

Lesson Title: How Much has Math Changed?

Grade Level: 9th – 11th Algebra

Standards

PDE Standards

GRADE 11

2.1.11.A - Use operations (e.g., opposite, reciprocal, absolute value, raising to a power, finding roots, finding logarithms).

2.5.11.B Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

2.5.11.C Present mathematical procedures and results clearly, systematically, succinctly and correctly.

Museum Education Standards

Standard 1. Focus on Audiences and Community. Museum educators have knowledge of and respect for the audiences their museums serve. They promote the wide public service role of museums within our changing society.

Principle 1. Engage the community and serve the museum's audiences.

Develop and maintain sound relationships with community organizations, schools, cultural institutions, universities, other museums, and the general public. Reflect the needs and complexities of a changing society.

Shape content and interpretation toward relevant issues and create a broad dialogue.

Standard 3. Excellence in Content and Methodology. Museum educators have a solid grounding in the history, theory, and practice of the disciplines relevant to their museums. They demonstrate knowledge of human development, education theories, and teaching practices related to the personal and group learning that takes place in museums.

Principle 3.1. Demonstrate excellence in content knowledge.

Master the content related to museum collections, exhibitions, and the museum's mission.

Collaborate with scholars and specialists.

Conduct research to advance and improve the museum profession.

Provide professional development and training for new and established staff to share current education methods, new media, developments in scholarship related to learning theory and evaluation, and best practices in the field

Principle 3.2. Incorporate learning theory and educational research into practice.

Base methods and design of interpretation upon museum and educational learning theories.

Apply knowledge of cognitive development, educational theory, and teaching practices to the types of voluntary, personal, and life-long learning that occurs in museums.

Principle 3.3. Employ a variety of appropriate educational tools to promote learning.

Demonstrate a broad understanding of communication strategies and media.

Use techniques and technology appropriate to educational goals, content, concepts, and audience.

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Involve education staff in the design and use of technology to advance learning.
Evaluate the educational tools used.

Standard 5. Dedication to Learning. Museum educators possess a love of learning and a commitment to nurture and develop an informed and humane citizenry.

Principle 5.1 Promote professional development within the museum community.

- Recognize and share the value of continuous learning with colleagues.
- Persistently seek opportunities to expand the knowledge of learning theory, education methods, evaluation, media, management, scholarship related to the museum's collections, and best practices in the field.
- Foster an institutional atmosphere that encourages professional development.
- Disseminate current ideas through publications and other appropriate media.

Principle 5.2 Promote a spirit of inquiry and openness to new ideas and approaches.

- Recognize and share the joys of learning with all people.
- Promote the complementary nature of formal and informal learning at every stage of life.

Instructional Objectives

The student will...

Be able to compare the methods and practices of a math class in a common school to their own math class.

Be able to hypothesize as to why things have changed in math education and why they have stayed the same.

Materials

One room school house algebra and arithmetic texts (or copies)

Students text book

Pencils/Notebooks (Limit Paper)

Chalk board/chalk

Rulers

Subject Matter

Solving quadratic equations

Procedure

Introduction and Motivation

Conduct a class in the format that would have been used in a one room school.

All students will do the same assignment using the one room school text.

Teaching Methods

Drill from text

Problems at the board

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Development-Activities-Questions

Students will then be asked to get out their text and turn to the appropriate pages. Using only what is available in the room (i.e. no calculators, tables of values ect.) students will be asked to do a few problems (set up so that the numbers are not easy)

Questions

What is different about the types of numbers?
How many ways do we have to solve a quadratic equation?
Would all of those made sense in a one room school?
Where did we use solving linear equations?
Where do you think we are going to use solving quadratic equations?
Are there any signs of a graphing unit in this room?

Closure

Some of the applications of quadratics
Projectile motion
Energy curves

Assessment

Turn in homework assignment to be graded. (See attached paperwork)

Assignment

Complete student assignment paper.

Self Evaluation

One of the most important parts of this assignment is the students getting to compare their math book with a book a century old. I would really prefer that the students get to look at the books themselves to make those comparisons. If need be the teacher could make copies of the needed pages. However, that would really take away a lot of the wow factor in the assignment.

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Document 1: One room school lesson.

Note: Students will be arranged into 5 groups. Each group will act as a grade level. The groups will be divided into different lessons as follows.

Group 1: Factoring a common factor

Group 2: Factoring a trinomial into a product of binomials

Group 3: Factoring special products

Group 4: Solving linear equations

Group 5: Solving quadratic equations using factoring

To save time each group will have a set of about 10 problems to work on using the following methods.

Group work at board

Seat work

Each group will go to the board and be expected to finish their work alone in their seats.

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Document 2: Student Assignment worksheet

Comparing a text from the one room school house and the text you have been using in class all year.

- 1.) What is the title of each book?

- 2.) How many pages are in each book?

- 3.) What are the dimensions of each book? (you may need a ruler)

- 4.) Find two sections (or chapters, or units whatever each book uses to break up the topics) that cover the same type of problems
 - a.) What is the title of the chapter in the old text?

 - b.) What is the title of the chapter in your text?

- 5.) How many problems are there for the student to solve in each chapter?

- 6.) Find one problem that appears in both books. Write the problem and solve it in the space below.

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- 7.) What types of numbers does the old book use?
Fractions, Decimals, Big numbers, Scientific Notation, negatives, pirmses, etc

- 8.) What is different about the types of numbers in your book?

- 9.) How many ways do we have to solve a quadratic equation? List all of the ways to solve a quadratic

- 10.) Would all of those made sense in a one room school?

- 11.) For what purpose did we use solving linear equations?

- 12.) For what purpose do you think we are going to use solving quadratic equations?

- 13.) Are there any signs of a graphing unit in this room?