

ALGEBRA

Middle School • International Curriculum Worksheet Pack

What's inside	Core skills
12 printable pages of structured practice, puzzles, reasoning and real-life applications.	Variables • expressions • substitution • equations • distributive property • patterns • problem solving

Suggested age: 11–14 years (approximately Grades 6–8 / KS3)

International alignment: supports common lower-secondary algebra objectives, including Common Core 6.EE and 7.EE strands.

Name: _____ Date: _____

Learning Targets

By the end of this pack, I can:

- identify variables, coefficients, constants and terms.
- write algebraic expressions from words.
- combine like terms and simplify expressions.
- substitute values into expressions.
- solve one-step and two-step equations.
- use the distributive property.
- recognise patterns and use algebra to solve real-world problems.

Algebra Toolkit

Term	Example	Meaning
Variable	x	A letter or symbol representing an unknown or changing value.
Coefficient	$5x$	The number multiplying the variable.
Constant	7	A number without a variable.
Expression	$3x + 4$	A mathematical phrase without an equals sign.
Equation	$3x + 4 = 19$	A statement showing two expressions are equal.

Golden Rule

Whatever you do to one side of an equation, do to the other side. Keep the equation balanced and check your answer by substituting it back in.

A. Identify the Parts

1. Circle the variable in: $7x + 3$.

2. Underline the coefficient in: $9m - 4$.

3. Box the constant in: $5p + 12$.

4. How many terms are in $3x + 2y - 7$?

5. Write an expression for: 6 more than a number n .

6. Write an expression for: 4 times a number k .

B. Translate Words into Algebra

7. twice a number x

8. 10 less than y

9. the sum of a and 8

10. the product of 5 and b

Combine like terms. Show the step that makes your simplification clear.

1. Simplify: $3x + 5x$.

2. Simplify: $9a - 4a + 2$.

3. Simplify: $7m + 3 - 2m + 5$.

4. Simplify: $6p + 4q - 2p + q$.

5. Simplify: $10y - 3 + 2y + 8$.

6. Simplify: $4r + 6 - r - 1$.

7. Simplify: $5x + 2y + 3x - y$.

8. Simplify: $12n - 5n + 4 - 9$.

Challenge

Write two different expressions that simplify to $7x + 5$.

Substitute the given value and calculate.

1. Evaluate $3x + 4$ when $x = 5$.

2. Evaluate $7a - 2$ when $a = 6$.

3. Evaluate $4m + 3n$ when $m = 2$, $n = 5$.

4. Evaluate $2p^2 + 1$ when $p = 3$.

5. Evaluate $5y - 2x$ when $y = 7$, $x = 4$.

6. Evaluate $3(r + 2)$ when $r = 6$.

Reasoning Challenge

Which is greater when $x = 4$: $3x + 8$ or $5x - 1$? Explain without only giving the answer.

Solve each equation. Then check your answer.

1. Solve: $x + 7 = 19$

2. Solve: $y - 8 = 14$

3. Solve: $5a = 35$

4. Solve: $m/4 = 6$

5. Solve: $p + 13 = 28$

6. Solve: $q - 15 = 9$

7. Solve: $7r = 56$

8. Solve: $s/5 = 9$

Check It

Choose one equation above. Show how you can check your solution by substituting your answer.

Solve using inverse operations. Keep your working organised.

1. Solve: $2x + 5 = 17$

2. Solve: $3y - 4 = 20$

3. Solve: $5a + 7 = 42$

4. Solve: $4m - 9 = 27$

5. Solve: $6p + 3 = 45$

6. Solve: $7q - 8 = 34$

Algebra Challenge

I am thinking of a number. I multiply it by 4 and add 7. The result is 31. What is my number? Write an equation and solve it.

Use the distributive property: $a(b + c) = ab + ac$.

