Polynomials: collect terms and remove brackets — Teacher answers

Year 7, upper volume • text pp. 45–54 • foundation lessons 23–27

Use the prerequisite checks to choose support, project the worked and guided items, then let learners work on paper. Select supplements or extensions as needed. No learner answers are saved by this presentation.

Worked example 1

Simplify by collecting the x terms and the constant terms separately.

$$3x + 2 - x + 5$$

Reference answer

2x+7.

$$2x + 7$$

1. 3x − x = 2x; 2 + 5 = 7.
2. The simplified expression is 2x + 7.

- Keep each sign and collect only terms with the same variable powers.
- Give an equivalent simplified expression.

Guided attempt 2

Remove the brackets and simplify. Show how each enclosed sign changes.

$$5a - (2a - 3)$$

1. −(2a − 3) = _____ a + _____.
2. 5a − 2a + 3 = _____ a + _____.

Reference answer

3a+3.

$$3a + 3$$

1. Distribute the minus: 5a − 2a + 3.
2. Collect: 3a + 3.

- Keep each sign and collect only terms with the same variable powers.
- Give an equivalent simplified expression.

Prerequisite 3

Combine the like terms.

$$2x + 5x$$

Reference answer

7x.

$$7x$$

1. Both terms have x to the first power.
2. Add coefficients: 2 + 5 = 7, giving 7x.

- Keep each sign and collect only terms with the same variable powers.
- Give an equivalent simplified expression.

Prerequisite 4

Can y + y^2 be combined into one monomial? Write an equivalent expression and explain.

$$y + y^2$$

Reference answer

No. Keep y^2 + y; their exponents differ.

$$y^2 + y$$

1. The exponents are 1 and 2.
2. They are unlike terms, so reordering does not combine them.

- Keep each sign and collect only terms with the same variable powers.
- Give an equivalent simplified expression.

Independent practice 5

Simplify.

$$-4x + 7x - 2$$

Reference answer

3x−2.

$$3x - 2$$

1. −4 + 7 = 3 for the x coefficient.
2. Keep the constant −2: 3x − 2.

- Keep each sign and collect only terms with the same variable powers.
- Give an equivalent simplified expression.

Independent practice 6

Simplify, keeping the squared and linear terms in separate groups.

$$2a^2 + 3a - 5a^2 + a$$

Reference answer

$-3a^2+4a$.

$$-3a^2 + 4a$$

1. $2a^2 - 5a^2 = -3a^2$.
2. 3a + a = 4a, giving $-3a^2 + 4a$.

- Keep each sign and collect only terms with the same variable powers.
- Give an equivalent simplified expression.

Independent practice 7

Remove brackets and simplify.

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

Reference answer

3x−6.

$$3x - 6$$

1. Subtract both enclosed terms: 4x − x − 6.
2. Collect to obtain 3x − 6.

- Keep each sign and collect only terms with the same variable powers.
- Give an equivalent simplified expression.

Independent practice 8

Apply the distributive law, then simplify.

$$2(3y - 1) - 4y$$

Reference answer

2y−2.

$$2y - 2$$

1. 2(3y − 1) = 6y − 2.
2. 6y − 2 − 4y = 2y − 2.

- Keep each sign and collect only terms with the same variable powers.
- Give an equivalent simplified expression.

Exit question 9

Simplify and explain the sign of the final constant.

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

Reference answer

x+5.

$$x + 5$$

1. −(2x − 5) = −2x + 5.
2. Add 3x: x + 5.

- Keep each sign and collect only terms with the same variable powers.
- Give an equivalent simplified expression.

Exit question 10

Simplify first, then evaluate at a = −2.

$$5a - 2(2a - 3)$$

Reference answer

The value is 4.

$$4$$

1. Distribute: 5a − 4a + 6 = a + 6.
2. At a = −2, the value is −2 + 6 = 4.

- Keep each sign and collect only terms with the same variable powers.
- Substitute the stated values into the complete expression and calculate.

Further practice 11

Simplify.

$$7x - 3x + 2 - 9$$

Reference answer

4x−7.

$$4x - 7$$

1. 7x − 3x = 4x.
2. 2 − 9 = −7, so the result is 4x − 7.

- Keep each sign and collect only terms with the same variable powers.
- Give an equivalent simplified expression.

Further practice 12

Simplify.

$$a - (2a - b) + 3b$$

Reference answer

−a+4b.

$$-a + 4b$$

1. Remove brackets: a − 2a + b + 3b.
2. Collect separately: −a + 4b.

- Keep each sign and collect only terms with the same variable powers.
- Give an equivalent simplified expression.

Further practice 13

Expand each product, then simplify.

$$3(2x + 1) - 2(x - 4)$$

Reference answer

4x+11.

$$4x + 11$$

1. The products give 6x + 3 − 2x + 8.
2. Collect to get 4x + 11.

- Keep each sign and collect only terms with the same variable powers.
- Give an equivalent simplified expression.

Further practice 14

Simplify and explain why xy and yx can be grouped.

$$2xy - 3yx + 5xy$$

Reference answer

4xy.

$$4xy$$

1. Multiplication is commutative, so yx = xy.
2. The coefficient is 2 − 3 + 5 = 4.

- Keep each sign and collect only terms with the same variable powers.
- Give an equivalent simplified expression.

Extension 15

A = 2x − 1 and B = x + 3. Find A − 2B. Keep the whole expression B in brackets first.

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

Reference answer

−7.

$$-7$$

1. Substitute the whole expressions: (2x − 1) − 2(x + 3).
2. Expand: 2x − 1 − 2x − 6 = −7.

- Keep each sign and collect only terms with the same variable powers.
- Give an equivalent simplified expression.

Extension 16

A learner writes 3(x − 2) = 3x − 2. Correct the expansion, then use x = 1 to show why the learner’ s version fails.

$$3(x-2)$$

Reference answer

Correct: 3x − 6. At x = 1, the original is −3 but 3x − 2 is 1.

$$-3$$

1. 3 must multiply both x and −2, giving 3x − 6.
2. At x = 1, 3(1 − 2) = −3 while 3 × 1 − 2 = 1.

- Keep each sign and collect only terms with the same variable powers.
- Substitute the stated values into the complete expression and calculate.