

2.1.3 Manipulation

Name: _____ Class: _____ Date: _____

KEY WORDS factorise

<!-- Session 2 native-skill companion -->

Objective

Practise manipulation within the labelled native lessons. Public original tasks; locally authored answer guidance.

1 Key knowledge and worked examples

■ Collecting, expanding and factorising expressions · Foundation

Collect like terms, distribute over brackets and reverse expansion by factorising. Take out a common factor first. Expand products of two binomials and factorise simple monic quadratics and differences of squares.

$$(x + 2)(x + 3) = x^2 + 5x + 6$$

$3x+4x=7x$; $3x+4y$ cannot be combined. Expand $2(x+3)=2x+6$ and $(x+2)(x+3)=x^2+5x+6$. Reverse the last identity to factorise x^2+5x+6 . Difference of squares gives $x^2-9=(x-3)(x+3)$. The same expansion rule works with given roots: $(\sqrt{2}+1)(\sqrt{2}-1)=2-1=1$.

x^2 and x are unlike terms. A factor multiplies a whole expression; it is not a separate added term. Check a proposed factorisation by expanding it.

AQA A4 Foundation includes collecting, single brackets, common factors, two-binomial expansion and monic quadratic factorisation. Higher adds non-monic factorisation, more binomials, surds and algebraic fractions.

■ Collecting, expanding and factorising expressions · Higher

Collect only like terms. Distribute multiplication over every term in a bracket, including signs. Factorising reverses expansion. Use common factors first; then pairs for a quadratic. Algebraic fractions may cancel common factors, with forbidden denominator values stated.

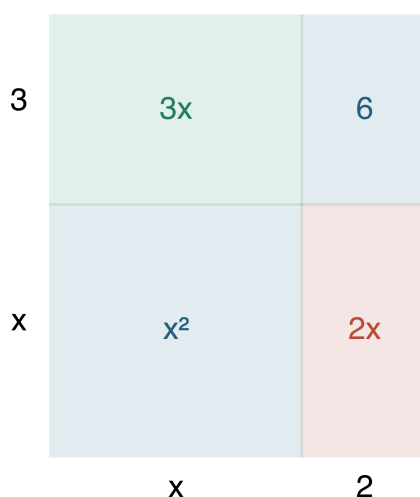
$$(x + 2)(x + 3) = x^2 + 5x + 6$$

$3x+4x=7x$, but $3x+4y$ cannot be combined. Expand $2(x+3)=2x+6$ and $(x+2)(x+3)=x^2+5x+6$. Reverse the last result to factorise x^2+5x+6 . Difference of squares gives $x^2-9=(x-3)(x+3)$.

For Higher, $2x^2+5x+2=(2x+1)(x+2)$, and $(x^2-9)/(x-3)=x+3$ only when $x \neq 3$. Also $(x+1)(x+2)(x+3)=x^3+6x^2+11x+6$. x^2 and x are unlike terms. Cancelling across a sum is invalid; factor the whole expression first. A simplified fraction must retain values excluded by its original denominator.

AQA A4 Foundation includes collecting, single brackets, common factors, two-binomial expansion and monic quadratic factorisation. Higher adds non-monic factorisation, more binomials, surds and algebraic fractions.

$$(x + 2)(x + 3) = x^2 + 5x + 6$$



Original native-lesson illustration; labels belong to its worked example.

2 Practice

2.1 (Foundation) Find the coefficient of x in $3x+4x$.

2.2 (Foundation) Find the constant term after expanding $2(x+3)$.

2.3 (Foundation) Find the coefficient of x in $(x+2)(x+3)$.

3 Exam-style questions

3.1 Decide whether this claim is true. Justify with a concrete calculation or counterexample: The terms $3x$ and $4y$ can be collected to give $7xy$.

Solutions

2.1 Add coefficients $3+4$.

2.2 Distribute 2 to both terms; $2 \times 3 = 6$.

2.3 The cross terms are $3x+2x=5x$.

3.1 False. At $x=1, y=2$, $3x+4y=11$, while $7xy=14$. The terms have different variable parts and cannot be collected as like terms.

Local review guidance: show the chosen method; give the checked result; explain the condition or failed shortcut. This is authored classroom guidance.