



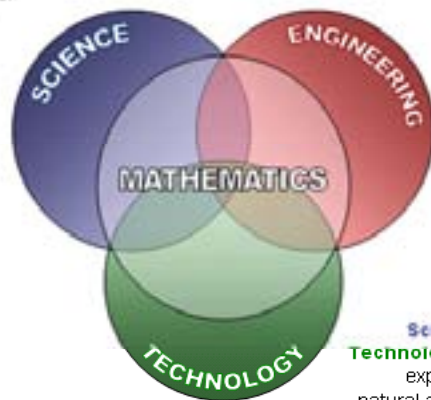
Beyond Unpacking the New Standards 2009-2010 School Year How Do We Implement?



Tennessee Vision for STEM Education

Science seeks to explain the complexity of the natural world and uses this understanding to make valid and useful predictions.

Engineering creatively applies scientific principles to analyze events, design processes, develop materials, and construct objects that benefit society.



Technology utilizes innovative tools, materials, and processes to solve problems or satisfy the needs of individuals, society, and the environment.

Science, Engineering and Technology use **Mathematics** to explore questions about the natural and human-made worlds.

Adapted with permission from the Massachusetts' Science and Technology / Engineering Curriculum Frameworks.

Dr. Scott Eddins
Mathematics Coordinator
Tennessee Department of
Education

Scott.Eddins@tn.gov

(615) 741-3043

Browser address bar: <http://www.tnec.org/index.html>

Navigation menu: Home Welcome iTunes U GSPP Site Map

www.tnec.org

TENNESSEE.GOV



Dr. Timothy K. Webb, Commissioner

ELC Welcome - Dr. Webb
What's New On The ELC
Navigating The ELC
Teacher Professional Development ▶
Governor's Study Partner Program
Curriculum Resources
Tennessee Dept. of Education
2009 High School Policy
Instructional Leadership
Professional Development Survey

electronic learning center



Dr. Timothy K. Webb, Commissioner

summer standards training

Presentation Materials Are Available for Download
Using the Following Links:

Administrators' Workshop [CLICK HERE](#)

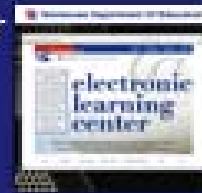
WELCOME TO TENNESSEE'S ELECTRONIC LEARNING CENTER!



Dr. Timothy K. Webb, Commissioner

Last Modified: Nov 23, 2008

Total Tracks: 1



Navigating Tennessee's ELC

Last Modified: Jun 11, 2009

Total Tracks: 1

THE GOVERNOR'S STUDY PARTNER PROGRAM



GSPP Intro/Overview

Last Modified: Jun 11, 2009

Total Tracks: 2



GSPP Service Learning Manual

Last Modified: Jun 11, 2009

Total Tracks: 1



Language Arts

Last Modified: Jun 11, 2009

Total Tracks: 193



Math

Last Modified: Sep 27, 2009

Total Tracks: 109



Study Skills

Last Modified: Jun 11, 2009

Total Tracks: 12

TENNESSEE CURRICULAR STANDARDS TRAINING



www.tnelc.org/math.html

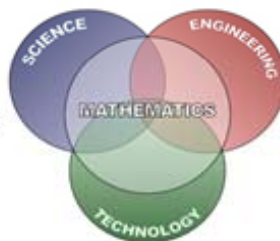
mathematics

2009-2010 Curriculum Standards:

<http://www.tennessee.gov/education/curriculum.shtml>

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STEM Resources for developing and implementing standards-based instruction are available by [CLICKING HERE](#)

Unpacking the Tennessee Math Standards 2009

Tennessee Diploma Project Mathematics Background [Click here](#)

Math Course Requirements and Recommendations [Click here](#)

Math FAQ's [Click here](#)

Administrator Information for K-8 Professional Development [Click here](#)

This session is designed for school leaders to understand the impact of the Tennessee Diploma Project on mathematics education. Learn about the new graduation requirements, high school course sequence, and the focus of the mathematics program. Discuss what type of professional development is needed for elementary teachers for teaching the big ideas that lead to a basic understanding of numeracy. And, we will talk about the importance of Algebra topics in middle school.

