: _____ / 18 |
|---|---|---|

## Quick Review and Helpful Hints

To factor $x^2 + bx + c$, find two numbers that *multiply* to $c$ and *add* to $b$. Then write the factors as $(x + \square)(x + \square)$ using those numbers. Watch the signs: a positive $c$ means the numbers share a sign; a negative $c$ means they have opposite signs.

▷ **Example:** Factor $x^2 + 5x + 6$. **Work:** Find two numbers that multiply to $6$ and add to $5$: that's $2$ and $3$. Write them as factors.

★ **Answer:** $(x + 2)(x + 3)$

| | $x$ | $2$ |
|---|---|---|
| $x$ | $x^2$ | $2x$ |
| $3$ | $3x$ | $6$ |

$(x + 2)(x + 3) = x^2 + 5x + 6.$

## Practice Problems

*Factor each trinomial.*

1. $x^2 + 5x + 6$ _____
2. $x^2 + 8x + 15$ _____
3. $x^2 - 6x + 8$ _____
4. $x^2 - 3x - 10$ _____
5. $x^2 + 2x - 24$ _____
6. $x^2 - 10x + 21$ _____
7. $x^2 + x - 30$ _____
8. $x^2 - 11x + 30$ _____
9. $x^2 + 4x - 12$ _____
10. $x^2 + 7x + 12$ _____
11. $x^2 - 9x + 20$ _____
12. $x^2 + x - 12$ _____
13. $x^2 - 4x - 21$ _____
14. $x^2 + 9x + 14$ _____

## Word Problems

15. A rectangle has area $x^2 + 7x + 10$. Write its length and width as factors. _____
16. A rectangular garden model has area $x^2 - 5x - 14$. Factor it to represent possible side expressions. _____
17. The area of a square plus its border is $x^2 + 6x + 9$. Factor it. _____
18. A photo mat area is modeled by $x^2 + 10x + 24$. Factor it to show the side expressions. _____



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# Answer Keys

| | | |
|---|---|---|
| **1.** $(x+2)(x+3)$ | **7.** $(x+6)(x-5)$ | **13.** $(x-7)(x+3)$ |
| **2.** $(x+3)(x+5)$ | **8.** $(x-5)(x-6)$ | **14.** $(x+2)(x+7)$ |
| **3.** $(x-2)(x-4)$ | **9.** $(x+6)(x-2)$ | **15.** $(x+2)(x+5)$ |
| **4.** $(x-5)(x+2)$ | **10.** $(x+3)(x+4)$ | **16.** $(x-7)(x+2)$ |
| **5.** $(x+6)(x-4)$ | **11.** $(x-4)(x-5)$ | **17.** $(x+3)^2$ |
| **6.** $(x-3)(x-7)$ | **12.** $(x+4)(x-3)$ | **18.** $(x+4)(x+6)$ |

## Step-by-Step Explanations

**1.** Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Two numbers that multiply to $6$ and add to $5$ are $2$ and $3$: $(x+2)(x+3)$. So the final answer is $(x+2)(x+3)$.

**2.** A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Multiply to $15$, add to $8$: $3$ and $5$: $(x+3)(x+5)$. So the final answer is $(x+3)(x+5)$.

**3.** Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Multiply to $8$, add to $-6$: both negative, $-2$ and $-4$: $(x-2)(x-4)$. So the final answer is $(x-2)(x-4)$.

**4.** Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Multiply to $-10$, add to $-3$: $-5$ and $2$: $(x-5)(x+2)$. So the final answer is $(x-5)(x+2)$.

**5.** Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Multiply to $-24$, add to $2$: $6$ and $-4$: $(x+6)(x-4)$. So the final answer is $(x+6)(x-4)$.

**6.** A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Multiply to $21$, add to $-10$: $-3$ and $-7$: $(x-3)(x-7)$. So the final answer is $(x-3)(x-7)$.

**7.** Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Multiply to $-30$, add to $1$: $6$ and $-5$: $(x+6)(x-5)$. So the final answer is $(x+6)(x-5)$.

**8.** Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Multiply to $30$, add to $-11$: $-5$ and $-6$: $(x-5)(x-6)$. So the final answer is $(x-5)(x-6)$.

**9.** Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Multiply to $-12$, add to $4$: $6$ and $-2$: $(x+6)(x-2)$. So the final answer is $(x+6)(x-2)$.

**10.** A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Multiply to $12$, add to $7$: $3$ and $4$: $(x+3)(x+4)$. So the final answer is $(x+3)(x+4)$.

**11.** Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Multiply to $20$, add to $-9$: $-4$ and $-5$: $(x-4)(x-5)$. So the final answer is $(x-4)(x-5)$.

**12.** Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Multiply to $-12$, add to $1$: $4$ and $-3$: $(x+4)(x-3)$. So the final answer is $(x+4)(x-3)$.

**13.** Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Multiply to $-21$, add to $-4$: $-7$ and $3$: $(x-7)(x+3)$. So the final answer is $(x-7)(x+3)$.

**14.** A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Multiply to $14$, add to $9$: $2$ and $7$: $(x+2)(x+7)$. So the final answer is $(x+2)(x+7)$.

**15.** Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Multiply to $10$, add to $7$: $2$ and $5$: $(x+2)(x+5)$. So the final answer is $(x+2)(x+5)$.

**16.** Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Multiply to $-14$, add to $-5$: $-7$ and $2$: $(x-7)(x+2)$. So the final answer is $(x-7)(x+2)$.

**17.** Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Multiply to $9$, add to $6$: $3$ and $3$, a perfect square: $(x+3)^2$. So the final answer is $(x+3)^2$.

**18.** A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Multiply to $24$, add to $10$: $4$ and $6$: $(x+4)(x+6)$. So the final answer is $(x+4)(x+6)$.

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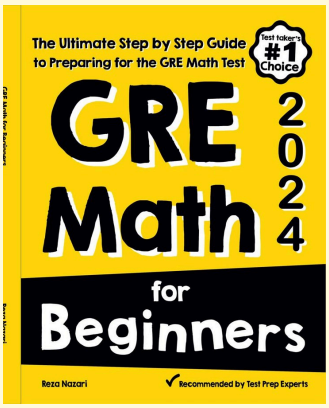


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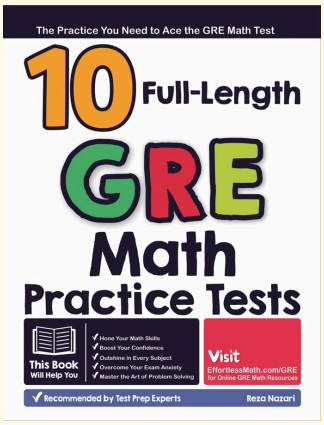


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