

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.

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

◆ 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. _____



Answer Keys

1. $(x + 2)(x + 3)$

2. $(x + 3)(x + 5)$

3. $(x - 2)(x - 4)$

4. $(x - 5)(x + 2)$

5. $(x + 6)(x - 4)$

6. $(x - 3)(x - 7)$

7. $(x + 6)(x - 5)$

8. $(x - 5)(x - 6)$

9. $(x + 6)(x - 2)$

10. $(x + 3)(x + 4)$

11. $(x - 4)(x - 5)$

12. $(x + 4)(x - 3)$

13. $(x - 7)(x + 3)$

14. $(x + 2)(x + 7)$

15. $(x + 2)(x + 5)$

16. $(x - 7)(x + 2)$

17. $(x + 3)^2$

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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