1. Expand and simplify: $3(x + 4)$

2. Expand and simplify: $5(a - 2)$

3. Expand and simplify: $2(4m + 3)$

4. Expand and simplify: $6(p - 5)$

5. Expand and simplify: $-2(y + 7)$

6. Expand and simplify: $4(2n - 3)$

Reverse the Process

Factorise: $6x + 18$. What common factor can you take out?

Think Deeper

Explain why $3(x + 5)$ is equal to $3x + 15$.

Look for the rule. Use algebra to describe the pattern.

1. 4, 7, 10, 13, __, __ What is the common difference?

2. 5, 10, 15, 20, __, __ Write a rule for the n th term.

3. 2, 6, 10, 14, __ What is the n th-term rule?

4. A pattern starts at 9 and increases by 4 each time. Write an expression for the n th term.

5. A tile pattern has 3 tiles in Figure 1, 5 in Figure 2, and 7 in Figure 3. How many tiles are in Figure 10?

Translate each situation into an equation or expression, then solve.

1. A cinema ticket costs \$8. Maya buys x tickets and spends \$40. How many tickets did she buy?

2. A taxi charges a \$5 starting fee plus \$3 per kilometre. Write an expression for a journey of k kilometres.

3. A rectangle has length 3 cm more than its width w . Write an expression for its length.

4. Four identical notebooks and a \$2 pen cost \$18 altogether. What is the price of one notebook?

5. A phone plan costs \$12 per month plus \$4 for each extra data package. Write an expression for x extra packages.

6. A school club has 25 members. The number of girls is 5 more than the number of boys. How many boys and girls are there?

Part A • Find the Mistake

Correct work:

Part B • Mixed Skills

1. Simplify: $8x - 3x + 7$.
2. Evaluate $2a + 5$ when $a = 9$.
3. Solve: $3x + 4 = 25$.
4. Expand: $4(y - 3)$.
5. Write an expression for 7 less than twice n .
6. A number increased by 9 is 24. Write and solve an equation.

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1. x • 2. 9 • 3. 12 • 4. 3 terms • 5. $n+6$ • 6. $4k$ • 7. $2x$ • 8. $y-10$ • 9. $a+8$ • 10. $5b$.

Page 4

1. $8x$ • 2. $5a+2$ • 3. $5m+8$ • 4. $4p+5q$ • 5. $12y+5$ • 6. $3r+5$ • 7. $8x+y$ • 8. $7n+4$. Challenge examples: $7x+5$; $2x+5x+5$.

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1. 19 • 2. 40 • 3. 23 • 4. 19 • 5. 27 • 6. 24. Challenge: $3x+8=20$; $5x-1=19$, so $3x+8$ is greater.

Page 6

1. 12 • 2. 22 • 3. 7 • 4. 24 • 5. 15 • 6. 24 • 7. 8 • 8. 45.

Page 7

1. 6 • 2. 8 • 3. 7 • 4. 9 • 5. 7 • 6. 6. Challenge: $4x+7=31$, $x=6$.

Page 8

1. $3x+12$ • 2. $5a-10$ • 3. $8m+6$ • 4. $6p-30$ • 5. $-2y-14$ • 6. $8n-12$. Factorise: $6(x+3)$.

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1. 16,19; difference 3. 2. 25,30; nth term $5n$. 3. nth term $4n-2$. 4. $4n+5$. 5. 21 tiles.

Page 10

1. 5 tickets • 2. $5+3k$ • 3. $w+3$ • 4. \$4 per notebook • 5. $12+4x$ • 6. Boys=10, Girls=15.

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Find the mistake: 1. subtract 6 before dividing, $x=6$. 2. 3 is a constant, so $6x+3$. 3. distribute 5 to both terms, $5x+10$. Mixed: 1. $5x+7$ • 2. 23 • 3. 7 • 4. $4y-12$ • 5. $2n-7$ • 6. $x+9=24$, $x=15$.

Teacher note

Encourage students to show their reasoning, use correct algebra vocabulary, maintain equality when solving equations, and check solutions by substitution.