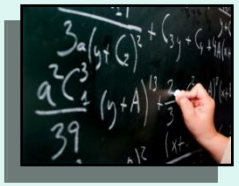
Connecticut Common Core Algebra 1 Curriculum





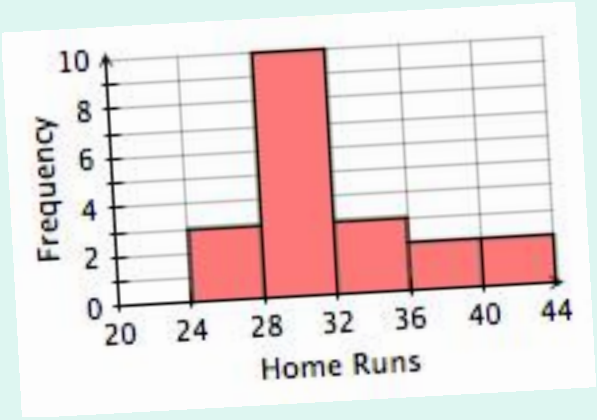


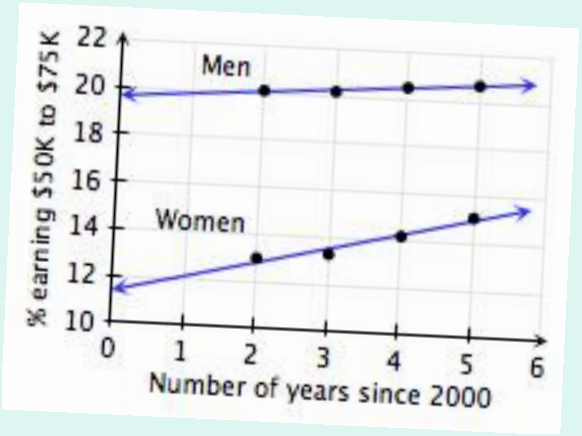
Why a new Curriculum for Algebra I ?

- P.A.10-111
  - Secondary School Reform; including "model" curricula and end of course exams
- CCSSM
  - Common Core State Standards for Mathematics (adopted by Connecticut in 2010)

High School Requirements
starting with class of 2020 (P.A. 10-111)

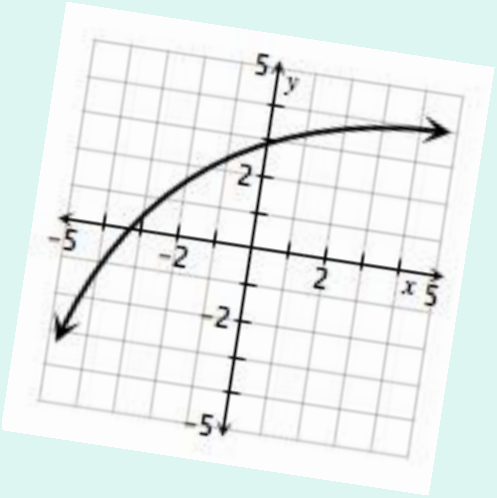
- 25 credits for graduation
- 8 in STEM areas with at least 4 in mathematics (including **Algebra I, Geometry, Algebra II** and/or **Probablity/Statistics**)
- Model curricula to be developed for 8 courses
- Common final examinations for **Algebra I, Geometry, Biology, English 2, American History**

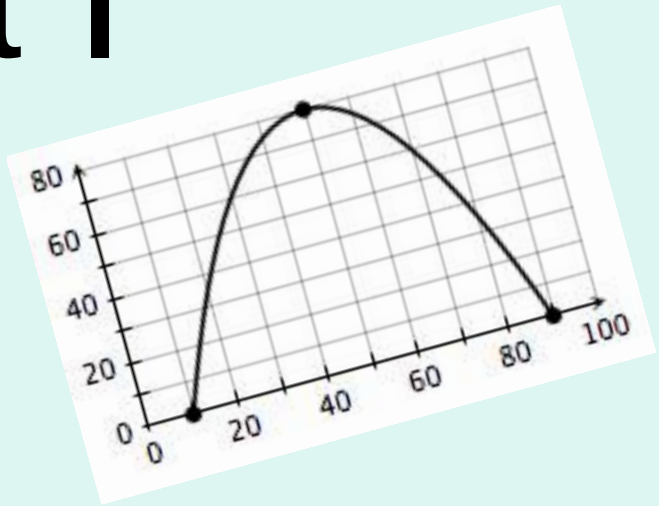




First "model curriculum" to be developed

Algebra I





Common Core State Standards

- K-12
- Emphasis on Focus, Coherence, Conceptual Understanding
- HS standards for “College and Career Readiness”
- Most HS standards identified as “core” with addition standards for “STEM”
- Eighth grade curriculum will place major emphasis on algebra and geometry
- The model curriculum developed by Connecticut is well aligned with these standards.