Improving Numeracy & Algebraic Thinking In Grades 4 – 8 Steven Lay Ph.D., Professor of Mathematics, Lee University

This series of video podcasts was designed to help you meet the new mathematics standards in grades 4 through 8. The podcasts include material from the new

The study of mathematics plays a vital role in STEM (Science, Technology, Engineering, and Mathematics) education. The purpose of this page is to provide service and support for all mathematics and STEM educators in Tennessee. Your input is welcome on how to make this page more helpful. Check frequently for updates on training and news from Tennessee Department of Education that relate to mathematics and STEM education.

LIBRARY

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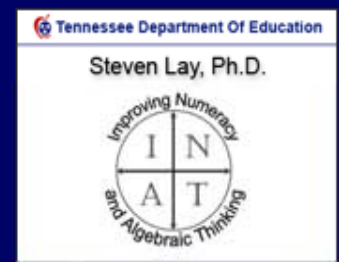
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- Music Videos
- My Top Rated
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- Recently Played
- Top 25 Most Played

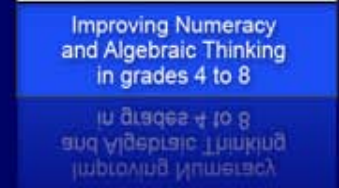
Improving Numeracy & Algebraic Th...



Steven Lay, Ph.D.
Professor of Mathematics
Lee University, Cleveland, TN

Last Modified: Sep 4, 2009
 Tracks in Chapter 1 - Sums & Differences: 6

GET TRACKS
 SUBSCRIBE



DESCRIPTION

This ten chapter series of video podcasts was designed to help you meet the new mathematics standards in grades 4 through 8. The lessons are based on the book "Prelude to Algebra", the original text in the "Prelude Math" series. These podcasts are directed primarily to Middle School Math Teachers, but they will also benefit upper Elementary Teachers. If you teach in the 4th or 5th grades, you will want to consider using one of the lower level "Prelude" books. They introduce the same ideas and approaches at a level appropriate for younger students.

TELL A FRIEND

LINKS

- Tennessee Department of Education
- Tennessee's Electronic Learning Center

RESOURCES

- Prelude to Algebra

▲	Name	Time	Artist	Album	Price
1	Lesson 1.1_Symbols & Sums	12:20	Tennessee State Dep...	INAT - Chapter 1 - S...	Free GET MOVIE
2	Lesson 1.2_Inequalities	4:15	Tennessee State Dep...	INAT - Chapter 1 - S...	Free GET MOVIE
3	Lesson 1.3_Differences	5:18	Tennessee State Dep...	INAT - Chapter 1 - S...	Free GET MOVIE
4	Lesson 1.4_Differences and ...	3:18	Tennessee State Dep...	INAT - Chapter 1 - S...	Free GET MOVIE
5	Lesson 1.5_Properties of Sums	4:35	Tennessee State Dep...	INAT - Chapter 1 - S...	Free GET MOVIE
6	Lesson 1.6_Invariant Principl...	11:04	Tennessee State Dep...	INAT - Chapter 1 - S...	Free GET MOVIE

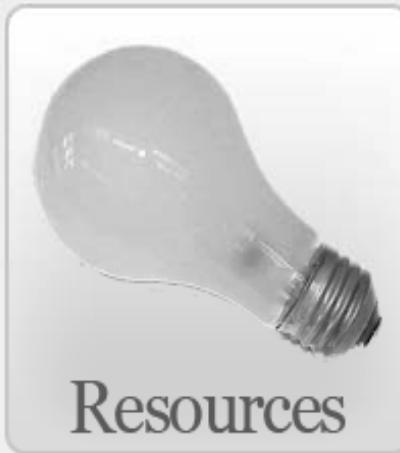


<http://stemresources.com/>



IE STANDARDS STEM EDUCATION TOOLS STEM TEACHER RESOURCES LOGIN

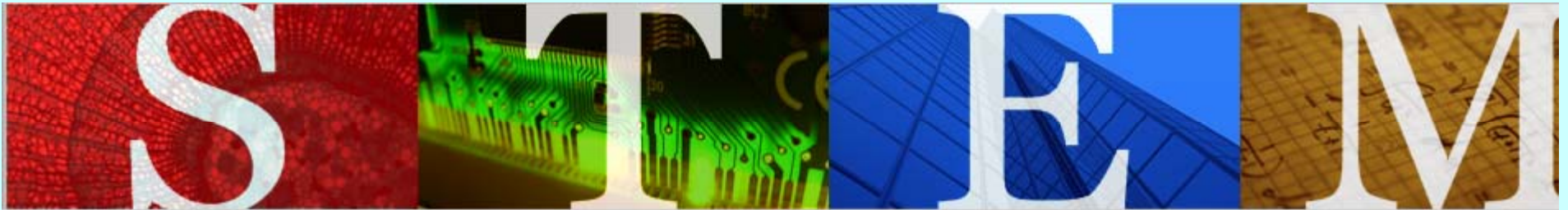
STEMresources.com - Tennessee



Welcome to the STEMresources.com
learning community!

