

Unit # 5: Factoring and Applications

Content Area: **Mathematics**
Course(s): **College Prep Math 2**
Time Period: **April**
Length: **14 days**
Status: **Published**

Unit Overview

This unit begins with the review of common factor and greatest common factor. Emphasis in this unit will be on special techniques of factoring polynomials such as factoring difference of two squares and perfect square trinomials.

Enduring Understandings

- Factors are a 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.
- The same pattern can be found in many different forms.

Essential Questions

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

Standards / Indicators / Student Learning Objectives (SLOs)

- SWBAT factor by grouping .
- SWBAT factor trinomials after factoring out the greatest common factor.
- SWBAT solve quadratic equations by factoring.
- SWBAT factor a difference of two squares.
- SWBAT factor a perfect square trinomial.
- SWBAT factor out the greatest common factor of a polynomial.
- SWBAT factor trinomials by grouping when the coefficient of the quadratic (squared) term is greater than 1.
- SWBAT factor trinomials using bottoms up method , the box method, or any other approved method.
- SWBAT factor trinomials with a coefficient of 1 for the quadratic (squared) term.
- SWBAT find the greatest common factor of a list of variable terms.
- SWBAT find the greatest common factor of a list of numbers.

MA.K-12.1	Make sense of problems and persevere in solving them. Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MA.A-SSE.B.3a	Factor a quadratic expression to reveal the zeros of the function it defines.
MA.K-12.8	Look for and express regularity in repeated reasoning. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
MA.A-APR.A	Perform arithmetic operations on polynomials
MA.A-APR.C.5	Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n , where x and y are any numbers, with coefficients determined for example by Pascal’s Triangle.
MA.A-REI.B.4	Solve quadratic equations in one variable.
MA.A-REI.B.4b	Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b .

Lesson Titles

- Factoring Trinomials
- Factoring Trinomials by Grouping
- Factoring Trinomials by FOIL
- Factors; The Greatest Common Factor
- Solving Quadratic Equations by Factoring
- Special Factoring Techniques

Career Readiness, Life Literacies & Key Skills

WRK.K-12.P.4

Demonstrate creativity and innovation.

WRK.K-12.P.5

Utilize critical thinking to make sense of problems and persevere in solving them.

Inter-Disciplinary Connections

LA.RH.11-12.4

Determine the meaning of words and phrases as they are used in a text, including analyzing how an author uses and refines the meaning of a key term over the course of a text (e.g., how Madison defines faction in Federalist No. 10).

LA.WHST.11-12.1.E

Provide a concluding paragraph or section that supports the argument presented.

SCI.HS-ESS1-4

Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.

Instructional Strategies, Learning Activities, and Blooms/DOK:

- Explanation , examples, and practice factoring trinomials by grouping.
- Explanation , examples, and practice factoring trinomials using foil and the complete factoring methods.
- Explanation , examples, and practice factoring trinomials
- Explanation , examples, and practice finding and factoring out the greatest common factor.
- Explanation , examples, and practice using special factoring techniques.
- Tutoring during Delsea One

Equity Considerations

Asian American and Pacific Islander Mandate

Students will engage in learning different AAPI mathematicians that have contributed to mathematical processes and developments.

https://www.youtube.com/watch?v=_pUHsSapfu0

<https://www.ngpf.org/blog/math/math-monday-celebrating-aapi-mathematicians/>

<https://ideas.ted.com/8-asian-americans-and-pacific-islanders-whose-innovations-have-changed-your-life-really/>

LGBTQ and Disabilities Mandate

Students will engage in learning different mathematicians from the LGBTQ community along with those with disabilities that have made significant impacts in math.

LGBTQ:

[Sir Francis Bacon \(1561–1626\)](#)

[Florence Nightingale](#)[Francis Bacon |](#)
[Philosophy, Scientific Method, & Facts |](#)
[Britannica\(1820-1910\)](#)

[George Washington Carver \(1861-1943\)](#)

[Sara Josephine Baker \(1873-1945\)](#)

[Alan Turing \(1912-1954\)](#)

[Allan Cox \(1926-1987\)](#)

[Sally Ride \(1951-2012\)](#)

[Ben Barres \(1954-2017\)](#)

[Ruth Gates \(1962-2018\)](#)

[Tim Cook \(1960\)](#)

STEM

Disabilities:

[Leonardo da Vinci \(1452-1519\)](#)- Dyslexia

[Isaac Newton \(1664-1727\)](#)- Epilepsy

[Thomas Edison \(1847-1931\)](#)- Hearing

[Charles Darwin \(1809-1882\)](#)- Stutter,
Dyslexia

[Alexander Graham Bell \(1847-1922\)](#)- Deaf

[Albert Einstein \(1879-1955\)](#)- Aspergers

[Florence B. Seibert \(1897-1991\)](#)- Mobility

[Stephen Hawking \(1942-2019\)](#)- ALS

[John Forbes Nash \(1928-2015\)](#)-
Schizophrenia

[Temple Grandin \(1947\)](#)- Autism

Climate Change

Connection to math and STEM processes: Students will be able to build on previously taught science material particularly carbon footprints in regards to the mathematically processes centered around it.

<http://www.climatechangeeducation.org/k-12/math/index.html>

<https://www.oercommons.org/authoring/7876-climate-change-cross-curricular-math-english-scien/view>

SCI.HS-ESS2-1

Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.

Modifications

ELL Modifications

- 1:1 testing
- Assess ELL students continuously using formative assessment methods
- Be flexible with time frames and deadlines
- Intentional scheduling/grouping with student/teacher who speaks the same language if possible

IEP and 504 Modifications

- Allowing co-teaching with general education and special education teachers in the same classroom so that the special education teacher can re-teach students with special needs in a different way in a smaller group (pulled to the side)
- Allowing student to take notes in class for reinforcement but also providing a copy of completed/correct notes to study from
- If not in a co-teaching setting allowing time in the schedule for a special education teacher to consult with general education teachers on what specifically can be modified or how to paraphrase things in a different way specific to that lesson
- Modeling and showing lots of examples

G & T Modifications

- Additional reinforcement activities soliciting a deeper understanding of curriculum.
- Different test items.
- Peer leadership or mentoring
- Provide additional rigorous challenge problems for advanced students

At Risk Modifications

- Additional help during tutoring/Delsea One/Academic Enrichment
- Guided notes
- Hands-on Instruction
- Modeling and showing lots of examples
- Review, restate, reword directions
- Study guides
- Tutoring during Delsea One
- Visuals

Formative Assessment

- Accuplacer practice problem
- Begin the homework assignment and periodically check answers together
- Class discussions
- Graded classwork
- Graded homework
- Guided practice
- Individual practice
- Oral questioning
- Oral response
- Teacher observation
- Warm up problems - factoring trinomials using factor by grouping
- Warm up problems - factoring trinomials using special techniques such as difference of 2 squares and perfect square trinomials
- Warm up problems - finding the greatest common factor and factoring it out
- Written work

Resources & Materials

- Computer Generated Warm Ups (see formative assessment section for specific topics)
- Internet worksheets (see formative assessment section for specific topics)

- Teacher made worksheets (see formative assessment section for specific topics)
- Text: Introductory Algebra (2010) (Ninth Edition)
- Warm up problems (see formative assessment section)

Technology

- Chrome book
- Internet Sources: <http://accuplacer.collegeboard.org/students>
- Math XL
- Smart Board

TECH.8.1.12.B.CS1

Apply existing knowledge to generate new ideas, products, or processes.

TECH.8.1.12.C

Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.