CT Algebra One Partners (Curriculum Writing 2009)

- Associated Teachers of Mathematics in Connecticut (ATOMIC)
- Connecticut Academy for Education in Mathematics, Science & Technology, Inc.
- Connecticut Council of Leaders of Mathematics (CCLM)
- Mathematics Basic Skills Council of Connecticut (MBSCC)
- Mathematical Association of Two-Year Colleges of CT (MatyCONN)
- Project to Increase Mastery of Mathematics and Science (PIMMS)

Algebra 1 Curriculum Components

- **Guiding Principles-framed the work**
- **Big Ideas About Algebra-critical concepts**
- Course-level Expectations
- **Pacing Guidance for all Eight Units**
- Assessments
- Unit Storylines-overview of activities
- Culminating experience: two end-of-course project models
- End-of-Course Test

Guiding Principles

1. **Scope Principle**: The Algebra One Curriculum must **focus on the essential ideas and processes** of mathematics. There must be an emphasis on the development of understanding and application of important content, rather than trying to teach too much too quickly and with too little depth....

Guiding Principles

2. **Connections Principle**: The Algebra One Curriculum must include explicit and coherent exploration of how one piece of mathematics relates to other pieces of mathematics. It must **effectively organize and integrate important mathematical ideas** so that students see how the concepts, skills and logical thinking build on and connect to each other.

Guiding Principles

3. Context Principle: The Algebra One Curriculum must include situations, applications and contemporary problems, often interdisciplinary in nature, that illustrate the **usefulness of mathematics**. Relevant contexts include worthwhile mathematical tasks, interesting applications and problem-based lessons that motivate learning.

Guiding Principles

4. Reasoning Principle: The Algebra One Curriculum must **develop deep understanding of mathematical concepts and principles**. Students must be able to ask penetrating questions, explain their thinking, make reasonable estimates and predictions, and justify and respond to each others' mathematical arguments, strategies and decisions.

Guiding Principles

5. Teaching Principle: The Algebra One Curriculum must **support and illustrate effective pedagogical practices.** Student discussion and collaboration is encouraged in an environment characterized by serious mathematical thinking. This environment is supported by the use of key questions, multiple representations of key ideas, alternative approaches to solving problems and frequent opportunities to communicate mathematical understanding in a variety of representations.

Guiding Principles

6. **Differentiation Principle**: The instructional design of the Algebra One Curriculum must be built around a common core of essential and important mathematics. It must be delivered through a **balance of shared experiences for all students with learning tasks that are appropriately chosen** to reflect the prior knowledge of the students and respond to and build on that knowledge....

Guiding Principles

7. Assessment Principle: ...The Algebra One Curriculum envisions **assessment as an integral part of instruction.** It must include a balanced portfolio of strategically aligned and high quality summative assessments that enhance student learning and provide important information that supports instructional decisions. It also includes benchmark tasks and formative assessment techniques....

Guiding Principles

8. Technology Principle: The Algebra One Curriculum must make **full use of technologies** that increase the productivity of instruction and enrich students' experiences. The use of calculators, computers, data-gathering tools and probes, interactive software and student response systems should be pervasive throughout instruction and assessment.

Big Ideas

1. The fundamental **structure of algebra provides a systematic method** for *identifying, describing, extending, analyzing* and *generalizing* patterns.

Big Ideas

2. Algebra provides a way to use *numbers*, *symbolic notation* and *arithmetic operations* to **model, transform, simplify and solve problems efficiently**.

Big Ideas

3. Information may be represented by *physical models, diagrams, data tables, graphs* and *symbolic expressions*. **Algebra facilitates correlation among these different representations**, which may give different insights into the solution of a problem.

Big Ideas

4. Algebra provides ways to describe and classify relationships and functions and use the classifications to **derive models that have practical real-world applications**.

Big Ideas

5. Algebra provides a way to explore and **understand the effects of parameter changes** on any function and its various representations.

Big Ideas

6. Algebra is a **process of conjecturing about the relationships** among quantities and measures. It provides a way to *describe correlations, summarize data sets, estimate and make predictions*, including *extrapolation* and *interpolation* of data.

Big Ideas

7. Algebra provides the underlying structure to make **connections among all branches of mathematics**, including *measurement, geometry, calculus* and *statistics*.

Big Ideas

8. **Innovations in technology** allow users to explore and deepen their understanding of new and long-standing *mathematical concepts* and *applications of algebra*.

