Training for the New Georgia Performance Standards
Day 1: Standards-Based Education and the New GPS

Participant's Guide Mathematics 6

Table of Contents

Acknowledgements

This training program was developed by the Georgia Department of Education as part of a series of professional development opportunities to help teachers increase student achievement through the use of the Georgia Performance Standards. The following people contributed to its development.

Carolyn Baldree
Eloise Barron
Gerald Boyd
Kathleen Boyle
Lisa Copeland
William Cranshaw
Robin Gower
Sally Krisel
Marty Lawrence
Phyllis Martin
Alicia McCartney
Sallie Mills
John O'Connor
Stephen Pruitt
Sherry Reynolds
Cynde Snider
Sharrita Stanley
Marlee Tierce
Kay Seabolt

For more information on this or other GPS training modules, please contact Robin Gower at (404) 463-1933 or rogower@doe.k12.ga.us.

Use of This Guide

The module materials, including a Leader's Guide, Participant's Guide, PowerPoint Presentation, and supplementary materials, are available to designated trainers throughout the state of Georgia who have successfully completed a Train-the-Trainer course offered through the Georgia Department of Education.

Agenda

This is a one-day course, with approximately seven hours of instructional time.

Introduction .... 30 minutes

Overview of Standards .... 2 hours, 30 minutes

Standards-Based Teaching and Learning ....1 hour, 50 minutes

Putting It All Together...1 hour, 40 minutes

Summary and Follow Up Assignment .... 30 minutes

Module Goal

Demonstrate a deep understanding of the new Georgia Performance Standards and the standards-based education approach, through thoughtful curriculum planning, development of formative and summative assessments, and the design of instruction matched to the standards and research-based best practices. This shall be measured by student performance on progress monitoring and standardized criterion-referenced tests.

Key words from the goal:

- Deep understanding
- Georgia Performance Standards (GPS)
- Standards-based education
- Research-based best practices

Note that the goal will not be reached by day one of training alone. It will take preparation, follow up, and eight days of classroom instruction to master this goal. Various days of training will deal with different components of the goal, such as curriculum planning, assessment, and instruction.

Module Objectives

By the end of day one of training, participants will be able to:

1. Describe the benefits of the GPS.

2. Describe the various phases of the GPS rollout plan.

3. Define terms related to the GPS.

4. Identify four parts of each standard.

5. Describe the backward design process used in standards-based teaching and learning.

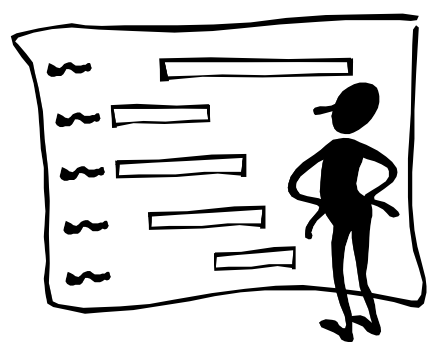
6. Identify key components of the applicable standards (for example, K-3 ELA).

Implementation Timeline

Mathematics Curriculum Timeline

Year	Teacher Training	Curriculum Used in Classroom	Testing Implmntd.	State Textbook Adoption	Textbooks Used in Classroom
4	6 only				
5	K-2, 7	6 only	6 only		
6	3-5, 8	K-2, 7	K-2, 7	K-12	
7	All HS	3-5, 8	3-5, 8		K-12
8		All HS	All HS		

Georgia will lead the nation in improving student achievement. 9



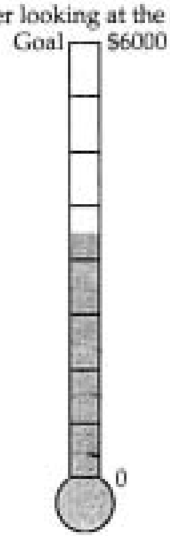
Tasks for Grade 6 Standards

Tasks for M6N1:

A) You are riding your bike on a trail that is 11 miles long. You plan to stop for a rest break every 2¾ (two and three-fourths) miles. How many rest stops do you plan to make? Justify your answer.

B) Write a set of directions for a younger student, explaining how to divide 1½ (one and one-half) by 0.25. Use a diagram and a written explanation showing why you divide these numbers the way you do.

C) After looking at the scale below…



Michael said, "We have reached $\frac{5}{8}$ of our goal."

Juan said, "I think we have earned about 60% of the $6,000 we need."

Fiona said, "We have earned about $3,500."

Nathan said, "You are all close, but none of you is correct."

Nathan is right.

1. Represent the amount earned as a fraction, as a decimal, as a percent, and as a dollar amount.
2. Show how you know that the *fraction*, the *percent*, the *decimal*, and the *dollar* amount answers are all equivalent in this situation.
3. Which 3 of the amounts are *always* equivalent to each other? Why?
4. Which amount is *not always* equivalent to the others? Why not?

