

Check your skill level

Skill 01: Factorisation | Levels 01-15

Work on separate paper. Show your method and check your result.

Level 01

Take out the greatest common monomial factor. If only 1 is common, explain why. You do not need to use methods from later levels.

- $6x + 9$
- $\frac{3}{4}x + \frac{1}{2}$
- $8x - 12$
- $0.6x + 0.9$
- $15 + 10x$
- $\frac{2}{3}x - \frac{4}{9}$
- Why is x not a common factor of $4x + 7$?
- A student writes $0.4x + 0.8 = 0.4(x + 0.8)$. Correct it.

Level 03

Take out the greatest common monomial factor. If only 1 is common, explain why. You do not need to use methods from later levels.

- $8x + 4x^3 - 12x^2$
- $\frac{1}{2}x^3 + \frac{3}{4}x^2 - \frac{1}{4}x$
- $6x^4 - 9x^3 + 12x^2 - 3x$
- $0.2x^2 + 0.6 + 0.4x$
- $2x^4 + 4x^3 - 6x^2 + 8x + 10$
- $12x^2 - 18x$
- For $2x^2 + 3x + 5$, is there a common monomial factor other than 1?
- A student factors only the first two terms: $6x^2 + 9x + 4 = 3x(2x + 3 + 4)$. Why is this wrong?

Level 02

Take out the greatest common monomial factor. If only 1 is common, explain why. You do not need to use methods from later levels.

- $6x^2 + 9x$
- $\frac{3}{4}x^2 + \frac{1}{2}x$
- $8x^2 - 12x$
- $0.6x^2 + 0.9x$
- $15x^3 + 10x^2$
- $\frac{2}{3}x^2 - \frac{4}{9}x$
- Why is x not a common factor of $4x + 7$?
- A student writes $0.4x + 0.8 = 0.4(x + 0.8)$. Correct it.

Level 04

Take out the greatest common monomial factor. If only 1 is common, explain why. You do not need to use methods from later levels.

- $12x^2y + 18xy^2$
- $\frac{1}{2}x^2y - \frac{3}{4}xy^2$
- $0.8xy^2 + 1.2x^2y$
- $15a^3b^2 - 10a^2b$
- $6x^3 - 3x^2 + 9x$
- $0.45x^2 + 0.3x$
- Why can you take $2x$, but not $2xy$, from $4xy + 6x$?
- For $\frac{1}{2}x^2y + \frac{1}{4}y$, what is the common variable factor?

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Level 05

Take out the greatest common monomial factor. If only 1 is common, explain why. You do not need to use methods from later levels.

- $8a^2bc - 12ab^2c$
- $\frac{1}{2}x^2yz + \frac{3}{4}xy^2z - \frac{1}{4}xyz$
- $0.2ab + 0.4abc - 0.6ab^2$
- $6x^2yz + 9xy^2z - 3xyz^2 + 12xyz$
- $2a^2bc + 4ab^2c + 6abc^2 - 8abc + 10abc^3$
- $\frac{3}{5}xy + \frac{9}{10}x^2y$
- In $xyz + xy + xz + 1$, which variable divides every term?
- Can you take xyz from $0.3xyz + 0.6xy$? Explain.

Level 07

Factorise completely over rational coefficients unless a question says otherwise. Choose your method before you start, then check by expanding.

- $3x(x - 2) - 4(2 - x)$
- $\frac{1}{2}x(x + 1) + \frac{3}{4}(x + 1)$
- $0.2x(x - 3) - 0.6(3 - x)$
- $-6x^2 + 9x$
- $ax + ay + bx + by$
- $\frac{2}{5}xy - \frac{6}{5}x$
- Is $2 - x$ equal to $x - 2$?
- Correct: $-0.5x^2 - x = -0.5x(x - 2)$.

Level 06

Factorise completely over rational coefficients unless a question says otherwise. Choose your method before you start, then check by expanding.

- $xy + 2x + 3y + 6$
- $\frac{1}{2}xy + x + \frac{3}{2}y + 3$
- $0.2xy + 0.4x + 0.6y + 1.2$
- $6 + 2x + xy + 3y$
- $4x^2y - 8xy$
- $\frac{1}{3}abc + \frac{2}{3}ab$
- A student stops at $x(y + 2) + 3(y + 2)$. What is still missing?
- Does grouping $x^2 + x + 2x + 3$ give matching brackets?

Level 08

Factorise completely over rational coefficients unless a question says otherwise. Choose your method before you start, then check by expanding.