Tennessee actively supports STEM Education. Understanding Science, Technology, Engineering, and Mathematics (STEM) topics is increasingly important to fully participate in society. STEM content comes alive when students consistently experience it during hands-on learning situations that seamlessly weave together the four sub-disciplines that comprise the STEM acronym.

Q: "What do we know works to improve



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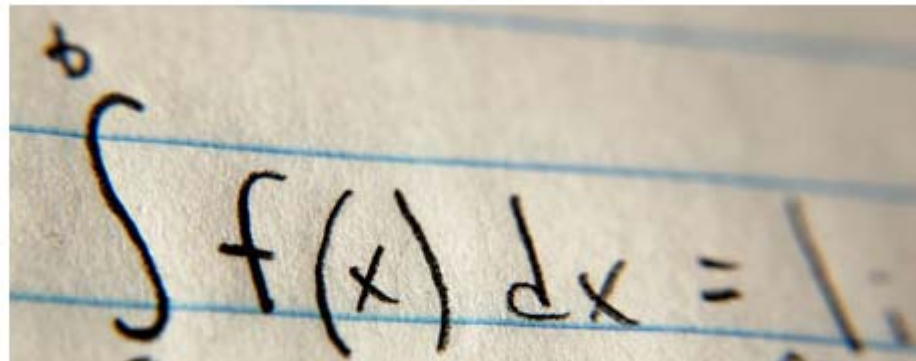
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Tennessee Mathematics Standards

You are here: [Standards](#) > [Tennessee Mathematics Standards](#) > [Tennessee Mathematics Standards](#)

Mathematics

- [Standard 1: Mathematical Processes](#)
- [Standard 2: Number and Operations](#)
- [Standard 3: Algebra](#)
- [Standard 4: Geometry and Measurement](#)



Scott Eddins
Mathematics Coordinator



Standard 2 : Number and Operations (Mathematics)

You are here: Tennessee Mathematics Standards > Mathematics > Number and Operations

- Select Standard -

View this standard as a list

Number Sense

Operations

Problem Solving

View All

	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7
ue	<p>GLE 0306.2.1 Understand the place value of whole numbers to ten-thousands place including expanded notation for all arithmetic operations.</p>	<p>GLE 0406.2.1 Understand place value of numbers from hundredths to the hundred-thousands place.</p>	<p>GLE 0506.2.1 Extend the understanding of place value through millions and millionths in various contexts and representations.</p>	<p>GLE 0606.2.1 Understand and explain the procedures for multiplication and division of fractions, mixed numbers, and decimals.</p>	<p>GLE 0706.2.1 Extend understand addition, subtractic multiplication and integers.</p>
ten	<p>GLE 0306.2.2 Develop understanding of multiplication and related division facts through multiple strategies and representations.</p>	<p>GLE 0406.2.2 Develop fluency with multiplication and single-digit division.</p>	<p>GLE 0506.2.2 Write natural numbers (to 50) as a product of prime factors and understand that this is unique (apart from order).</p>	<p>GLE 0606.2.2 Solve multi-step mathematical, contextual and verbal problems using fractions, mixed numbers, and decimals.</p>	<p>GLE 0706.2.2 Understand and wo properties of and op the system of rator</p>
with	<p>GLE 0306.2.3 Relate multiplication and division as inverse operations.</p>	<p>GLE 0406.2.3 Identify prime and composite numbers.</p>	<p>GLE 0506.2.3 Develop fluency with division of whole numbers. Understand the relationship of divisor, dividend, and quotient in terms of multiplication and division</p>	<p>GLE 0606.2.3 Understand and use ratios, rates and percents.</p>	<p>GLE 0706.2.3 Develop an underst apply proportionali</p>

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STEM WebLinks

You are here: [STEM Teacher Resources](#) > [STEM WebLinks](#)

Teams of Tennessee teachers carefully searched the Internet to find valuable places where STEM educators can gather information about topics and themes such as inquiry, lab safety, and Virtual Fieldtrips.

