

COURSE: Introduction to Algebra
INSTRUCTOR: Darrell Roecker
TEXTBOOK: Algebra, AGS 1998

COURSE PURPOSE:

The student will...

1. develop competence in basic algebra skills in order to progress successfully through the math curriculum.
2. use problem solving and mathematical modeling using algebraic techniques.
3. develop effective uses of handheld technology.
4. develop the ability to effectively communicate and justify solutions to a variety of problems.
5. see mathematics as a part of God's logical order and expression in creation.

COURSE OUTCOMES:

The student will...

1. demonstrate knowledge and use of algebra facts, terminology, concepts, and principles.
2. demonstrate the ability to solve various equations with one variable.
3. demonstrate the ability to factor basic expressions.
4. demonstrate competency with exponents in variable expressions.
5. develop basic mathematical modeling skills.
6. analyze data and present the results verbally, technologically, and in written form.
7. demonstrate the ability to solve problems involving polynomials.
8. demonstrate knowledge and use of the coordinate plane.
9. demonstrate ability in basic problem solving.
10. complete assignments as a faithful steward of God's gifts and talents.

COURSE GOALS:

The student will...

1. understand the need to use algebra in the world God has given them in order to be good stewards of his/her gifts and talents.
2. apply algebraic problem solving and modeling in order to analyze a situation and develop a solution.
3. appreciate an atmosphere of Christian love and acceptance in which positive peer pressure promotes spiritual and academic growth. (I Corinthians 12:4-6)
4. serve God by completing jobs with accountability. (Galatians 6:4-5)

COURSE OUTLINE:

Unit One. Basics of Algebra

The student will...

- solve simple equations.
- recognize inequalities.
- translate verbal expressions, equations, and inequalities.
- memorize mathematical properties.
- memorize the order of operations.

- combine like terms.
- simplify like terms.
- simplify algebraic expressions.
- work with ratios, rates and variable expressions to solve problems.

Textbook: pages 16-20, 28-55, 88-111

Number of days: 20-25

S.O.: 2, 4, 6

D.O.: 2.3, 4.2, 4.3

W.S.S.: B12.2, B12.3,

Unit Two. Real Numbers.

The student will...

- study and construct real number lines.
- add and subtract real numbers.
- multiply and divide real numbers.
- learn absolute value and opposites.
- use the distributive property to solve problems in different ways.
- problem solve.

Textbook: pages 1-14

Number of days: 20-25

S.O.: 2, 4, 6

D.O.: 2.1, 2.3, 4.2, 4.3

W.S.S.: B12.3, A 12.5

Unit Three. Solving Equations.

The student will...

- solve one-step equations using addition, subtraction, multiplication, and division.
- solve equations with more than one step.

Textbook: pages 56-87

Number of days: 20-25

S.O.: 2, 4, 6

D.O.: 2.3, 4.2, 4.3

W.S.S.: F12.1, F12.4

Unit Four. Polynomials.

The student will...

- learn and apply the laws of exponents.
- add and subtract polynomials.
- multiply and divided polynomials.
- problem solve.
- convert numbers to and from scientific notation.
- solve problems using scientific notation.

Textbook: pages 112-139

Number of days: 20-25
S.O.: 2, 4, 6
D.O.: 2.1, 2.3, 4.2, 4.3
W.S.S.: F12.2

Unit Five. Factoring.

The student will...

- find the greatest common factor of two or more numbers.
- solve equations using factoring.
- solve problems using factoring.
- learn and use the FOIL (first, outside, inside, last) method.
- factor trinomials ($x^2 + bx + c$).
- find the prime factorization of numbers.

Textbook: pages 140-167, 201-229
Number of days: 20-25
S.O.: 2, 4, 6
D.O.: 2.3, 4.2, 4.3
W.S.S.: B12.2

Unit Six. Data, Statistics, and Probability.

The student will...

- organize data into graphs.
- read and interpret graphic representations.
- determine range and measures of central tendency.
- compute probabilities and complementary events involving statistics.

Textbook: pages 169-199
Number of days: 5-10
S.O.: 2, 4, 6
D.O.: 2.3, 4.2, 4.3
W.S.S.: B12.1

Unit Seven. Graphing.

The student will...

- recognize and construct a coordinate plane with four quadrants, X axis, and Y axis.
- graph ordered pairs.
- find the slope of a line ($y = mx + b$).
- graph linear equations.

Textbook: pages 230-244
Number of days: 20-25
S.O.: 2, 4, 6
D.O.: 2.3, 4.2, 4.3
W.S.S.: F8.2

Unit Eight. Functions. (Time permitting)

The student will...

- learn domain and range of functions.
- solve function problems.

