# 01 Factoring

Content Area: **Math**
Course(s):
Time Period: **Full Year**
Length: **4 Weeks**
Status: **Published**

## General Overview, Course Description or Course Philosophy

This course is an extension of Algebra 1. Emphasis is upon the development of insights into the structure of algebra as a deductive process. The content includes function foundations, equations and inequalities, polynomial functions and equations, rational functions and equations, radical expressions and equations, exponential and logarithmic functions and equations, trigonometric functions and equations, introductory data analysis, and probability.

## OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Objectives:

- Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication.
- Rules and properties of arithmetic and algebra can be applied together with equivalence to transform polynomial expressions.

Essential Questions:

- How can polynomials be simplified and applies to solve problems?
- Can two algebraic expressions that appear to be different be equivalent?
- How are properties of real numbers related to polynomials?

Enduring Understanding:

- The properties of integers apply to polynomials
- Factors are subset of a product and with the distributive property allow options in solving polynomials
- Multiplying and factoring polynomials are related.
- Solving polynomials involves the reversal of operations, the distributive property and rules of exponents

## CONTENT AREA STANDARDS

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| MA.K-12.1 | Make sense of problems and persevere in solving them. |
| MA.K-12.4 | Model with mathematics. |
| MA.K-12.6 | Attend to precision. |
| MA.K-12.7 | Look for and make use of structure. |
| MA.K-12.8 | Look for and express regularity in repeated reasoning. |
| MA.A-APR.A.1 | Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. |
| MA.A-SSE.A.1 | Interpret expressions that represent a quantity in terms of its context. |
| MA.A-SSE.A.2 | Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$. |
| MA.A-SSE.A.1a | Interpret parts of an expression, such as terms, factors, and coefficients. |
| MA.A-SSE.A.1b | Interpret complicated expressions by viewing one or more of their parts as a single entity. |

## RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

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|---|---|
| CS.K-12.2.a | Cultivate working relationships with individuals possessing diverse perspectives, skills, and personalities. |
| CS.K-12.2.b | Create team norms, expectations, and equitable workloads to increase efficiency and effectiveness. |
| CS.K-12.2.c | Solicit and incorporate feedback from, and provide constructive feedback to, team members and other stakeholders. |
| CS.K-12.2.d | Evaluate and select technological tools that can be used to collaborate on a project. |
| CS.K-12.3.b | Decompose complex real-world problems into manageable sub-problems that could integrate existing solutions or procedures. |
| CS.K-12.3.c | Evaluate whether it is appropriate and feasible to solve a problem computationally. |
| LA.K-12.NJSLSA.R7 | Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words. |
| TECH.9.4.2.CT.3 | Use a variety of types of thinking to solve problems (e.g., inductive, deductive). |
| TECH.9.4.2.TL.4 | Navigate a virtual space to build context and describe the visual content. |
| TECH.9.4.2.TL.5 | Describe the difference between real and virtual experiences. |
| TECH.9.4.2.GCA | Global and Cultural Awareness |

## STUDENT LEARNING TARGETS

### Declarative Knowledge

Students will understand that:

- Polynomial expressions and equations can be written in specific forms (factored, standard, or other) for specific purposes (solving, identifying critical attributes, graphing)

## Procedural Knowledge

Students will be able to:

- identify the different parts of an expression
- explain the meaning of different parts of the expression using the context of the problem
- translate linear, exponential, and quadratic expressions into English and vice versa
- complete the steps of the mathematical modeling cycle (Problem, Formulate, Compute, Interpret, Validate, Report) that relate to the target
- translate complex mathematical expressions with symbol notation into English and vice versa
- translate complicated mathematical expressions by identifying one or more of their parts as a single entity
    - (e.g., interpret P(1+r)n as the product of P and a factor (1+r)n which depends on the variables r and n and not P
- identify linear, exponential, and quadratic structures in expressions
- rewrite expressions into equivalent expressions using one or multiple factoring techniques such as:
    - Greatest common factor (GCF)
    - Grouping
    - Difference of two squares
    - Sum or difference of two cubes
    - Perfect square trinomial
    - General method for factoring quadratics
- describe the technique(s) used to rewrite expressions
- explain why polynomials are closed under the operations of addition, subtraction, and multiplication
- Define and identify polynomials
- Add polynomials
- Subtract polynomials
- Multiply polynomials

## EVIDENCE OF LEARNING

## Formative Assessments

- Class Discussion
- Teacher observation
- Exit/Entrance Tickets
- Classwork
- Homework
- Track progress of "Factor Facts" using worksheets generated from Kuta Software

## Summative Assessments

- Quizzes
- Tests
- Projects

## RESOURCES (Instructional, Supplemental, Intervention Materials)

- Sullivan Algebra and Trigonometry Textbook (review 1)
- Khan Academy
- Arlington Algebra Project
- Illustrative Mathematics
- Illustrative Mathematics Task by Standard
- Deltamath
- Desmos
    - https://teacher.desmos.com/activitybuilder/custom/5fbe4b517750870d2bc10a76?collections=5ff0ee0c289a1a0d5c68023b
    - https://teacher.desmos.com/collection/6024a483750e0a0d56d996a3

## INTERDISCIPLINARY CONNECTIONS

Interdisciplinary connections are frequently addressed through modeling and application problems whereby students solve and analyze situations such as projectiles in physics, acid-base reactions in chemistry, mortgages, stocks and bonds in finance. Examples can be found in topic specific textbook problems and digital resources.

## ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.