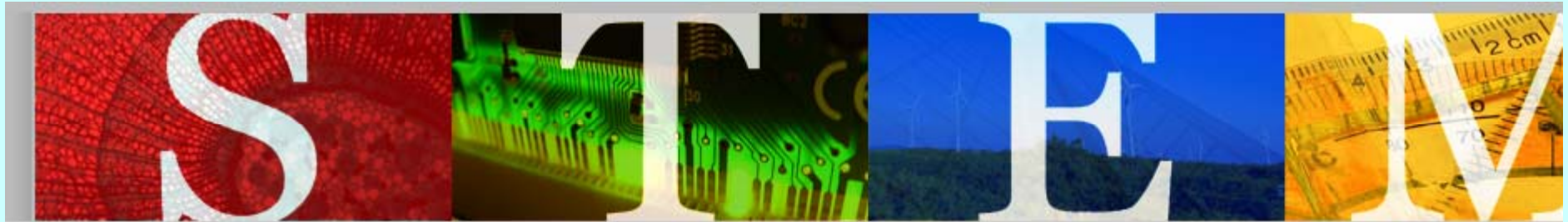
These WebLink collections can help teachers to effectively integrate digital resources into their professional practice. While many of these materials are specific to science or mathematics, others, such as Questioning Techniques cut across all disciplines.

While no one makes the claim that these collections are all-encompassing, STEM WebLinks are terrific “starting points” for exploring the Web. When information is being sought for any of these topics, much of the search for high quality resources has already been done.

One word of caution... the Internet is a dynamic, ever-changing place. Although we strive to keep these lists up to date, you may find that some of these websites are no longer active or available. Please let us know if you find any inactive sites.



- [Assessment](#) (15)
- [Case Study](#) (10)
- [Contextual Academics](#) (10)
- [Curriculum Development](#) (8)
- [Curriculum Integration](#) (11)
- [National Science Standards](#) (10)
- [Podcasts](#) (18)
- [Problem-Based Learning](#) (18)
- [Questioning Techniques](#) (14)
- [Reading and Writing across the STEM Curriculum](#) (13)



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Assessment Collection

You are here: [STEM Education Tools](#) ▶ [Assessment Collection](#)

- ▶ [Pre-Assessment](#)
- ▶ [Formative Assessment](#)
- ▶ [Summative Assessment](#)
- ▶ [Assessment Weblinks](#)

“Effective learners operate best when they have insight into their own strengths and weaknesses ...” Brown, 1994

Proof Points...



Each corner of a six-sided counting cube is assigned a number called a *vertex number*. A vertex number is EQUAL to the SUM of the numbers on the faces that meet at that vertex. What is the sum of ALL the vertex numbers?

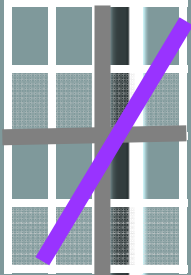


Regardless of the arrangement of the digits on the counting cube, each of the numbers touches four vertices and, therefore, is added to the sum four times:

