

Algebraic Factorisation SUMMARY

For Year level(s): 10, 11, 12

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This material relates to:

Year 10

Factorise algebraic expressions by taking out a common algebraic factor (ACMNA230)

Expand binomial products and factorise monic quadratic expressions using a variety of strategies (ACMNA233)

Solve simple quadratic equations using a range of strategies (ACMNA241)

10A

Investigate the concept of a polynomial and apply the factor and remainder theorems to solve problems (ACMNA266)

Describe, interpret and sketch parabolas, hyperbolas, circles and exponential functions and their transformations (ACMNA267)

Apply understanding of polynomials to sketch a range of curves and describe the features of these curves from their equation (ACMNA268)

Factorise monic and non-monic quadratic expressions and solve a wide range of quadratic equations derived from a variety of contexts (ACMNA269)

Year 11 Methods

Recognise features of the graphs of $y = x^2$, $y = a(x - b)^2 + c$, and $y = a(x - b)(x - c)$ including their parabolic nature, turning points, axes of symmetry and intercepts (ACMMM007)

Solve quadratic equations using the quadratic formula and by completing the square (ACMMM008)

Solve cubic equations using technology, and algebraically in cases where a linear factor is easily obtained. (ACMM019)

Rationale for Use

It is expected that students will have access to an array of practice material in the form of text books or school prepared exercises. The purpose of the AMSI materials and links is to support the development of **understanding** and **reasoning** about the concepts involved. They complement and enhance the teacher instruction elements of normal classroom instruction.

Short Explanation

Factorisation of functions is a means of breaking them into their component parts. Numerical factors provide information about how the parent function has been dilated (stretched). Algebraic factors, and specifically **linear ones**, give us information about where the curve

touches or cuts the x-axis. This is important for curve sketching. As can be seen from the list of related material above, factorisation is a vital skill for higher level mathematics.

List of Resources

For an overview of algebraic factorisation look at: [AMSI SAM Module on Factorisation](#)

The list below sets out the order in which different techniques should be employed when factorising algebraic expressions. They move from easiest to hardest.

Also, by extracting simpler factors it is then easier to see hints for other factors that may have previously been hidden. When this happens it may be necessary to go back up the list and use earlier methods in the list.

Alongside each method is a note indicating what year level the concept is first encountered by students.

- 1) Common Factors
 - a. Numerical Year 8
[Khan Academy - Factoring polynomials by taking a common factor](#)
 - b. Algebraic Year 10
[Khan Academy - Factoring polynomials by taking a common factor](#)
 - c. Grouping Year 10
[Khan Academy Factoring by Grouping](#)
- 2) Recognising Common Forms
 - a. Perfect Squares Year 10
 Exploring Quadratics and Parabolas Activity (pdf)
 Exploring Perfect Squares; and **Am I a Perfect Square?** (Geogebra Applets)
 - b. Difference of Two Squares Year 10
 Exploring the Difference of Two Squares Activity (pdf)
 Difference of Two Squares – Geogebra applet
 - c. Perfect Cubes Year 11 – in development
 - d. Sum of Two Cubes Year 11 – in development
 - e. Difference of Two Cubes Year 11 – in development
- 3) General Method for Quadratics Year 10
[NRICH Finding Factors](#)
- 4) Null Factor law Year 10A
[Khan Academy Zero Product Property](#)
- 5) Quadratic Formula Year 11
[AMSI SAM Module Factoring Quadratics](#)
- 6) Completing the Square Year 11
- 7) [AMSI SAM Module Factoring Quadratics](#)
- 8) Long Division (Last Resort only) Not formally covered

FURTHER INFORMATION

Interesting Problems to think about that use algebraic thinking can be found at [NRICH](#)

NRICH [Parabolic Patterns](#), and in [RESOLVE: Real World Algebra](#)