CCSS Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Scope and Sequence

Unit 1: Patterns
Unit 2: Linear Equations and Inequalities
Unit 3: Functions
Unit 4: Linear Functions
Unit 5: Scatter Plots and Trend Lines
Unit 6: Systems of Linear Equations
Unit 7: Introduction to Exponential Functions
Unit 8: Quadratic Functions

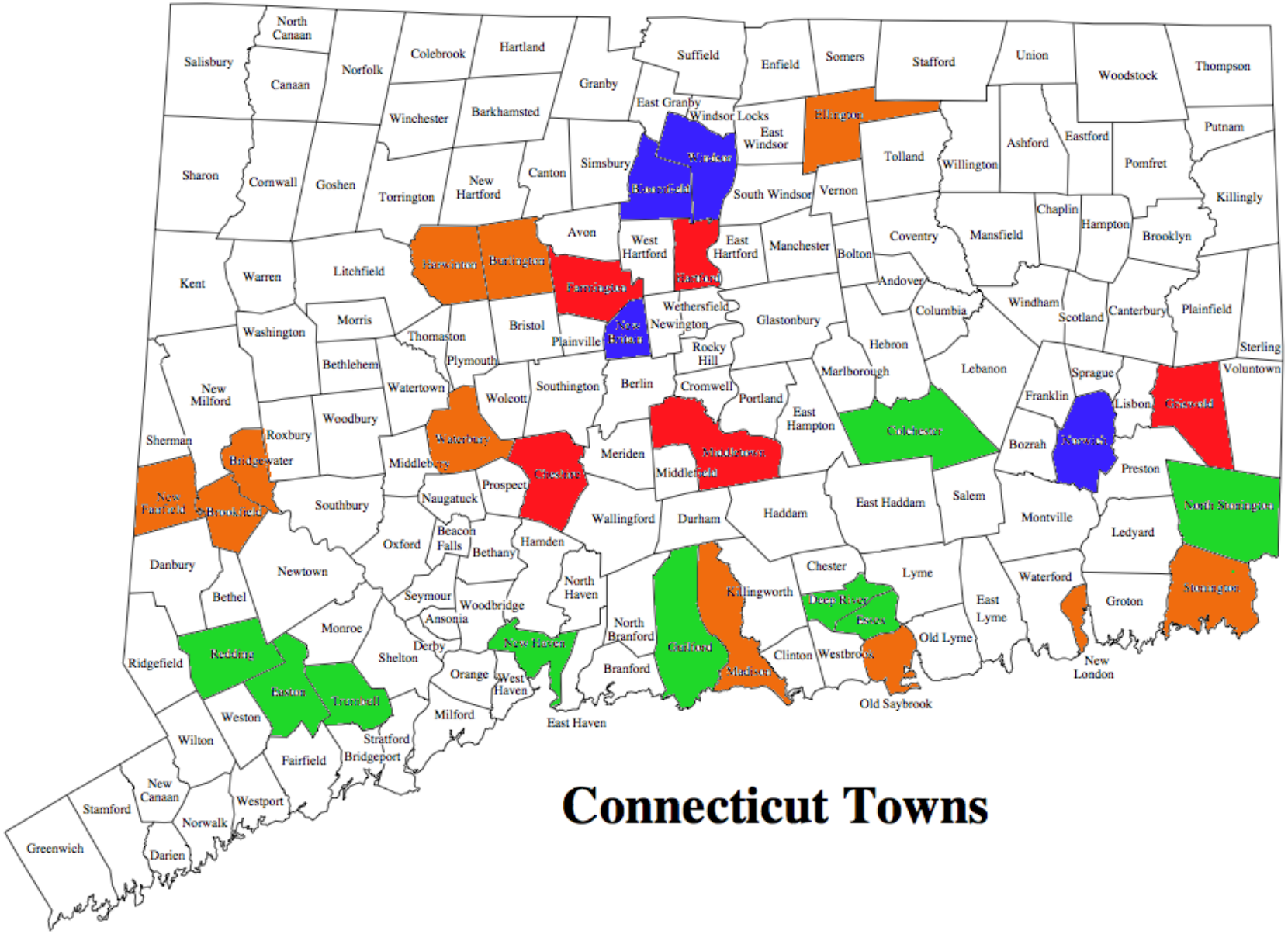
Mathematics and Science Partnership Grant 2010-2013

- Field testing in 3 phases
- 80 teachers involved
- Curriculum was continually improved on the basis of feedback from the field test sites.
- In year 3 Education Development Center conducted a comparative study.

Mathematics and Science Partnership Grant 2010-2013

Districts participating are shown on the map.

- Year 1: red
- Year 2: blue
- Year 3 experimental group: green
- Year 3 control group: orange (adopting curriculum in 2013-14)



Connecticut Towns