$$4 \times (1 + 2 + 3 + 4 + 5 + 6) = 84.$$

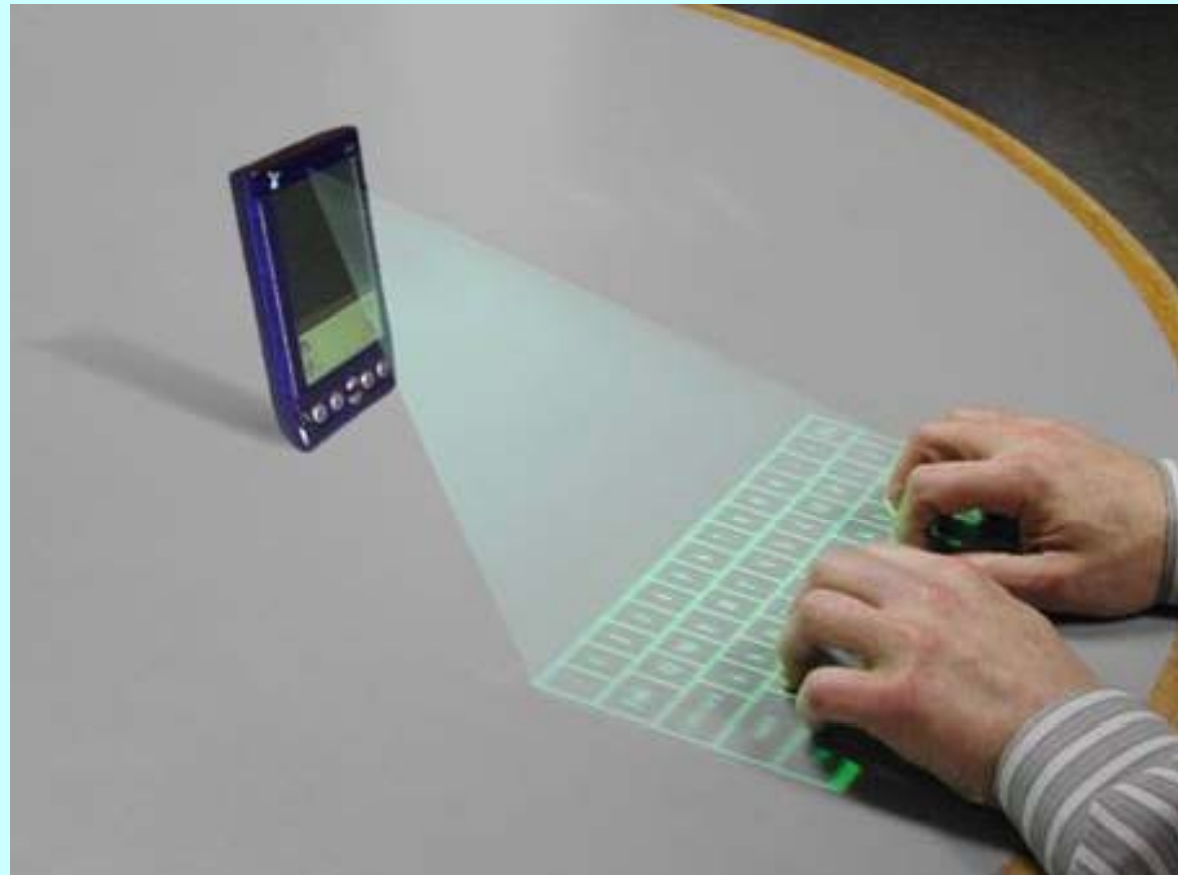


Algebraic Thinking

Verbal Description	Tabular Representation	Graph	Symbolic Represent	Set Notation	Contextual Problem												
y is 3 less than twice a number x	<table border="1"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr><td>-4</td><td>-11</td></tr> <tr><td>-2</td><td>-7</td></tr> <tr><td>0</td><td>-3</td></tr> <tr><td>2</td><td>1</td></tr> <tr><td>4</td><td>5</td></tr> </tbody> </table>	x	y	-4	-11	-2	-7	0	-3	2	1	4	5		$y = 2x - 3$	$\{(-4,11),(-2,7), (0,3),(2,1),(4,5)\}$	<p>Lakisha, a freshman basketball player, scored three less than twice the total number of points of her fellow teammates combined. Write an equation to model this. If Lakisha scored 25 points, how many total points did her teammates score?</p>
x	y																
-4	-11																
-2	-7																
0	-3																
2	1																
4	5																



What is the role of technology in the current classroom?



