Key focus

Forming expressions is the process of translating written descriptions—often from real-world contexts—into algebraic notation. This is a foundational skill that bridges concrete problem-solving and abstract algebra. Students learn to identify variables, select appropriate operations, and write concise algebraic expressions that represent relationships and quantities. Mastery of this skill enables students to model situations, solve equations, and understand the power of algebra as a communication tool.

Suggested teaching sequence

1. Start with single operations and familiar language: "Write an expression for n plus 4." Model the process of identifying the variable (n), the operation (addition), and the number (4), then combine them as $n + 4$. Use multiple phrasings: "n plus 4", "4 more than n", "n increased by 4".
2. Introduce different operations with the same structure: subtraction ("x minus 7"), multiplication ("3 times y"), and division ("m divided by 5"). Emphasise that "times" always means multiplication, and "divided by" always means division, not the other way round.
3. Progress to multi-step expressions: "3 times n plus 2" becomes $3n + 2$. Show that the order in the sentence matches the order of operations: first multiply, then add.
4. Introduce brackets to change the order of operations: "double s, then subtract 5" is $2(s - 5)$ with brackets, not $2s - 5$ without them. Compare: "double the sum of s and 5" is $2(s + 5)$.
5. Apply expressions in real-world contexts: cost calculations ("if pens cost $3 each and a book costs $5, write the total cost of x pens and one book"), age problems, measurement (area and perimeter with variables), and time-related expressions.
6. Introduce fractions and division notation: "p divided by 4, then add 1" can be written as $\frac{p}{4} + 1$ or $p \div 4 + 1$.
7. Explore expressions with two or more variables: the perimeter of a rectangle with length l and width w is $2l + 2w$, or cost of x apples at $2 each and y bananas at $1 each is $2x + y$.
8. Build confidence with error identification: present incorrect expressions and ask students to explain why they are wrong, reinforcing correct notation and operation selection.

Core examples to model

- Single operation: "n plus 4" is $n + 4$. Write the variable first, then the operation, then the number.
- Phrases with different meanings: "5 more than x" is $x + 5$, not $5 + x$ (though addition is commutative); "5 less than x" is $x - 5$, not $5 - x$ (subtraction is not commutative).
- Multiplication shorthand: "3 times y" is $3y$, not $3 \times y$. Explain that in algebra we omit the $\times$ symbol to avoid confusion with the variable x.
- Multi-step: "three times n plus 2" is $3n + 2$ (multiply first, then add). Compare: "three times

the sum of n and 2" is $3(n+2)$ (add first, then multiply).

- Fractions: "p divided by 4" can be written as $\frac{p}{4}$ or $p \div 4$ or $p/4$; all are equivalent.
- Brackets for order: "double s, then subtract 5" is $2(s-5) = 2s - 10$ when simplified. Without brackets, $2s - 5$ means "double s, then subtract 5 separately".
- Two variables: perimeter of a rectangle with length l and width w is $2l + 2w$. Cost of x items at \$3 each and y items at \$1 each is $3x + y$.
- Real-world context: if a phone plan charges \$5 per month plus \$0.10 per text message, and you send m messages, the total cost is $5 + 0.1m$ dollars.
- Identifying the variable: in "the cost of books at \$5 each", the variable is the number of books (let's call it b), so the expression is $5b$.

Watch for

- Direction matters in subtraction: "5 less than x" means $x - 5$, not $5 - x$. Use a number line or concrete example to cement this: "5 less than 12 is 7", which is $12 - 5 = 7$.
- Multiplication is written without a symbol in algebra: $3x$ means $3 \times x$, not $3 + x$. Reinforce this repeatedly, especially with coefficients.
- Brackets change the meaning: $2(x+5)$ and $2x+5$ are completely different. Use area models or expansion to show why: $2(x+5) = 2x + 10$, but $2x + 5$ stays as is.
- Phrases like "double" and "triple" mean multiplication by 2 and 3: "double y" is $2y$, not $2 + y$ or y^2.
- Order of operations still applies when writing expressions: "add 1 to p divided by 4" should be written as $\frac{p}{4} + 1$, not $\frac{p+1}{4}$ (which would mean dividing the sum).
- Two-variable expressions can be confusing: reinforce that xy means "x times y", and $x + y$ means "x plus y". They are not the same.
- Negative coefficients and subtraction: "3 less than $2x$" is $2x - 3$, not $2x + (-3)$ in written form (though they are equivalent).
- Common error: students sometimes reverse division: "p divided by 4" is $\frac{p}{4}$, not $\frac{4}{p}$.

Checks for understanding

- Can students identify the variable in a word description?
- Can they correctly translate a single operation into an algebraic expression?
- Can they write multi-step expressions and understand that order matters (both in the sentence and after translation)?
- Can they use brackets correctly to show grouped operations?
- Can they write expressions for real-world contexts (costs, ages, measurements)?
- Can they handle fractions and division in expressions?
- Can they write and interpret expressions with two or more variables?

- Can they identify and correct errors in expressions, explaining why they are wrong?
- Can they explain the difference between “$3x + 5$” and “$3(x + 5)$”?
- Can they match verbal descriptions to multiple equivalent algebraic forms (e.g., “double s minus 5”, $2s - 5$, and $2(s - 2.5)$ are related)?