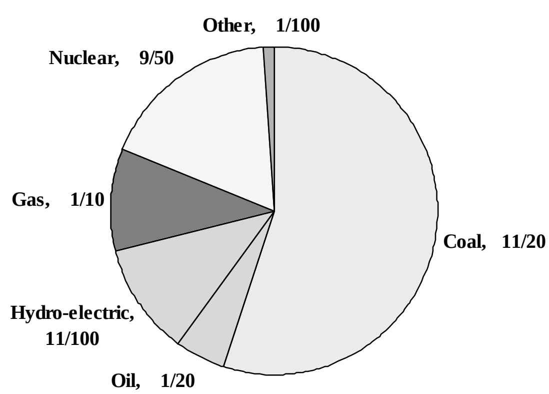
D) Which of the following are solved by 1/2 • 1/3 (one-half multiplied by one-third) and which are solved by 1/2 ÷ 1/3 (one-half divided by one-third)? Explain your answers.

- How many cups of sugar do you need to make 1/2 batch of cookies if a full batch takes 1/3 cup of sugar?
- How many poster boards can you paint with 1/2 can of paint if one poster board takes 1/3 of a can of paint?
- How many cups of birdseed do you need to fill a bird feeder if 1/2 cup of birdseed fills the bird feeder 1/3 full?
- What is the area, in square miles, of a rectangular plot of land that is 1/2 mile long and 1/3 mile wide?

E) Solve the following problem, write your answer as a mixed number and explain the steps you followed:
   - 2/3 times 3/5 + 0.5 divided by ¾

F) Three middle schools are going to have a science fair. The science fair will be in an auditorium. The amount of space given to each school is based on the number of students. Columbus Middle School has about 1,000 students, William Middle School has about 600 students, and Tyler Middle School has about 400 students.
   - The rectangle below represents the auditorium. Divide the rectangle to show the amount of space each school should get based on number of students. Label each section CM for Columbus Middle, WM for William Middle or TM for Tyler Middle.
   - What fraction of the space should each school get based on number of students? Show your mathematical reasoning.
   - If the schools share the cost of the science fair based on number of students, what percent of the cost should each school pay?
   - If the cost of the science fair is $300.00, how much should each school pay based on the number of students? Justify your answer.

G) The circle graph below compares the different ways that electricity is produced in the United States. Add the fractional parts and explain why your answer is 1 or why your answer is not 1. Explain what percent of a whole your answer represents.



H) Could you have a pie graph that has four regions, one taking up 1/8 of the pie, one taking up 3/5 of the pie, one taking up 3/20, and one taking up 1/10 of the pie? Explain why or why not.

I) Draw a number line in which 0, 1, 1/5 (one-fifth), and 1/4 (one-fourth) are marked. Choose one fraction, one decimal, and one percent that are between 1/5 (one-fifth) and 1/4 (one-fourth) on the number line. Make sure none of your answers is equivalent to any of your other answers. Explain how you know each of your answers is between 1/5 (one-fifth) and 1/4 (one-fourth).

Tasks for M6M4:

A) As an employee of the ABC Toy Company, your task is to design a package to house 24 blocks. You are supplied with 24 stacking cubes to explore the different ways the cubes can be put together and packaged in the shape of a rectangular prism. For each package built, determine the dimensions and calculate the surface area. Record the data in a table. Explain how you determined the surface area for each package. Identify which package you would recommend and justify your answer.

B) Draw a net for a rectangular prism that is 4 units by 6 units by 8 units on grid paper. Find the surface area of the rectangular prism. Be sure to show the steps that you followed to find the surface area.

Tasks for M6M1:

A) Use the following table to demonstrate your understanding of the unit relationships in the metric system of measurement. Explain your work.

Kilometer	Hectometer	Decameter	Meter	Decimeter	Centimeter	Millimeter
					1000 cm	
1 km						
			15 m			

Kiloliter	Hectoliter	Decaliter	Liter	Deciliter	Centiliter	Milliliter
			1 L			
		10 daL				
				25 dL		

Kilogram	Hectogram	Decagram	Gram	Decigram	Centigram	Milligram
1 g						
			100 g			
					2500 cg	

B) Use the following table to demonstrate your understanding of the unit relationships in the customary system of measurement. Explain your work.

Inch	Feet	Yard
		3 yds.
18 in.		
	12 ft.	

Cup	Pint	Quart	Gallon
		3 qts.	
4 c			
			4 gal.

Ounce	Pound
	3 lbs.
48 oz.	

Tasks for M6M2:

A) 1.

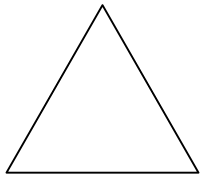
(a) Use centimeter or inch graph paper to make a pattern for a closed box. The box should have six sides, and when you fold the pattern, there should be no overlapping pieces of paper.

(b) How much paper is your box is made of? Be sure to use an appropriate unit in your answer.

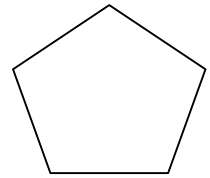
(c) Describe one-dimensional, two-dimensional, and three-dimensional parts or aspects of your box. In each case, give the size of the part or aspect of the box using an appropriate unit.

Tasks for M6G1:

A) Draw all the lines of symmetry for each of the figures below and justify your lines.

1. 

2. 