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Mathematics Coordinator

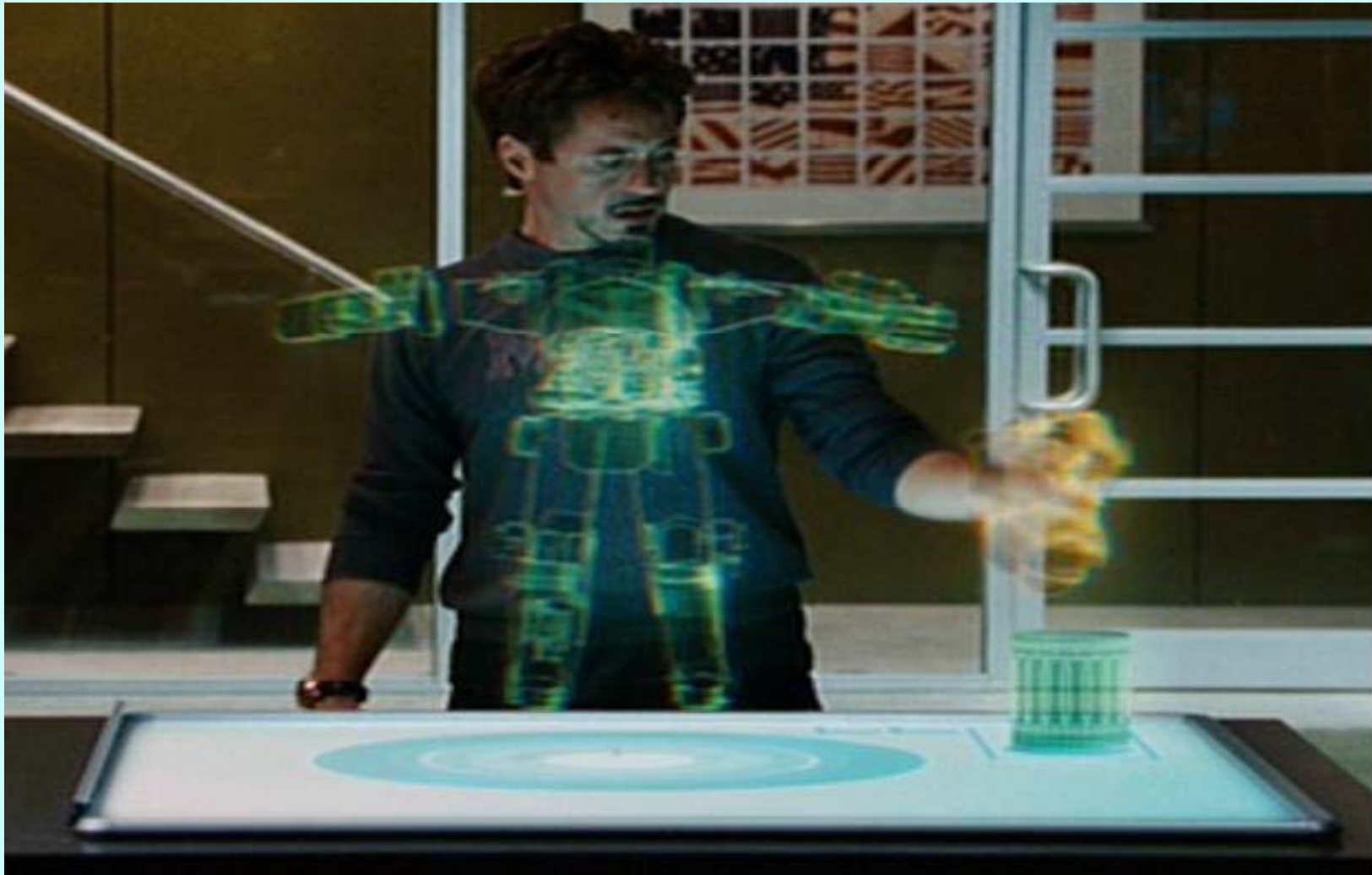


Translation Goggles

What will change in the classroom?



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Mathematics Coordinator



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Mathematics Coordinator

Science Fiction ?



The chalkboard features several mathematical elements:

- A circle on the left with a radius line drawn from the center to the circumference.
- A vertical y-axis and a diagonal line with arrows at both ends.
- A table with the following data:

	radius	circum.
1	0.6	4.1
2	1.1	6.7
3	1.3	8.2
4	2.3	14.3

Below the table, the following text is written:

$f(x) = 6.27x$
radius = 2.3 cm
circumference = 14.3 cm

Science Fiction or NOT??



General Organizational Format of the Tennessee Mathematics Curriculum Framework

STANDARDS are the major math content area topics addressed in a particular grade level or course

STATE PERFORMANCE INDICATORS are the basis for student accountability and are used by the state to prepare standardized test items aligned with corresponding Grade (GLE) or Course (CLE) Level Expectations.

