Pupils should be taught to:	As outcomes, Year 7 pupils should, for example:

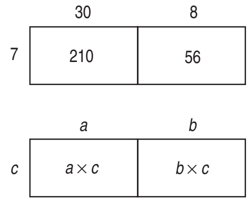
Simplify or transform algebraic expressions

Simplify linear expressions by collecting like terms; begin to multiply a single term over a bracket.

Understand that partitioning a number helps to break a multiplication into a series of steps. For example:

- By partitioning 38, 38 × 7 becomes
  (30 + 8) × 7 = 30 × 7 + 8 × 7

  Generalise, from this and similar examples, to:
  (a + b) × c = (a × c) + (b × c)
  or ac + bc



Link to written methods for multiplication (pages 104–5).

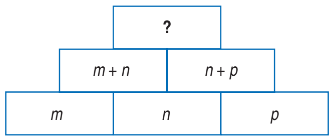
Recognise that letters stand for numbers in problems. For example:

- Simplify expressions such as:

  a. a + a + a = 3a
  b. b + 2b + b = 4b
  c. x + 6 + 2x = 3x + 6
  d. 3n + 2n = 5n
  e. 3(n + 2) = 3n + 6

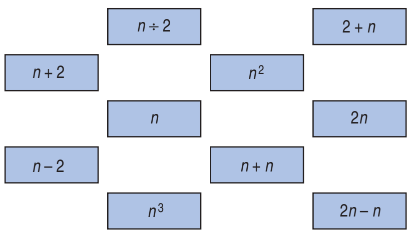
  and a/a = 1, 2a/a = 2, … and 4a/2 = 2a, 6a/2 = 3a, etc.

- The number in each cell is the result of adding the numbers in the two cells beneath it.



  Write an expression for the number in the top cell.
  Write your expression as simply as possible.

- Here are some algebra cards.



  a. Which card will always give the same answer as n/2?
  b. Which card will always give the same answer as n × n?
  c. Two cards will always give the same answer as 2 × n. Which cards are they?
  d. When the expressions on three of the cards are added together they will always have the same answer as 5n. Which cards are they?
  e. Write a new card that will always give the same answer as 3n + 2n.

- Draw some shapes that have a perimeter of 6x + 12.

- The answer is 2a + 5b. What was the question?

As outcomes, Year 8 pupils should, for example:

Simplify or transform linear expressions by collecting like terms; multiply a single term over a bracket.

Understand the application of the distributive law to arithmetic calculations such as:

- $7 \times 36 = 7(30 + 6) = 7 \times 30 + 7 \times 6$
- $7 \times 49 = 7(50 - 1) = 7 \times 50 - 7 \times 1$

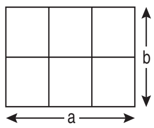
Know and use the distributive law for multiplication:

- over addition, namely $a(b + c) = ab + ac$
- over subtraction, namely $a(b - c) = ab - ac$

Recognise that letters stand for numbers in problems. For example:

- Simplify these expressions:
  a. $3a + 2b + 2a - b$
  b. $4x + 7 + 3x - 3 - x$
  c. $3(x + 5)$
  d. $12 - (n - 3)$
  e. $m(n - p)$
  f. $4(a + 2b) - 2(2a + b)$

- Write different equivalent expressions for the total length of the lines in this diagram.

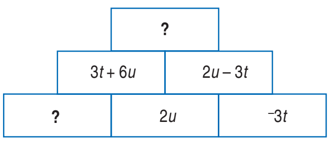


  Simplify each expression as far as possible.
  What did you discover?

- In a magic square the sum of the expressions in each row, column and diagonal is the same. Show that this square is a magic square.

$m - p$	$m + p - q$	$m + q$
$m + p + q$	m	$m - p - q$
$m - q$	$m - p + q$	$m + p$

- The number in each cell is made by adding the numbers in the two cells beneath it.
  Fill in the missing expressions.
  Write each expression as simply as possible.



As outcomes, Year 9 pupils should, for example:

Simplify or transform expressions by taking out single-term common factors.

Continue to use the distributive law to multiply a single term over a bracket.

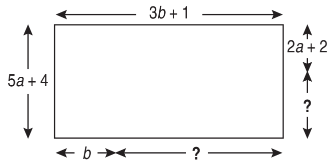
Extend to taking out single-term common factors.

Recognise that letters stand for numbers in problems. For example:

- Simplify these expressions:
  $3(x - 2) - 2(4 - 3x)$
  $(n + 1)^2 - (n + 1) + 1$

- Factorise:
  $3a + 6b = 3(a + 2b)$
  $x^3 + x^2 + 2x = x(x^2 + x + 2)$

- Write an expression for each missing length in this rectangle. Write each expression as simply as possible.



- The area of a rectangle is $2x^2 + 4x$.
  Suggest suitable lengths for its sides.
  What if the perimeter of a rectangle is $2x^2 + 4x$?

- Prove that the sum of three consecutive integers is always a multiple of 3.
  Let the integers be n, $n + 1$ and $n + 2$.
  Sum $= n + (n + 1) + (n + 2)$
  $= 3n + 3$
  $= 3(n + 1)$, which is a multiple of 3.

- Think of a number, multiply by 3, add 15, divide by 3, subtract 5. Record your answer.
  Try other starting numbers. What do you notice?
  Use algebra to prove the result.

- What is the smallest value you can get for $x^2 - x$ if x is an integer?
  What is the smallest value if x does not have to be an integer?
  Use a **spreadsheet** to help.

- Prove that the value of $x^3 - x + 9$ is divisible by 3 for any integer value of x.