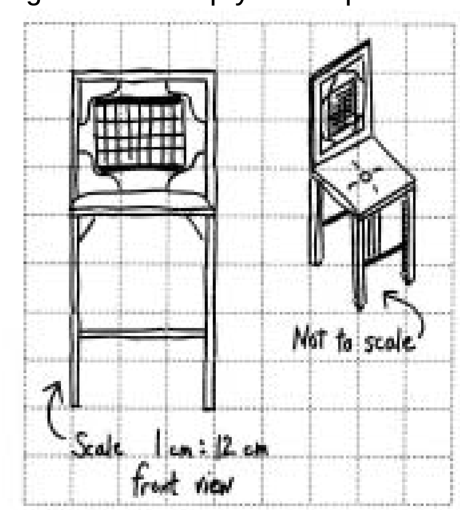
3. 

B) Identify which figure has point symmetry. Explain why and show how you know.

X G

C) If a rectangular garden is 20 feet long and 15 feet wide and if a scale drawing of the garden is 4 inches long, then how wide should the scale drawing of the garden be?

D) Use the scaled drawing below to help you complete this task.



- How tall is the real chair? Explain how you know.
- How far from the ground is the seat of the real chair? Explain how you found the answer.
- How wide is the real chair? Show how you figured it out.
- Use centimeter paper to make a scaled drawing of the front of the chair with the scale changed to 1 cm.: 6 cm.

Tasks for M6G2:

A) Given a rectangular prism (box), students use cm grid paper to make at least 3 nets to form the box. Students test each paper net by cutting it out and wrapping it around the box. Students then write descriptions for their nets.

Tasks for M6A1 and M6A2:

A) Read about each situation below. For each one:
   - Make a table of values, if possible, with at least 3 pairs of variables;
   - Say whether it is a proportional situation or not;
   - Say how you know it is or isn't proportional.
     a) Each classroom gets 62.5 square yards of carpet. Is the amount of carpet in the school proportional to the number of classrooms?
     b) Cells divide in a dish. Each hour, there are twice as many cells as the hour before. Is the number of cells in the dish proportional to the number of hours?
     c) On a bag of potting soil: "By volume, mix 1/10 portion of sand with each portion of potting soil." Is the volume of sand in a mixture proportional to the volume of potting soil?
     d) It costs me $10 per month to be connected to the electricity company. Then, electricity costs $0.15 per kilowatt-hour. Is my total bill proportional to the number of kilowatt-hours I use?
     e) The same road crew builds the same number of feet of road every day. Is "total number of feet built" proportional to "number of days worked"?

B) If 3/4 of a can of paint covers 2/3 of the wall, how many cans of paint will you need for the whole wall? Let X represent the amount of paint you need for the whole wall. Write an equation for X.

C) Haley mixed 3 1/2 (three and one-half) cups of white paint with 1 cup of red paint to make pink paint. If Haley wants to make 10 cups of the same shade of pink paint, how many cups of white paint and how many cups of red paint will she need? Explain your reasoning.

D) If 3 assembly lines take 2 hours to make enough items to fill 1 truckload, then how long will it take 1 assembly line to fill 1 truckload? All assembly lines produce items at the same rate. How long will it take 2 assembly lines to fill 1 truckload? Explain your reasoning.

E) If 3/4 (three-fourths) of a cup of juice gives you 60% of your daily value of vitamin C, then what percent of your daily value of vitamin C will you get in 1/2 cup of juice? Explain your solution.

Tasks for M6D1:

A) Use the data in the table below to construct two graphs. Construct one such that the data is presented consistently and the other presented such that the data display is misleading. Then, explain how the graphs are different and why one is misleading.

Favorite Programs

Program	**% of Average Audience**
A	17.5
B	17.8
C	18.7
D	21.2
E	22.0

B) A survey of foods that children like to eat found the following:

Food	**% of Children Saying They Enjoy**
Carrots	15
Beans	10
Tomatoes	30
Corn	40
Peas	5

Would it be appropriate to use a single pie graph to display this data? Why or why not?

C) The following table shows the number of home runs hit by each major league baseball team in the 1996 season.

- Find the mean, mode, and median number of home runs for the National League.
- Find the mean, mode, and median number of home runs for the American League.
- According to your data, which league has a better performance record? Justify your answer.

National League		American League	
Team	**Home Runs**	**Team**	**Home Runs**
Colorado	221	Baltimore	257
Atlanta	197	Seattle	245
Cincinnati	191	Oakland	243
Chicago Clubs	175	Kansas City	243
San Francisco	153	Texas	221
Florida	150	Cleveland	218
Los Angeles	150	Boston	209
Montreal	148	Detroit	204
San Diego	147	Chi. White Sox	194
New York Mets	147	California	192
St. Louis	142	Milwaukee	178
Pittsburgh	138	Toronto	177
Philadelphia	132	NY Yankees	162
Houston	129	Minnesota	118

D) WHO IS THE BEST? Rick, Mike and Sarah are all on their school's golf team. They have been practicing their chipping. Each player thinks s/he is the best chipper on the team. To decide who is right, they have a contest. Each player chips 10 balls onto the same green. The balls are different colors so they can tell them apart. When they finish they measure the distance from each ball to the cup in inches. Here are the results in no particular order.
Rick: 40, 60, 100, 120, 312, 320, 152, 105, 95, 46
Mike: 52, 76, 184, 288, 230, 120, 64, 60, 88, 188
Sarah: 84, 99, 130, 135, 200, 165, 120, 129, 136, 152

When the contest was over, the kids still couldn't decide who the winner was. The balls were all spread out. No one was close every time. They asked the coach for advice. He said, "In the game of golf, getting close and being consistent are important. So, you should consider who is closest and most consistent. Don't just consider who has the best shot. You're the math whizzes—I'm sure you can figure it out."

