

Class 8 Factorisation Worksheet

By Thinking Juggernaut

Class: 8th Standard

Subject: Mathematics

Total Questions: 24

Total Marks: 24

Understanding Factorisation

What is Factorisation?

Factorisation is the process of expressing an algebraic expression as a product of its factors. It is the reverse process of expanding brackets.

Key Methods of Factorisation:

1. **Common Factor Method:** $ab + ac = a(b + c)$
2. **Difference of Squares:** $a^2 - b^2 = (a + b)(a - b)$
3. **Perfect Square Trinomial:**
 - $a^2 + 2ab + b^2 = (a + b)^2$
 - $a^2 - 2ab + b^2 = (a - b)^2$
4. **Splitting the Middle Term:** For $x^2 + bx + c$, find two numbers whose product = c and sum = b
5. **Regrouping Method:** Group terms to find common factors

Why is Factorisation Important?

- Simplifies algebraic expressions
- Helps solve equations
- Used in finding HCF and LCM of algebraic expressions
- Essential for higher mathematics like calculus

Sample Problem with Visual Explanation

Problem: Factorise $x^2 - 16$

$$x^2 - 16$$



$$a^2 - b^2 = (a+b)(a-b)$$

Difference of squares

Step 1: Identify
 $x^2 = (x)^2$ and $16 = (4)^2$

Step 2: Apply Identity
 $a = x, b = 4$

Final Answer:
 $(x + 4)(x - 4)$

Step-by-step Solution:

1. Recognize that $x^2 - 16$ is a difference of two squares
2. Write each term as a square: $x^2 = (x)^2$ and $16 = (4)^2$
3. Apply the identity: $a^2 - b^2 = (a + b)(a - b)$
4. Substitute: $x^2 - 16 = (x)^2 - (4)^2 = (x + 4)(x - 4)$
5. **Verification:** $(x + 4)(x - 4) = x^2 - 4x + 4x - 16 = x^2 - 16 \checkmark$

Part A: Warm-up Practice

★ Easy Level - 8 Questions

Q1. Factorise: $6x + 9$

Q2. Find the common factor and factorise: $12a^2b + 8ab^2$

Q3. Factorise using the identity $a^2 - b^2$: $y^2 - 25$

Q4. Factorise the perfect square: $p^2 + 6p + 9$

Q5. Fill in the blank: $x^2 - 2xy + y^2 = (\text{_____})^2$

Q6. Factorise: $5m^2n - 10mn$

Q7. True or False: $x^2 + 9$ can be factorised as $(x + 3)(x + 3)$

Q8. Factorise: $49 - k^2$

Part B: Practice Zone

★★ Medium Level - 10 Questions

Q9. Factorise by splitting the middle term: $x^2 + 7x + 12$

Q10. Factorise by regrouping: $2ax + bx + 2ay + by$

Q11. Factorise: $4x^2 - 12xy + 9y^2$

Q12. Word Problem: The area of a rectangular garden is given by $(x^2 + 8x + 15)$ square meters. If the length is $(x + 5)$ meters, find the width by factorising the area.

Q13. Match the expressions with their factorised forms:

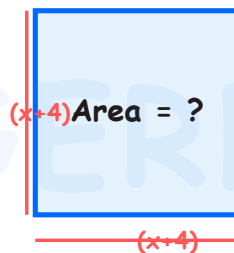
Column A	Column B
(i) $x^2 - 9$	(a) $(x - 5)^2$
(ii) $x^2 - 10x + 25$	(b) $(2x + 3)(2x - 3)$
(iii) $4x^2 - 9$	(c) $(x + 3)(x - 3)$

Write your answers: (i) → ____, (ii) → ____, (iii) → ____

Q14. Factorise: $a^2 - 2ab + b^2 - c^2$

Q15. Factorise completely: $3x^2 - 27$

Q16. Picture-based Problem: A square tile has side length $(x + 4)$ cm. What is the expression for its area? Now reverse the process - if the area is $x^2 + 8x + 16$, factorise it to find the side length.



Q17. Factorise: $x^2 - 5x + 6$

Q18. Word Problem: Rajesh has a rectangular plot of land. The area is $(2x^2 + 7x + 3)$ square meters. He wants to fence it with dimensions in whole meters. Factorise the expression to find possible dimensions.

Part C: Challenge Yourself!

☆☆☆ Hard Level - 6 Questions

Q19. Factorise: $x^4 - 81$

Q20. Factorise by regrouping: $xy^2 - xz^2 + y^2 - z^2$

Q21. Factorise: $27a^3 - 8b^3$ (using identity: $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$)

Q22. Complex Word Problem: A farmer has a square field with area $(4x^2 + 20x + 25)$ square meters. He wants to add a rectangular extension with area $(4x^2 - 25)$ square meters. Factorise both expressions and determine if the extension's length equals the original field's side.