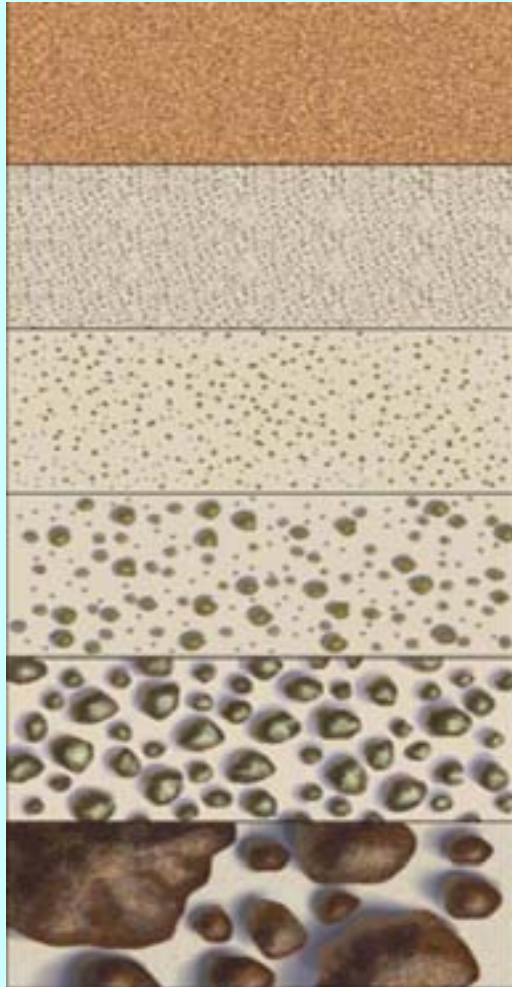
Grade 7: Standard 3 Algebra

Grade Level Expectation	Check for understanding (formative/summative assessment)	State Performance Indicator
GLE 0706.3.2 Understand and compare various representations of relations and functions.	✓ 0706.3.3 Identify a function from a written description, table, graph, rule, set of ordered pair, and/or mapping.	SPI 0706.3.2 Determine whether a relation (represented in various ways) is a function.

CHECKS FOR UNDERSTANDING are suggestions for assessing student learning. Formative assessments are typically embedded within a lesson. Summative assessments provide information about whether a student has met a particular Grade or Course Level Expectation.

GLE 0706.3.2

GLE	07	06	3	2
Grade Level Expectation	Grade 7	Mathematics	Standard 3 (Algebra)	Second GLE for that standard



✓ Checks For Understanding are our new formative assessment components. They are the fine grain size skills that students will exhibit on a daily basis in the classroom.

SPIs are now a larger grain size more like a NAEP or ACT item.



Why assess students?

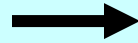
- To gather evidence of student learning
- To inform instruction
- To motivate students and increase student achievement