Help the kids decide who won. Analyze the results in as many ways as you know. Present a mathematical argument to back up your decision about who the winner was and why s/he won.

Tasks for M6D2:

A) You are taking a poll about water conservation. As a part of the poll, you ask 600 randomly selected adults how long they take a shower. The results are shown in the table. If you ask another adult the length of time he or she takes in the shower, what is the probability that the person will answer "between 5 and 10 minutes"? Explain your answer.

Length of shower (minutes)	**Number of people**
1 or less	1
Between 1 and 5	111
Between 5 and 10	360
Between 10 and 15	109
Between 15 and 20	16
20 or more	3

B) My friend wants me to play a game with him. I will get 1 point for each odd sum I roll with two number cubes (die). My friend will get 1 point for each even sum he rolls with the number cubes. I think I'm going to be cheated! I have noticed that I can't roll one of my odd numbers – 1! I only get a choice of 5 odd numbers (3, 5, 7, 9, 11) but my friend will get a choice of 6 even numbers (2, 4, 6, 8, 10, 12). Should I play this game with my friend? Using as much mathematical language and representation as you can, show me that this is or is not a fair game.

C) In a survey of 14 children, the ratio of children who preferred vanilla ice cream to those who preferred chocolate ice cream was 10 to 4, if there are 500 students in the school and the same ratio holds, how many students prefer vanilla to chocolate ice cream?

D) A researcher wants to estimate the number of fish in a small pond. She throws a net in the water, and when she pulls it out, she finds 30 fish in the net. The researcher marks these 30 fish and throws them back in the pond, unharmed. The next day, the researcher uses her net to catch some fish again. This time she catches 40 fish and finds that 2 of the fish are marked (so these two fish are two of the fish she had caught on the previous day). The fish mix freely in the pond. Based on the researcher's experiment, estimate the number of fish in the pond (this method is called the capture-recapture method of population estimation). Explain your reasoning.

Sample Student Work and Teacher Commentary (M6N1)

Note: The example below has been typed for ease of reading. In the original samples, both student work and teacher commentary were hand written.

Standard:

M6N1. Students will understand the meaning of the four arithmetic operations as related to positive rational numbers and percents using these concepts to solve problems.

a. Use factors and multiples.
b. Decompose numbers into their prime factorization (Fundamental Theorem of Arithmetic)
c. Determine the greatest common factor (GCF) and the least common multiple (LCM) for a set of numbers.
d. Multiply and divide fractions and mixed numbers.
e. Use fractions, decimals, and percents interchangeably.
f. Solve problems involving fractions, decimals, and percents and justify the process.
g. Evaluate expressions using order of operations including exponents.

Task:

Three middle schools are going to have a science fair. The science fair will be in an auditorium. The amount of space given to each school is based on the number of students. Columbus Middle School has about 1,000 students, Williams Middle School has about 600 students, and Tyler Middle School has about 400 students.

- A rectangle represents the auditorium. Divide the rectangle to show the amount of space each school should get based on number of students. Label each section CM for Columbus Middle, WM for William Middle and TM for Tyler Middle.
- What fraction of the space should each school get based on number of students? Show your mathematical reasoning.
- If the schools share the cost of the science fair based on number of students, what percent of the cost should each school pay?
- If the cost of the science fair is $300.00, how much should each school pay based on the number of students? Justify your answer.

Student Work:

1. The rectangle below represents the auditorium. Divide the rectangle to show the amount of space each school should get based on the number of students. Label each section CM for Columbus Middle, WM for Williams Middle, or TM for Tyler Middle.

CM	WM	TM

2. What fraction of the space should each school get based on the number of students? Show your mathematical reasoning.

Students in school/Total in all schools

CM - 1000/2000 = ½

WM - 600/2000 = 300/1000 = 30/100 = 3/10

TM - 400/2000 = 200/1000 = 100/500 = 10/50 = 1/5

CM = ½ = 0.50 = 50%

WM = 3/10 = .30 = 30%

TM = 1/5 = .20 = 20%

3. If the schools share the cost of the science fair based on number of students, what percent of the cost should each school pay?

CM - 50% because they take up ½ of the gym
WM - 30% because they take up 3/10 of the gym
TM - 20% because they take up 1/5 of the gym
Check: 50% + 30% + 20% = 100%

4. If the cost of the science fair is $300.00, how much should each school pay based on the number of students? Justify your answer.

CM -	$300 (total price) X 0.5 (amount taken up in gym) $300 X 0.5 = $150
WM -	$300 (total price) X 0.3 (amount taken up in gym) $300 X 0.3 = $90
TM -	$300 (total price) X 0.2 (amount taken up in gym) $300 X 0.2 = $60

Teacher commentary:

Number and Operations Concepts: The student…adds, subtracts, multiplies, and divides rational numbers…

Evidence found in the student work-question 4: "The student made appropriate computations and accurately divided the cost of the science fair proportionally, according to the approximate populations given at the beginning of the task."

