

Mathematics for world class mathematics standards

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In 1623 Galileo said:

*Mathematics is **the** language of **nature***

In 2006 we say:

*Mathematics is **a** language of **innovation***

Who uses mathematics?

- Mathematicians, statisticians, engineers, scientists
- Medical researchers
- Analysts—marketing, financial
- Computer application developers
- Pollsters, demographers
- All of us

- **Client:** Large Retail Firm
- **Problem:** Who buys what and why?
- **Data:** Records of every purchase for the last several years
- **Mathematics:** Statistics, computer science, algorithms

Examples of real mathematics II

- **Client:** Biomedical devices company
- **Problem:** Develop a real-time algorithm to visualize images from the inside of the body.
- **Data:** Sensing data (CAT scans)
- **Mathematics:** Geometry, computer science, calculus

Mathematics for 21st Century

- Algebra basics
- Data analysis skills
- Computational proficiency
- Interconnected
- Symbolic representation of quantities
- Statistics, visualization techniques
- Calculators, spreadsheets, computer programming
- Problem-solving skills

What does this have to do with K-12 Standards?

- **Teachers** must teach the mathematics that **will be used**—not mathematics that **was traditionally used**.
- **Students** must enter college **ready to learn** the mathematics they will need in the work-force
- **Graduates (high school and college)** must enter the work-force **ready to use** quantitatively sophisticated tools.
- **All of us** must be prepared **to work and think** in a world that uses quantitative information.

Current Standards are a big step in the right direction.

Four Strands:

- 1 Number Sense
- 2 Algebra
- 3 Geometry
- 4 Data and Probability

What about Algebra?

Tenet: Algebra skills are a good thing.

But...

Algebra is to good mathematics
as
Grammar is to good writing

Algebra is a means to an end...**not an end.**

Keep the bigger picture in mind when assessing a
world-class mathematics curriculum

What should our students be doing?

- **Engage** in mathematical (quantitative and computational) experiences
- **See** mathematics across the curriculum
- **Enjoy** mathematics
- **Recognize** that it is a **door-opener to many fulfilling careers**

Conclusions

- Mathematics is central to our economy.
- Mathematics is (far) more than algebra.
 - Now – create world-class mathematics standards for our students
- Mathematics has changed—and will continue to change.
 - Future – continued discussion of how to evolve world-class standards to reflect evolution of mathematics