Unit 3: Exponents and Polynomials

Content Area: **Mathematics**
Course(s): **Pre Algebra**
Time Period: **Generic Time Period**
Length: **13 weeks**
Status: **Published**

Unit Overview

During this unit, students will simplify integer exponential expressions, perform addition, subtraction, and mulitplication of polynomials, and factor quadratics by using grouping and when a = 1.

Throughout this unit, students will continue to improve their fluency with basic mathematical concepts through the use of Exact Path instructional software. This software is designed to identify students' strengths and weaknesses and generate programs of review, remediation, and growth through hundreds of interactive computer games. Lessons are engaging, individualized, and self-paced, and instructive feedback is provided to students and their teacher. The teacher will monitor student learning and assist students as they continue to work with Exact Path software throughout the unit.

By the end of the year, adminster the Link IT G8 NJSLS Form C

Transfer

Students will be able to independently use their learning to...

- simplify integer exponential expressions
- add polynomials
- subtract polynomials
- multiply polynomials
- determine the gcf of a polynomial
- factor out the gcf of a polynomial
- factor by grouping
- factor when a = 1

For more information, read the following article by Grant Wiggins.

http://www.authenticeducation.org/ae_bigideas/article.lasso?artid=60

Meaning

Understandings

Students will understand that...

- There is validity in simplifying integer exponents
- polynomials can be added, subtracted and multiplied
- determining the gcf will help factor polynomials
- factoring by gcf will help to factor by grouping polynomials with 4 terms
- factoring polynomials when a = 1 can be done by factor by grouping

Essential Questions

Students will keep considering...

- How do you multiply two powers with the same base?
- How do you divide two powers with the same base?
- Why 2^{-3} is the same as 1/8.
- How do you add two polynomials?
- How do you subtract two polynomials?
- How do you multiply two polynomials?
- How do you factor out the gcf?
- How do you factor by grouping?
- How do you factor when a = 1?

Application of Knowledge and Skill

Students will know...

- what an exponent represents
- what a negative exponent represents
- how to combine like terms
- the rule for multiplying monomials
- how to identify the gcf
- how to divide monomials
- integer operation rules

Students will be skilled at...

- simplifying integer exponents
- performing addition, subtraction, and multiplication of polynomials
- factoring using gcf
- factoring by grouping
- factoring quadratics when a = 1

Academic Vocabulary

power, exponent, base, polynomial, monomial, binomial, trinomial, quadratic, greatest common factor (GCF)

Learning Goal 1

Students will be able to simplify integer exponent expressions

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP11	Use technology to enhance productivity.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.1.12.A.CS2	Select and use applications effectively and productively.
TECH.8.1.12.E.CS1	Plan strategies to guide inquiry.
TECH.8.1.12.E.CS4	Process data and report results.
TECH.8.1.12.F.CS2	Plan and manage activities to develop a solution or complete a project.
TECH.8.1.12.F.CS3	Collect and analyze data to identify solutions and/or make informed decisions.
TECH.8.2.12.A.CS2	The core concepts of technology.

Target 1--(Level of Difficulty - 2: Comprehension)

SWBAT simplify positive integer exponents.

MA.K-12.2	Reason abstractly and quantitatively.
MA.8.EE.A.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.7	Look for and make use of structure.

Target 2--(Level of Difficulty - 2: Comprehension)

SWBAT simplify integer exponent expressions

MA.K-12.2	Reason abstractly and quantitatively.
MA.8.EE.A.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.7	Look for and make use of structure.

Learning Goal 2

Students will be able to perform addition, subtraction, and multiplication to two or more polynomials.

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP11	Use technology to enhance productivity.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.1.12.A.CS2	Select and use applications effectively and productively.
TECH.8.1.12.E.CS1	Plan strategies to guide inquiry.
TECH.8.1.12.E.CS4	Process data and report results.
TECH.8.1.12.F.CS2	Plan and manage activities to develop a solution or complete a project.
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TECH.8.2.12.A.CS2	The core concepts of technology.

Target 1--(Level of Difficulty - 1: Retrieval)

SWBAT classify polynomials

MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
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.S-IC.A.1	Understand statistics as a process for making inferences about population parameters

	based on a random sample from that population.

Target 2--(Level of Difficulty - 2: Comprehension)

SWBAT simplify polynomials by adding or subtracting

MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
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.S-IC.A.1	Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
MA.S-IC.B.6	Evaluate reports based on data.

Target 3--(Level of Difficulty - 3: Analysis)

SWBAT multiply and simplify polynomials

MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.7	Look for and make use of structure.
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.

Learning Goal 3

Students will be able to factor polynomials

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP11	Use technology to enhance productivity.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.1.12.A.CS2	Select and use applications effectively and productively.
TECH.8.1.12.E.CS1	Plan strategies to guide inquiry.
TECH.8.1.12.E.CS4	Process data and report results.
TECH.8.1.12.F.CS2	Plan and manage activities to develop a solution or complete a project.
TECH.8.1.12.F.CS3	Collect and analyze data to identify solutions and/or make informed decisions.
TECH.8.2.12.A.CS2	The core concepts of technology.

Target 1 (Level of Difficulty - 2: Comprehension)

SWBAT factor polynomials by using GCF

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.7	Look for and make use of structure.
MA.A-APR.B.3	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.

Target 2--(Level of Difficulty - 2: Comprehension)

SWBAT factor polynomials by grouping method

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.A-SSE.B.3	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
MA.A-SSE.B.3a	Factor a quadratic expression to reveal the zeros of the function it defines.
MA.K-12.7	Look for and make use of structure.

Target 3--(Level of Difficulty - 3: Analysis)

SWBAT factor quadratics when a = 1

MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.A-SSE.B.3	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
MA.A-SSE.B.3a	Factor a quadratic expression to reveal the zeros of the function it defines.
MA.K-12.7	Look for and make use of structure.

Formative Assessment and Performance Opportunities

- Class Poll (0-4, Thumps Up/Down...)
- Clickers
- Do Nows
- Exit Tickets

- Guided Practice
- Homework
- Learning Games
- Questioning
- Quizzes
- Self-Assessed Scale Rating
- Whiteboard/Communicator Opportunities

Summative Assessment

- Class Assessments
- Common Assessments (Unit Exam)
- Exact Path
- LinkIt assessments
- Station Activities

21st Century Life and Careers and Technology

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP3	Attend to personal health and financial well-being.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CAEP.9.2.12.C.2	Modify Personalized Student Learning Plans to support declared career goals.
CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.1.12.A.CS2	Select and use applications effectively and productively.
TECH.8.1.12.D.CS2	Demonstrate personal responsibility for lifelong learning.

Accomodations and Modifications

- 504 Accommodations
- Calculators
- Exact Path
- Guided Notes
- IEP Modifications
- Learning Centers/Stations
- Manipulatives

- Projects
- Scaffolding Questions
- Small Group Instruction
- Technology

Unit Resources

- Albert
- Exact Path
- Khan Academy
- Kuta Software
- Quizzizz
- Textbook Resource Kit
- Textbook: Algebra I
- Textbook: Pre-Algebra (Holt McDougal, 2012)

Interdisciplinary Connections

Real world applications involving mulitplying polynomials to find the area which helps students analyze engineering decisions (MA.9-12.A.APR.D.6)

9-12.HS-ETS1-1.1.1	Analyze complex real-world problems by specifying criteria and constraints for successful solutions.