Number and Operations Concepts: The student…applies and converts the different kinds and forms of rational numbers.

Evidence found in the student work- question 2: "The work makes clear the relationship between fractions and quotients, that 3/10 equals 3 divided by 10, etc. He converted the fractions into percentages."

Number and Operations Concepts: The student…reasons proportionally to solve problems involving equivalent fractions…

Evidence found in the student work -question 1: "The rectangle is not divided precisely in 5:4:2 ration, but it is very nearly so. The partitions are drawn sufficient for the given task. The school populations were approximations anyway."

Evidence found in the student work -question 2: "In part two the student exhibited understanding of some fundamental concepts of fractions. He used fractions to express a relationship where the whole is not a single item but a set (of 2,000 students). He determined the whole given the parts. He used equivalent fractions and simplified, as appropriate."

Evidence found in the student work -question 4: "The student accurately divided the cost of the science fair proportionally, according to the approximate populations given at the beginning of the task."

Problem Solving and Mathematical Reasoning: Conclusion. The student verifies and interprets results with respect to the original problem situation…

Evidence found in the student work -question 3: "The "check' that the three percentages computed must add up to 100%, the total, is more convincing evidence of understanding of percent that the actual rote computations performed by the student to obtain 50%, 30%, and 20%."

Evidence found in the student work -question 4: "The student checked that the charges computed for each school indeed add up to the $300 cost of the fair."

Correlation of the 6th grade GPS to the QCCs

Sixth Grade Georgia Performance Standards	Sixth Grade QCCs
M6N1a Use factors and multiples	Grade 4- 29; Grade 5-18 and 19; Grade 6- 40 and 41; Grade 7-31,33, and 34; Grade 8- 35 and 37 *Emphasis is on **finding** and **identifying** rather than **using.**
M6N1b Prime Factorization	Grade 5- 18 Grade 6- 40 Grade 7- 32 Grade 8- 36
M6N1c GCF and LCM	Grade 6- 40 Grade 7- 33 Grade 8- 37
M6N1d Multiply and divide fractions and mixed numbers	Grade 5- 4 (multiply only) Grade 6- 9 Grade 7- 14 Grade 8- 17
M6N1e Use fractions, decimals, and percents interchangeably	Grade 5- 16 (fractions and decimals only) Grade 6- 30 Grade 7- 29 Grade 8- 30
M6N1f Solve problems involving fractions, decimals, and percents and justify the process	Grade 5- 23 (fractions-add, subtract, and multiply) Grade 6- 9 (fractions and decimals only) Grade 7- 14 (fractions and decimals only) Grade 8-42 (percents only) * **Justify the process** was not present in any QCC)
M6N1g Use order of operations including exponents	Grade 6- 6 Grade 7- 9 Grade 8- 8 *Including exponents was not included.
M6M1 Convert from one unit to another within one system of measurement using proportional relationships	Grade 6- 23 Grade 7- 27 Grade 8- 29 *Proportional relationships were not included.

Sixth Grade Georgia Performance Standards	Sixth Grade QCCs
M6M2 Use appropriate units of measure for finding perimeter, area, and volume and express the answer using the appropriate unit	Grade 5- 12 Grade 6- 21 Grade 7- 25 Grade 8- 28
M6M3a Determine the formula for finding the volume of right prisms, cylinders, pyramids and cones	Grade 5- 14 Grade 6- 25 Grade 7- 24
M6M3b Compute the volume of right prisms, cylinders, pyramids, and cones	Grade 5- 14 Grade 6- 25 Grade 7- 24 Grade 8- 16
M6M3c Estimate the volume of right prisms, cylinders, pyramids, and cones	Grade 5- 25 ('predicts measurements by using rough comparisons') Grade 6- 24 ("estimates measures by using rough comparisons")
M6M3d Solve application problems involving volume of right prisms, cylinders, pyramids, and cones	Grade 5- 23 ("solves problems related to all 5th grade objectives")
M6M4a Find the surface area of a right prism and cylinder using manipulatives and nets	No Correlation
M6M4b Find the surface area using formulas	Grade 7- 23 and 24 Grade 8- 16
M6M4c Estimate the surface area	No Correlation
M6M4d Solve application problems involving surface area	No Correlation
M6G1a Understand the meaning of line and point (rotational) symmetry	Grade 1- 6 (folding for symmetry) Grade 2- 45 (create figures with symmetry) Grade 3- 9 (determine line of symmetry) Grade 4- 10 (sorts by line of symmetry) Grade 5- 10 (sorts by line of symmetry) Grade 6- 4 (line symmetry) *No correlation for understanding line symmetry and no mention of point symmetry.
M6G1b Demonstrate understanding of similar plane figures and the scale factor between them	Grade 3- 9 and 10 Grade 4- 9 Grade 5- 9 Grade 6- 16 Grade 7- 20 Grade 8- 21
M6G1c Interpret and sketch simple scale drawings	No Correlation

