Agenda

• Why Are You Here?
• What Should You Do Next?

• Unit 1 Topics
  • Ch. 1: Signed numbers
  • Ch. 2: Grouping symbols and their removal
  • Ch. 3: Solving first-degree equations
  • Ch. 4: Fractional equations
  • Ch. 5: Literal equations
  • Ch. 10: Addition and subtraction of fractions
  • Ch 11: Multiplication and division of fractions; complex fractions
Why Are You Here?

• Math Diagnostic: scored ≤5/7 on this unit
• Math Refresher courses introduced to help students succeed in quantitative coursework (RPAD 501, 503, 504, 505).
Why Are You Here?
What Should You Do Next?

(See handout.)

• “I wasn’t paying attention. I made simple calculation errors.”
• “It was so long ago that I forgot this stuff.”
• “I get anxious doing math stuff.”
• “I can’t do math stuff.”
Suggested Review Textbook


• On order at *Mary Jane Books*
Suggested Assignment

• Form a small study group.
• Divide up and do the chapter exercises in *Forgotten Algebra* for each review unit.
• Discuss your answers and teach each other what you know.
• If anything is still unclear, make an appointment with the unit instructor to get help.
Signed Numbers

Negative Numbers | Positive Numbers

-5  -4  -3  -2  -1  0  1  2  3  4  5

+1  +2  +3  +4  +5
Signed Numbers

- **Absolute value**: the distance from zero ("the origin")
- \(|-3| = \text{"absolute value of } -3\text{"} = 3\)
Adding Signed Numbers

• Like signs:
  1. Add their absolute values
  2. Keep the common sign

• Unlike signs:
  1. Subtract the smaller absolute value from the other
  2. Keep the sign of the number with the larger absolute value
Subtracting Signed Numbers

To subtract a signed number:
1. Add its opposite
Multiplying Signed Numbers

• Like signs:
  1. Multiply their absolute values
  2. Make the product positive

• Unlike signs:
  1. Multiply their absolute values
  2. Make the product negative
Dividing Signed Numbers

• Like signs:
  1. Divide their absolute values
  2. Make the quotient positive

• Unlike signs:
  1. Divide their absolute values
  2. Make the quotient negative
Order of Operations (PEMDAS)

1. **Parentheses**: perform any operations inside parentheses
2. **Exponents**: Not covered in this unit
3. **Multiply and Divide**: Working from left to right, do any multiplication and division
4. **Add and Subtract**: Working from left to right, do any addition and subtraction
Algebraic Concepts

$10zy + 3x - 5zy + 12$

variables

variable: letter or symbol used to represent some unknown quantity
Algebraic Concepts

$10zy + 3x - 5zy + 12$

**term**: symbol or group of symbols separated from other symbols by a plus or minus
Algebraic Concepts

10\text{zy} + 3x - 5\text{zy} + 12

coefficients

\underline{coefficient}: number that multiplies the variable
Algebraic Concepts

\[10zy + 3x - 5zy + 12\]

expression: sum or difference of one or more terms

- monomial expression: one term
- binomial expression: two terms
- trinomial expression: three terms
Algebraic Concepts

$10zy + 3x - 5zy + 12$

like terms

**like terms**: contain the same variable or variables and differ only in their numerical coefficients
Grouping Symbols

• Parentheses () and brackets []
• **Distributive property**: \( a(b + c) = ab + ac \)
First-Degree Equations

- Only one variable
- Involved in addition, subtraction, multiplication, and/or division
- No exponents $x^2$ or variables in denominators $\frac{1}{x}$
Solving First-Degree Equations

**Rule 1:** You can add or subtract the same term to both sides of the equation

**Rule 2:** You can multiply or divide both sides of the equation by the same nonzero number

A **solution** (or **root**) is any number that makes the equation true when that number is substituted for the variable.
Solving Equations

1. **Simplify**
   - Clear any fractions, remove parentheses, collect like terms

2. **Transpose**
   - Isolate all terms with the variable on one side, and all terms without the variable on the other

3. **Simplify**

4. **Divide**
   - Divide entire equation by the coefficient of the variable

5. **Check**
   - Substitute the solution back into original equation
Solving Equations

Not always one unique solution:
• Multiple solutions
• The entire set of real numbers
• No solution
Other Types of Equations

Fractional equation: the variable appears in the denominator
• Clear fractions and check for no solution

Proportion: An equation with two fractions, one on each side of the equation
• Cross-multiply to solve

Literal equation: Contains multiple variables
• Solve for one variable in terms of the others
Fractions

If $a$ and $b$ are integers with $b \neq 0$, then $\frac{a}{b}$ is a rational number (or fraction).

A fraction is in lowest terms when all possible common factors in the numerator and denominator have been divided out.
Addition of Fractions

With a common denominator:

\[
\frac{a}{b} + \frac{c}{b} = \frac{a + c}{b}
\]

With unlike denominators:

\[
\frac{a}{b} + \frac{c}{d} = \frac{ad}{bd} + \frac{bc}{bd} = \frac{ad + bc}{bd}
\]
Subtraction of Fractions

With a common denominator:

\[
\frac{a}{b} - \frac{c}{b} = \frac{a - c}{b}
\]

With unlike denominators:

\[
\frac{a}{b} - \frac{c}{d} = \frac{ad}{bd} - \frac{bc}{bd} = \frac{ad - bc}{bd}
\]
Multiplication and Division

Multiplication of fractions:

\[
\frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}
\]

Division of fractions:

\[
\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{ad}{bc}
\]
Complex Fractions

Complex fractions: fractions in which there are one or more fractions in the numerator and/or denominator

• Rewrite as a division problem