Intro to Algebra II

[Implement start year (2013-2014)]

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Unit #1 Linear Equations and Inequalities

Stage 1 – Desired Results

Established Goals

2009 NJCCC Standard(s), Strand(s)/CPI #
(http://www.nj.gov/education/cccs/2009/final.htm)

Common Core Curriculum Standards for Math and English
(http://www.corestandards.org/)

Create Equations A-CED: 1, 3
- Create equations that describe numbers and relationships

Reasoning with equations and inequalities A-REI: 1, 3
- Understand solving equations as a process of reasoning and explain the reasoning

21st Century Themes
(www.21stcenturyskills.org)

___ Global Awareness
_X__Financial, Economic, Business and
    Entrepreneurial Literacy
___Civic Literacy
___Health Literacy
___Environmental Literacy

21st Century Skills

Learning and Innovation Skills:
_X__Creativity and Innovation
_X__Critical Thinking and Problem Solving
_X__Communication and Collaboration

Information, Media and Technology Skills:
___Information Literacy
___Media Literacy
_X__ICT (Information, Communications and
    Technology) Literacy

Life and Career Skills:
_X__Flexibility and Adaptability
_X__Initiative and Self-Direction
_X__Social and Cross-Cultural Skills
_X__Productivity and Accountability
_X__Leadership and Responsibility

Enduring Understandings:	Essential Questions:
Students will understand that . . .	
EU 1 Algebra is a symbolic language used to model real world phenomena	**EU 1** • How can real world situations be modeled algebraically? • What are the benefits of modeling real-world situations algebraically?
EU 2 Equations and inequalities can be transformed into equivalent forms so that solutions can be found.	**EU 2** • How are mathematical operations beneficial to solving equations and inequalities? • What is the most efficient use of mathematical operations to solve equations and inequalities? • Why are there multiple ways to represent the same equation or inequality? • How can equations and inequalities be solved in multiple ways?
EU 3 Critical vocabulary will be utilized throughout this course as well as in the field of mathematics.	**EU 3** • How can critical vocabulary terms be used to better enhance the understanding of mathematics?
Knowledge: *Students will know . . .*	**Skills:** *Students will be able to . . .*
EU 1 • the appropriate use of operational signs when translating verbal phrases into expressions, equations and inequalities. • determine known and unknown variables of a real-world application • critical vocabulary for a given problem.	**EU 1** • translate and write algebraic expressions, equations and inequalities using appropriate operational signs. • identify known and unknown variables of a real –world situation. • demonstrate the correct usage and application of critical vocabulary in a real-world situation.

EU 2	EU 2
• inverse operations are used to isolate the variable in equations and inequalities. • solutions can be real, infinite, or non-existent.	• demonstrate the correct usage of inverse operations when solving an equation or inequality • solve equations and inequalities (including absolute value) with real, infinite, or non-existent solutions.

Stage 2 – Assessment Evidence

Recommended Performance Tasks:

You are the editor of a textbook. This means your job is to ensure that everything within each chapter of the text book is written and solved correctly, with appropriate support and justification. Your task today is look over three examples and their explanations before you submit it to Sally Publisher for printing. You must show detail when demonstrating justification and an explanation of the mistakes (there is no way to send it back to the author for a "do-over"). Any revisions and corrections made must be explained in a separate memo to the author.

Example 1

The local YMCA wants to order T-shirts for kids who attend its summer day camps. After calling a few local shirt printers, the staff members find one that will charge a $3.50 setup fee for the design and $4 per shirt for the T-shirt with design printed on it. Using this information, the staff at the YMCA can estimate costs using formula:

$$C = 4 + 350s$$

where C represents the total cost in dollars for T-shirts.
  a)   What will it cost the YMCA to purchase 100 T-shirts?
  b)   How many T-shirts can the YMCA purchase if the budget for T-Shirts is $1,250?

SOLUTION:

a) Since the staff members want to purchase 100 T-shirts, s = 100. Substitute this into the equation and evaluate to find the cost.

      C = 4 + 350(100)   *Substitute 100 for s*

      C = 4 + 35,000

      C = 35,004

If the YMCA purchases 100 T-shirts, it will cost $35,004.

b) The YMCA has $1,250 to spend on T-shirts, so we let C = 1250 and solve for s.