Sixth Grade Georgia Performance Standards	Sixth Grade QCCs
M6G1d Solve problems involving scale drawings	No Correlation
M6G2a Compare and contrast right prisms and pyramids	Grade 6- 18 (compare and contrast solids) Grade 7- 19 Grade 8- 19 (classify)
M6G2b Compare and contrast cylinders and cones	Grade 6- 18 Grade 7- 19 Grade 8- 19
M6G2c Interpret and sketch solid figures	No Correlation
M6G2d Create nets	No Correlation
M6A1 Meaning of ratio and how to use	Grade 6- 11 and 36 Grade 8- 41
M6A2a Analyze and describe patterns arising from function rules, tables, and graphs	Grade 3- 30 Grade 4- 19 Grade 5 20 Grade 7- 12 Grade 8- 14
M6A2b Understand the meaning of direct proportion. Graph functions in the form y=kx	No Correlation
M6A2c Solve proportions	Grade 7- 10 Grade 8- 12
M6A2d Solve equations in the form y=kx	Grade 6- 8 Grade 7- 7 Grade 8- 10
M6A2e Use proportional reasoning to solve problems	Grade 6- 49 and 11 Grade 7- 39 Grade 8- 41
M6D1a Construct frequency distributions, tables, and graphs	Grade K- 25 Grade 1- 35 Grade 3- 38 Grade 4- 26 Grade 5- 31 Grade 6- 51 Grade 7- 41 Grade 8- 43
M6D1b Choose appropriate tables and graphs	Grade 6- 50 Grade 7- 41 Grade 8- 43
M6D2a Experimental probability	Grade 3- 40 Grade 4- 27 Grade 5- 30 Grade 6- 44 Grade 7- 36 Grade 8- 39

Sixth Grade Georgia Performance Standards	Sixth Grade QCCs
M6D2b Theoretical probability	Grade 6- 45
M6D2c Use proportions to estimate the values of a collection of objects	No Correlation
M6P1a Solve non-routine word problems	All grade levels
M6P1b Solve problems related to 6th grade objectives	Grade 6- 46 and 47
M6P1c Determines the operation	Grade 6- 46
M6P1d Determine the most efficient way	All grade levels
M6P2 Investigate, develop, and evaluate mathematical arguments	No Correlation
M6P3 Use the language of mathematics	All grade levels
M6P4 Interconnect and apply in other contexts	No Correlation
M6P5 Communicate math ideas	All grade levels

GPS and the Fifth Grade Mathematics Teacher

To help with the transition from the fifth grade mathematics QCC to the sixth grade mathematics GPS, here are some suggested topics that fifth grade mathematics teachers could integrate into their current curriculum if time permits.

Topics:

Concept	Standard
Decimals	Operations with decimals (multiplication and division) (See GPS M5N3)
Percent	Concept of Percent (See GPS M5N5)
Volume and Capacity	Relationship between volume and capacity (See GPS M5M4f)
Area	Area of parallelogram, triangle, circle, polygons (regular and irregular) (See GPS M5M1)
Algebra	Simple algebraic expressions: substituting numbers for the unknown (See GPS M5A1b)

Suggestions:

- When? After CRCT testing, in after school programs or Saturday School
- How? Tie to related concepts (Example: Percent to fractions and decimals)
- Save time –
  - Don't teach everything in textbook
  - Teach Grade 5 QCC Standards, then as time permits teach extras – the GPS Standards listed above

Scope and Sequence of K-8 Mathematics in the GPS

	Numbers and Operation	Measurement	Algebra	Geometry	Data Analysis and Probability
K	• Numerals • Count to 30 • Estimates in 5's and 10's • Identify coins • Model addition and subtraction • Build and represent combinations of 10	• Order length • Order capacity • Order height • Order weight • Name days • Name months • Name seasons • Understand daily schedule		• Recognize and name triangles, rectangles, squares, circles, spheres, and cubes • Combine shapes • Beside, above, and below • Front, behind, and inside • Recognize and extend missing shapes in patterns	• Pose questions • Gather data • Organize data
1	• Represent compare, and order numbers to 100 • Place value through 100 • Add and subtract numbers less than 100 • Compose/Decompose numbers less than 10 • Sort and arrange collections of objects through 100 (use even, odd, halves, fourths, sets)	• Compare length • Compare weight • Compare capacity • Use non-standard units of measure • Time • Calendar • Sequence of events		• Study and create triangles, rectangles, pentagons, hexagons, cylinders, cones, rect. Prisms • Compare and contrast shapes • Arrange and describe shapes	• Create simple tables • Create simple graphs • Interpret tables and graphs
2	• Place value through four digits • Use decimals to represent money • Count change • Multi-digit addition and subtraction • Use inverse relation of addition and subtraction • Skip count • Construct multiplication tables • Multiply 1 digit numbers • Divide objects into equal groups • Determine reasonable solutions • Understand and compare common fractions (3rds, 6ths, 8ths, and 10ths) • Use equality and inequality signs	• Standard units of inch, foot, yard, centimeter, and meter • Perimeter of polygons • Time to the nearest 5 minutes • Temperature (in degrees Fahrenheit)		• Describe and classify triangles, square, rectangle, trapezoid, quadrilateral, pentagon, hexagon, and irregular polygonal shapes • Describe and classify prisms, cylinders, cones, and spheres • Recognize faces of solids • Classify angles as greater or less than right	• Picture graphs • Venn diagrams • Bar graphs