Q23. Factorise completely: $2x^3 - 32x$

Q24. Application Problem: The difference between the squares of two consecutive odd numbers is always divisible by 8. Prove this algebraically by taking two consecutive odd numbers as $(2n + 1)$ and $(2n + 3)$, and factorising $(2n + 3)^2 - (2n + 1)^2$.

Answer Key

Part A: Warm-up Practice (Easy)

Q1. $3(2x + 3)$

Q2. $4ab(3a + 2b)$

Q3. $(y + 5)(y - 5)$

Q4. $(p + 3)^2$

Q5. $(x - y)^2$

Q6. $5mn(m - 2)$

Q7. False. $x^2 + 9$ cannot be factorised using real numbers (it's a sum of squares)

Q8. $(7 + k)(7 - k)$

Part B: Practice Zone (Medium)

Q9. $(x + 3)(x + 4)$ [Split $7x$ as $3x + 4x$, since $3 \times 4 = 12$]

Q10. $(2a + b)(x + y)$ [Group as $(2ax + bx) + (2ay + by) = x(2a + b) + y(2a + b)$]

Q11. $(2x - 3y)^2$

Q12. Width = $(x + 3)$ meters [$x^2 + 8x + 15 = (x + 5)(x + 3)$]

Q13. (i) → (c), (ii) → (a), (iii) → (b)

Q14. $(a - b + c)(a - b - c)$ [First factorise $a^2 - 2ab + b^2 = (a - b)^2$, then $(a - b)^2 - c^2$]

Q15. $3(x + 3)(x - 3)$ [Take out common factor 3, then factorise $x^2 - 9$]

Q16. Side length = $(x + 4)$ cm [$x^2 + 8x + 16 = (x + 4)^2$]

Q17. $(x - 2)(x - 3)$ [Split $-5x$ as $-2x - 3x$, since $-2 \times -3 = 6$]

Q18. $(2x + 1)(x + 3)$ [Dimensions could be $(2x + 1)$ m and $(x + 3)$ m]

Part C: Challenge Questions (Hard)

Q19. $(x^2 + 9)(x + 3)(x - 3)$ [$x^4 - 81 = (x^2)^2 - 9^2$, apply $a^2 - b^2$ twice]

Q20. $(x + 1)(y + z)(y - z)$ [Group as $(xy^2 - xz^2) + (y^2 - z^2) = x(y^2 - z^2) + (y^2 - z^2)$]

Q21. $(3a - 2b)(9a^2 + 6ab + 4b^2)$

Q22. Original field: $(2x + 5)^2$ side; Extension: $(2x + 5)(2x - 5)$. The extension's length $(2x + 5)$ equals the field's side.

Q23. $2x(x + 4)(x - 4)$ [$2x^3 - 32x = 2x(x^2 - 16) = 2x(x + 4)(x - 4)$]

Q24. $(2n + 3)^2 - (2n + 1)^2 = (4n^2 + 12n + 9) - (4n^2 + 4n + 1) = 8n + 8 = 8(n + 1)$, which is divisible by 8.



Scoring Guide

Total Questions: 24 | Total Marks: 24

Score Range	Performance Level	What to Do Next
20-24	☆☆☆ Excellent!	Outstanding! You've mastered factorisation. Move on to algebraic identities applications, simultaneous equations, and polynomial division.
15-19	☆☆ Very Good!	Great work! Practice more regrouping problems and complex identities. Focus on word problems involving factorisation.
10-14	☆ Good Effort!	Keep practicing! Focus on memorizing the key identities and practice splitting the middle term. Work on 10-15 more problems daily.
0-9	Keep Trying!	Review the concept section carefully. Start with common factor method, then move to difference of squares. Practice basic identities daily before attempting complex problems.



Tips for Improvement:

- **Memorize key identities:** Write $(a+b)^2$, $(a-b)^2$, and a^2-b^2 on flashcards
- **Look for patterns:** Always check for common factors first
- **Practice splitting:** For $x^2 + bx + c$, find two numbers that multiply to c and add to b
- **Verify your answer:** Expand your factorised form to check if it matches the original
- **Group intelligently:** In regrouping method, try different groupings if first attempt doesn't work
- **Work systematically:** Follow these steps - Common factor → Identities → Splitting → Regrouping



Common Mistakes to Avoid:

- ✗ Forgetting to take out common factors before applying identities
- ✗ Confusing $(a+b)^2$ with $a^2 + b^2$ (remember the $2ab$ term!)
- ✗ Trying to factorise $x^2 + k^2$ (sum of squares doesn't factorise with real numbers)
- ✗ Wrong signs when splitting the middle term
- ✗ Not factorising completely (always check if factors can be factorised further)

- ✖ Forgetting to apply distributive property when verifying

✨ Great Job Completing This Worksheet! ✨

Keep practicing factorisation and you'll master it in no time!

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