      1250 = 4 + 350s   *Substitute in 1250 for C. Identify the variable term.*

      1250 = 4 + 350s   *Isolate the variable term by subtracting 4 from both sides.*

      <u> -4   -4   </u>

      1246 = 350s

      <u>1246</u> = <u>350s</u>   *Isolate s by dividing by 350.*

      350   350

        3.56 = s

If the YMCA has $1250 to spend on T-shirts, the staff can purchase 3.56 shirts.

Example 2

Solve: $\frac{2}{5}(x - 6) \geq x - 1$

SOLUTION: $\frac{2}{5}(x - 6) \geq x - 1$

               $5\left[\frac{2}{5}(x - 6)\right] \geq 5[x - 1]$ *Multiply both sides by 5 to eliminate fractions*

               $2(x - 6) \geq 5(x - 1)$

               $2x - 12 \geq 5x - 5$ *Apply the distributive property*

               $-3x - 12 \geq -5$ *Subtract 5x from both sides*

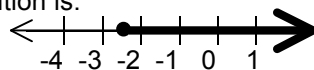 $-3x \geq 7$ Add 12 to both sides

                   $\frac{-3x}{-3} \geq \frac{7}{-3}$ Divide both sides by -3

                   $x \geq -\frac{7}{3}$ Simplify

The graph of the solution is:

               -4 -3 -2 -1 0   1

EXAMPLE 3

After winning the state lottery, Mark has $40,000 to invest. He will put part of the money in an account paying 4% interest and the remainder into stocks paying 6% interest. His accountant tells him that the total annual income from these investments should be $2040. How much should he invest at each rate?

SOLUTION:

Mark should invest $18,000 of the money at 4% interest and $22,000 of the money at 6% interest.

Other Recommended Evidence:

- Tests/quizzes on translating and solving multi-step equations and inequalities.
- "Ticket to leave" at the end of solving one variable, multi-step equations.
- Student explanations of homework, do-now, class work.
- Class discussions on the applications and benefits of modeling real-world situations algebraically.
- Observations on the use of inverse operations to solve equations and inequalities.
- Questioning on effective problem-solving strategies. Identify the knowns and unknowns of a problem, draw a diagram, develop a verbal model, translate to an algebraic model, and find the solution.

Stage 3 – Learning Plan

Suggested Learning Activities to Include Differentiated Instruction and Interdisciplinary Connections: *Consider the WHERETO elements. Each learning activity listed must be accompanied by a learning goal of A= Acquiring basic knowledge and skills, M= Making meaning and/or a T= Transfer.*

Activities:

- Activity #1
  Students will solve a series of linear equations involving variables on both sides of the equation, parentheses, fractions, fraction coefficients. Be sure to include problems with a unique solution, no solution, and infinitely many solutions. (A)

- Activity #2
  Students in pairs will translate a series of verbal statements into algebraic expressions/equations. Students must identify what was known and unknown from the given statement. (M)

- Activity #3
  Students will set up and solve various applications/modeling problems of linear equations such as percentage problems, consecutive integers, geometric applications (area/perimeter of rectangles and triangles), coin problems, and age problems. Students pair up and share their interpretation and answers.   (M/T)

- Activity #4
  Students will set up applications/modeling problems and solve linear inequalities with written justifications for each step of the solution. (M/T)

- Activity #5
  Students will edit and correct work that purposefully includes mistakes; error analysis.   (M)

The following is the suggested sequence of learning activities and for the Intro To Algebra II (level3) class and should comprise 29 school days:

- YWBAT Evaluate expressions and perform order of operations. (A)
- YWBAT evaluate algebraic expressions. (A)
- Activity #2: Translating Expressions. (M)
- YWBAT solve linear equations. (A)
- Activity #1: Solving Linear Equations. (M)
- YWBAT translate verbal statements into algebraic expressions. (A)
- YWBAT solve linear inequalities. (A)
- Activity #3: Translating and Applied Word Problems of linear inequalities. (M/T)
- YWBAT solve compound inequalities.(A)
- Activity #4: Application/Modeling of Problems Involving Linear Inequalities (M/T)
- YWBAT solve absolute value equations. (A)
- YWBAT solve absolute value inequalities. (A)
- Activity #5: Error Analysis. (M)