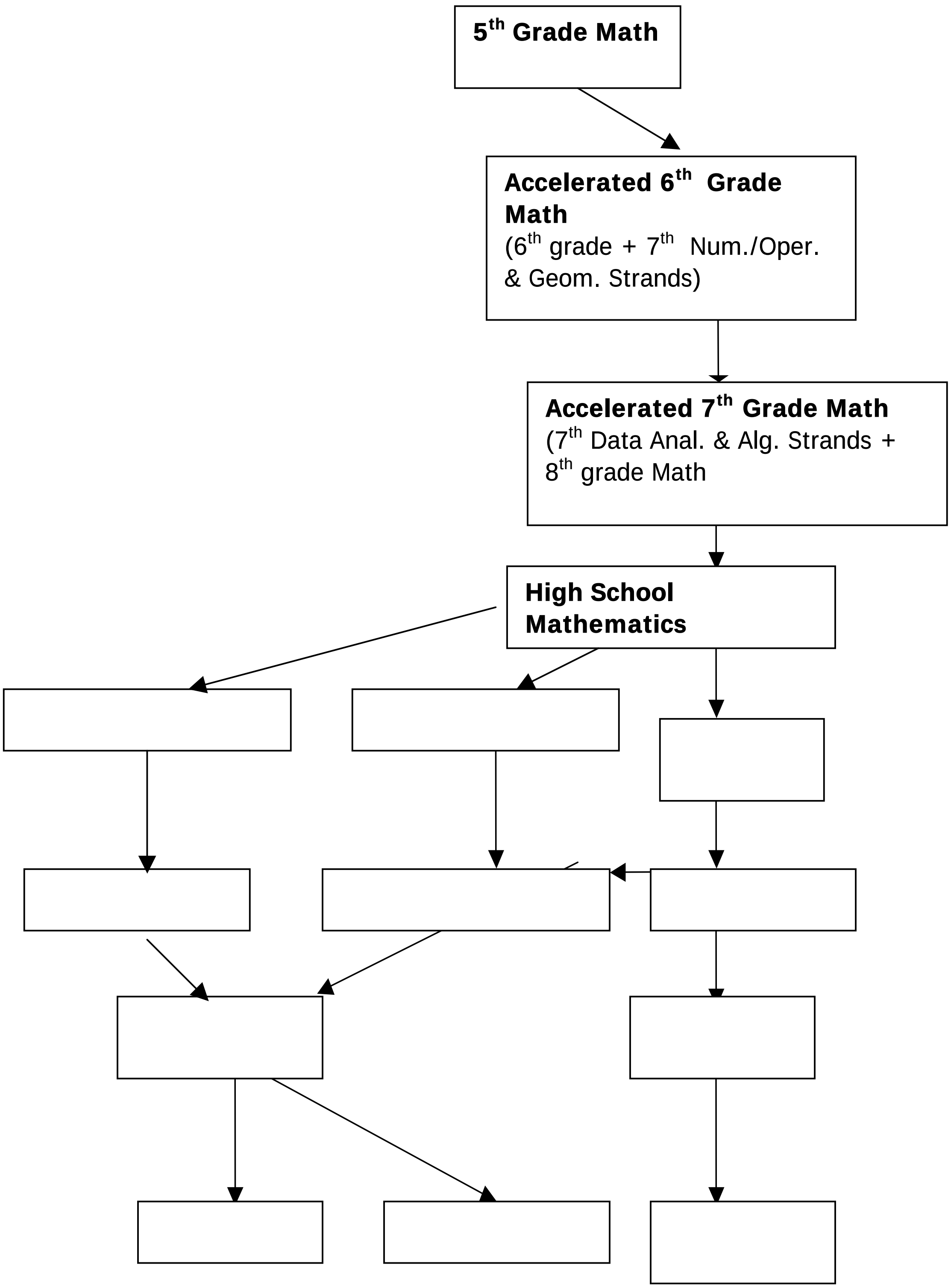
	Numbers and Operation	Measurement	Algebra	Geometry	Data Analysis and Probability
3	• Place value from tenths through ten thousands • Understand 10 times, 100 times, 1/10 of a single digit • Use properties of addition and subtraction • Use mental math to add and subtract • Use estimation to add and subtract • Multiplication facts to 10 X 10 • Distributive property • Multiply 2 or 3 digit number by a 1 or 2 digit number • Multiply by 10 or 100 • Understand division • Explain remainder • Divide a 3 digit number by a 1 digit number • Understand decimal and fraction relationship • Add and subtract decimal and common fractions with like denominators	• Determine elapsed time to full, half, and quarter hours • Use kilometers and miles • Use ¼ inch and millimeter • Convert within system of measurement • Measure perimeter • Measure area • Determine perimeter and area using formula	• Describe and extend numeric and geometric patterns • Use a symbol to represent and unknown and find the value of it	• Describe and classify triangles by sides as scalene, isosceles, and equilateral • Relate angles to geometric figures • Identify center, diameter, and radius of circle	• Bar graphs • Tables