- $x^2 + 5x + 6$
- $\frac{1}{2}x^2 + \frac{5}{2}x + 3$
- $0.1x^2 - 0.1x - 0.6$
- $x^2 - 6x + 9$
- $xy + 4x + 2y + 8$
- $\frac{1}{4}a^2b + \frac{1}{2}ab$
- Does $x^2 + x + 1$ have two rational linear factors?
- Correct: $0.2x^2 + 0.8x + 0.8 = 0.2(x + 4)(x + 4)$.

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Level 09

Factorise completely over rational coefficients unless a question says otherwise. Choose your method before you start, then check by expanding.

1. $6x^2 + 7x + 2$
2. $\frac{3}{2}x^2 + \frac{7}{4}x + \frac{1}{2}$
3. $0.6x^2 + 0.7x + 0.2$
4. $2x^2 - 5x - 3$
5. $x^2 - 7x + 12$
6. $\frac{1}{2}x(y - 1) + y - 1$
7. Does having three terms guarantee a quadratic?
8. Which pair splits 7x in $6x^2 + 7x + 2$: 1 and 6, or 3 and 4?

Level 10

Factorise completely over rational coefficients unless a question says otherwise. Choose your method before you start, then check by expanding.

1. $x^2 - 25$
2. $\frac{1}{4}x^2 - \frac{9}{16}$
3. $0.25x^2 - 0.04$
4. $12x^2 - 27y^2$
5. $2x^2 + 7x + 3$
6. $\frac{1}{3}x^2 + 2x + 3$
7. Explain why $x^2 + 16$ is not $(x - 4)(x + 4)$.
8. Correct: $0.09x^2 - 0.16 = (0.09x - 0.16)(0.09x + 0.16)$.

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Level 11

Factorise completely over rational coefficients unless a question says otherwise. Choose your method before you start, then check by expanding.

1. $2x^3 - 8x$
2. $\frac{1}{2}x^3 - 2x$
3. $0.3x^3 + 1.2x^2 + 1.2x$
4. $9x^2 - 12xy + 4y^2$
5. $4x^2 - 49$
6. $\frac{1}{5}xy + \frac{2}{5}x + \frac{3}{5}y + \frac{6}{5}$
7. Is $x^2 + 6x + 9$ equal to $(x + 9)^2$?
8. For $0.2x^3 - 1.8x$, a student stops at $0.2x(x^2 - 9)$. Finish it.

Level 12

Choose a method without a topic cue. Show your working. For equations, find the roots; for fractions, retain restrictions from the original denominator.

1. $6x^2 - x - 2$
2. $\frac{1}{2}x^2 - \frac{9}{2}$
3. $0.2x^3 - 0.8x$
4. $3x + 6y - x^2 - 2xy$
5. Solve $x^2 - 5x + 6 = 0$.
6. Simplify $\frac{x^2 - 9}{x^2 + 5x + 6}$, stating all excluded x-values.
7. Solve $0.5x^2 - 2x = 0$. Why is dividing by x unsafe?
8. Simplify $\frac{\frac{1}{4}x^2 - 1}{\frac{1}{2}x - 1}$, with restrictions.

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Level 13

Factorise completely over rational coefficients unless a question says otherwise. Choose your method before you start, then check by expanding.

1. $x^3 - 27$
2. $\frac{1}{8}x^3 + 1$
3. $0.001x^3 - 0.008$
4. $8x^3 + 27y^3$
5. $3x^3 - 12x$
6. $\frac{1}{2}x^2 + \frac{3}{2}x + 1$
7. Is $x^3 + 8$ equal to $(x + 2)^3$?
8. Which identity suits $0.008x^3 + 0.027y^3$?

Level 15

Factorise completely over rational coefficients unless a question says otherwise. Choose your method before you start, then check by expanding.

1. $x^4 - 5x^2 + 4$
2. $\frac{1}{2}x^4 - \frac{5}{2}x^2 + 2$
3. $0.1x^4 - 0.5x^2 + 0.4$
4. $x^4 + 5x^2 + 4$
5. $x^3 - 1$
6. $\frac{1}{4}x^2 - x + 1$
7. Why can $x^2 - 2$ factor over the reals but not into rational linear factors?
8. A student changes $x^4 - 5x^2 + 4$ into $(u - 1)(u - 4)$ and stops. What remains?

Level 14

Factorise completely over rational coefficients unless a question says otherwise. Choose your method before you start, then check by expanding.

1. $x^3 - 6x^2 + 11x - 6$
2. $\frac{1}{2}x^3 - 3x^2 + \frac{11}{2}x - 3$
3. $0.1x^3 - 0.6x^2 + 1.1x - 0.6$
4. $x^3 + x^2 - 4x - 4$
5. $x^3 + 8$
6. $\frac{1}{4}x^2 - 1$
7. If $P(-2) = 0$, which bracket is a factor?
8. If $P(3) = 7$, can $x - 3$ be a factor?