Shifts in Assessment

From assessing to
learn what students
do not know



To assessing to learn
what students
understand

From using results to
calculate grades



To using results to
inform instruction

From end-of-term
assessments by
teachers



To students engaged in
ongoing assessment of
their work and others

From judgmental
feedback that may
harm student
motivation

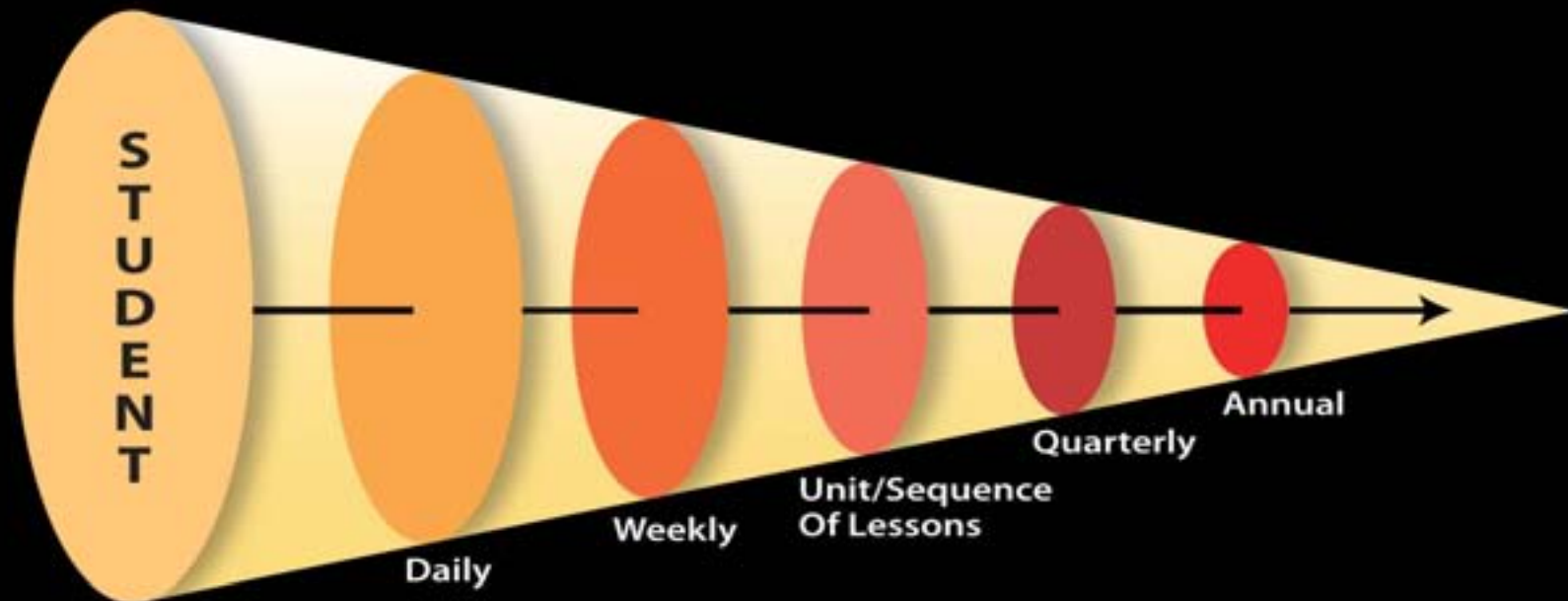


To descriptive
feedback that
empowers and
motivates students





Learning Goals/Progression





Of Every 100 American Kindergartners In Each Subgroup:

White	African American	Latino	American Indian/ Alaskan Native
94 Graduate from high school	89 Graduate from High School	62 Graduate from high school	71 Graduate from high school
66 Complete at least some college	51 Complete at Least Some College	31 Complete at least some college	30 Complete at least some college
34 Obtain at least a Bachelor's Degree	18 Obtain at Least a Bachelor's Degree	10 Obtain at least a Bachelor's Degree	12 Obtain at least a Bachelor's Degree

(25-to 29-Year-Olds)

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Source: US Department of Commerce, Bureau of the Census. March Current Population Surveys, 1971-2003, in The Condition of Education 2005. <http://nces.ed.gov/programs/coe/2005/section3/indicator23.asp#info>



College Graduates by Age 24

Young People From High Income Families	75%
Young People From Low Income Families	9%

Source: Tom Mortenson, Postsecondary Educational Opportunity..



For Students:

- Freshman Academies
- Advisor/Advisee
- Extended time before & after school
- Theme based small learning communities
- Tutoring
- Team Teaching
- Computer Assisted Programs
- Credit Recovery/E4TN
- Governor's Study Partners

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For Teachers:

- Professional Learning Communities
- Content Based Professional Development
- Use of Formative Assessment Strategies
- Analyzing Student Work
- Using Technology Strategically to Enhance Instruction

EXAMPLES:

- Mid Cumberland Coaches Council, organized by Dickson County
- Algebra I Audit, Memphis City Schools
- TI User's Groups across the state



A Resource For Math Teacher's Content Knowledge A Compendium of Data-Driven Case Studies on the Effectiveness of MyMathLab and MathXL

www.coursecompas.com

For District or School License Contact:
Michelle Cook michelle.cook@pearson.com

Available beginning December, 2009

Scott Eddins
Mathematics Coordinator





NATIONAL COUNCIL OF
TEACHERS OF MATHEMATICS

Regional Conference Nashville, TN November 18-20, 2009

1. Several Sessions focused on TN's New Standards
2. Excellent Professional Development for Tennessee Teachers
3. Supported by the Tennessee Mathematics Teachers Association (TMTA)



H S Graduation Requirements

Math - 4 Credits: (Students must take a math class each year)

- Algebra I - 1 Credit
- Geometry - 1 Credit
- Algebra II - 1 Credit
- Upper level Math: - 1 Credit
 - **Bridge Math** Students who have not earned a 19 on the mathematics component of the ACT by the beginning of the senior year is recommended to complete the Bridge Math course.
 - **Finite Senior Math Course for Non STEM students**
 - **STEM Math (Pre-Calculus, Calculus, Adv. Algebra and Trigonometry, Statistics, Discrete Mathematics)**



Same Standards / Different Methodologies

Academic and Contextual courses in mathematics, science, and English will be coded under a five-digit course code. This will enable the courses to be consistently titled, coded, and reported. An example of the five-digit course code is the following:

Algebra I :

3102(0) – Regular

31022 – CTE

31023 – Algebra I A

31024 – Algebra I B

31025 – SWD A Course for Content Credit

31026 – SWD B Course for Content Credit



Students with Disabilities who have an IEP

Require a math class each year achieving at least Algebra I and Geometry.

For example:

Freshman Year: Algebra IA (math credit)

Sophomore Year: Algebra IB (math credit)

Junior Year: Geometry A (math credit)

Senior Year: Geometry B (math credit)