Textbook: pages 246-247 / supplementary materials

Number of days: 5

S.O.: 2, 4, 6

D.O.: 2.3, 4.2, 4.3

W.S.S.: F8.2, F12.3

INSTRUCTIONAL STRATEGIES:

Review/Quizzes	15%
Lecture	25%
Group Work	20%
Individual Work	40%

GRADING:

Quizzes	20%
Tests	50%
Notes	5%
Homework	25%

TERMS:

absolute value
additive inverse
algebraic expression
area
axis
binomial
coefficient
composite
consecutive
coordinate
difference
distributive property
equation
equivalent expression
exponent
factor
FOIL
fraction
GCF
integer
LCM
like terms
linear equation
monomial
multiplicative inverse
opposite
order of operations

parallel lines
perimeter
polynomial
prime factorization
prime number product
quotient
rational numbers
real number
reciprocal
root
simplify
solution
solve
substitution
sum
term
undefined
variable
whole numbers

Appendix
Math Department Outcomes
Course Math Skills for Life
Instructor: Mr. Darrell Roecker

Unit One: Basics of Algebra

2.1 Develops a repertoire of problem solving techniques

2.3.1 deduce tentative conclusions to real-life problems

2.3.2 justify the validity of conclusions

2.3.3 derive valid solutions

4.2 Documents a logical sequence of symbolic manipulation.

4.3 Effectively expresses mathematical ideas in written form.

Unit Two: Real Numbers

2.3.1 deduce tentative conclusions to real-life problems

2.3.2 justify the validity of conclusions

2.3.3 derive valid solutions

4.2 Documents a logical sequence of symbolic manipulation

4.3 Effectively expresses mathematical ideas in written form.

Unit Three: Solving Equations

2.3.1 deduce tentative conclusions to real-life problems

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Unit Four: Polynomials

2.1 Develops a repertoire of problem solving techniques.

2.3.1 deduce tentative conclusions to real-life problems

2.3.2 justify the validity of conclusions

2.3.3 derive valid solutions

4.2 Documents a logical sequence of symbolic manipulation

4.3 Effectively expresses mathematical ideas in written form.

Unit Five: Factoring

2.3.1 deduce tentative conclusions to real-life problems

2.3.2 justify the validity of conclusions

2.3.3 derive valid solutions

4.2 Documents a logical sequence of symbolic manipulation

4.3 Effectively expresses mathematical ideas in written form.

Unit Six: Data, Statistics, Probability

2.3.1 deduce tentative conclusions to real-life problems

2.3.2 justify the validity of conclusions

2.3.3 derive valid solutions

4.2 Documents a logical sequence of symbolic manipulation

4.3 Effectively expresses mathematical ideas in written form.

Unit Seven: Graphing

2.3.1 deduce tentative conclusions to real-life problems

2.3.2 justify the validity of conclusions

2.3.3 derive valid solutions

4.2 Documents a logical sequence of symbolic manipulation

4.3 Effectively expresses mathematical ideas in written form.

Unit Eight: Functions

2.3.1 deduce tentative conclusions to real-life problems

2.3.2 justify the validity of conclusions

2.3.3 derive valid solutions

4.2 Documents a logical sequence of symbolic manipulation

4.3 Effectively expresses mathematical ideas in written form.

Wisconsin State Standards

Unit One

B.12.2 Compare real numbers using

- order relations ($>$, $<$) and transitivity*
- ordinal scales including logarithmic (e.g., Richter, pH rating)
- arithmetic differences
- ratios, proportions, percents, rates of change

B.12.3 Perform and explain operations on real numbers (add, subtract, multiply, divide, raise to a power, extract a root, take opposites and reciprocals, determine absolute value)

Unit 2

B.12.3 Perform and explain operations on real numbers (add, subtract, multiply, divide, raise to a power, extract a root, take opposites and reciprocals, determine absolute value)

A.12.5 Organize work and present mathematical procedures and results clearly, systematically, succinctly, and correctly

Unit 3

F.12.1 Analyze and generalize patterns of change (e.g., direct and inverse variation) and numerical sequences, and then represent them with algebraic expressions and equations

F.12.4 Model and solve a variety of mathematical and real-world problems by using algebraic expressions, equations, and inequalities

Unit 4

F.12.2 Use mathematical functions* (e.g., linear*, exponential*, quadratic*, power) in a variety of ways, including

- recognizing that a variety of mathematical and real-world phenomena can be modeled* by the same type of function
- translating different forms of representing them (e.g., tables, graphs, functional notation*, formulas)
- describing the relationships among variable quantities in a problem

- using appropriate technology to interpret properties of their graphical representations (e.g., intercepts, slopes, rates of change, changes in rates of change, maximum*, minimum*)

Unit 5

F.12.2 Use mathematical functions* (e.g., linear*, exponential*, quadratic*, power) in a variety of ways, including

- recognizing that a variety of mathematical and real-world phenomena can be modeled* by the same type of function
- translating different forms of representing them (e.g., tables, graphs, functional notation*, formulas)
- describing the relationships among variable quantities in a problem
- using appropriate technology to interpret properties of their graphical representations (e.g., intercepts, slopes, rates of change, changes in rates of change, maximum*, minimum*)

Unit 6

B.12.1 Use complex counting procedures such as union and intersection of sets and arrangements (permutations* and combinations*) to solve problems

Unit 7

F.8.2 Work with linear and nonlinear patterns* and relationships in a variety of ways, including

- representing them with tables, with graphs, and with algebraic expressions, equations, and inequalities
- describing and interpreting their graphical representations (e.g., slope*, rate of change, intercepts*)
- using them as models of real-world phenomena
- describing a real-world phenomenon that a given graph might represent

Unit 8

F.8.2 Work with linear and nonlinear patterns* and relationships in a variety of ways, including

- representing them with tables, with graphs, and with algebraic expressions, equations, and inequalities
- describing and interpreting their graphical representations (e.g., slope*, rate of change, intercepts*)
- using them as models of real-world phenomena
- describing a real-world phenomenon that a given graph might represent

F.12.3 Solve linear and quadratic equations, linear inequalities, and systems of linear equations and inequalities

- numerically
- graphically, including use of appropriate technology
- symbolically, including use of the quadratic formula