	Numbers and Operation	Measurement	Algebra	Geometry	Data Analysis and Probability
4	• Place value from hundredths to one million • Equate number's word name, standard form, and expended form • Round to nearest ten, hundred, or thousand • Round a decimal to the nearest whole number • Estimate sum or difference by rounding • Multiply 2 or 3 digit number by 1 or 2 digit number • Know division facts • Divide by a 2 digit number • Order two digit decimals • Add and subtract 1 and 2 digit decimals • Multiply and Divide 1 and 2 digit decimals • Understand simple equivalent fractions • Add and subtract fractions and mixed numbers with common fractions • Covert improper fractions and mixed numbers • Compute using order of operations • Compute using commutative, associative, and distributive properties • Use mental math and estimation	• Measure weight in standard and metric units • Use protractor to measure angles in degrees • Understand half and full rotations	• Represent unknowns using symbols • Write and evaluate mathematical expressions	• Define and classify triangles by angles • Describe parallel and perpendicular • Classify quadrilaterals as parallelograms, squares, rectangles, trapezoids, and rhombi • Compare and contrast solid geometric figures (cube, prism, cylinder) • Use coordinate system • Graph ordered pairs	• Bar graph • Line graph • Pictograph • Compare graphs • Analyze data

	Numbers and Operation	Measurement	Algebra	Geometry	Data Analysis and Probability
5	• Classify counting numbers into odd/even, prime/composite • Find multiples and factors • Use divisibility rules • Understand place value • Multiply by 10, 100, 1000, 0.1, and 0.01 • Multiply and divide decimals less than one and greater than one • Represent division of whole numbers as fractions • Find equivalent fractions • Simplify fractions • Compare fractions • Add and subtract fractions and mixed numbers with unlike denominators • Use fractions and decimals interchangeably • Estimate products and quotients • Understand the meaning of percentages • Model percent on a 10 by 10 grid • Apply percentages to circle graphs	• Estimate area • Derive formula for area of parallelogram • Derive formula for area of triangle • Determine and find area of circle using formula • Find area of polygon (regular and irregular) by dividing into squares, rectangles, or triangles • Use milliliters, liters, fluid ounces, cups, pints, quarts, and gallons • Convert within one system • Compute volume of cube and rectangular prism with appropriate units	• Use variables • Substitute numbers in simple algebraic expressions • Determine that a formula will be reliable regardless of type of number substituted	• Understand congruence of geometric figures and correspondence of vertices, sides, and angles • Find circumference of circles	• Compare and contrast multiple graphic representations • Collect, organize, and display data appropriately
6	• Factors and multiples • GCF and LCM • Add, subtract, multiply, and divide fractions and mixed numbers • Use fractions, decimals, and percents interchangeably • Evaluate expressions using order of operations including exponents	• Convert within one system • Use appropriate units for perimeter, area, and volume • Find volume of prisms and cylinders • Find surface area of prisms and cylinders	• Understand ratio and proportion • Understand the relations between two quantities and how they vary • Graph simple functions in the first quadrant • Understand inverse proportion • Write and solve linear equations • Use proportional reasoning and percents	• Understand line and point symmetry • Understand similar plane figures • Interpret and sketch simple scale drawings • Compare and contrast right prisms, pyramids, cylinder, and cones • Sketch front, back, and side views of solid figures • Create nets for prisms, cylinders, pyramids, and cones	• Construct frequency distributions, tables, and graphs • Choose appropriate display • Predict probability through trials/simulations • Determine theoretical probability • Use proportions to estimate

	Numbers and Operation	Measurement	Algebra	Geometry	Data Analysis and Probability
7	• Positive and negative numbers • Absolute value of rational numbers • Order rational numbers • Add, subtract, multiply, and divide positive and negative rational numbers	•	• Evaluate simple algebraic expressions • Add and subtract linear expressions • Solve two-step equations • Graph linear relations and functions • Graph direct proportions • Graph inverse proportions	• Make basic constructions using compass and straight edge • Use coordinate geometry to demonstrate translations, symmetry, rotations, and reflections • Compare plane and simple solid figures • Describe cross sections of cones, cylinders, pyramids, and prisms	• Frequency distribution • Mean, median, mode, range and outliers • Display data in appropriate graphs
8	• Apply laws of exponents • Use scientific notation • Find square root	•	• Simplify and evaluate algebraic expressions • Solve multi-step equations • Use linear relations and functions • Graph and analyze graphs of linear equations • Solve systems of linear equations • Solve and graph linear inequalities • Add, subtract, multiply, and divide monomials and polynomials	• Use properties of parallel and perpendicular lines • Use and apply properties of angle pairs • Apply properties of right triangle and Pythagorean theorem • Understand and use similarity and congruence • Determine congruence and similarity of triangles	• • Apply basic concepts of set theory • Determine the number of outcomes in a given event • Use basic laws of probability • Discover experimental probability approaches theoretical probability when using large number of trials

Local Option Accelerated Mathematics Curriculum



Backward Design

Definition	Examples:
What It Is	**What It Isn't**

Backward Design

Benefits of SBE

Directions: Imagine that you are back at your school, explaining to your colleagues how you are going to approach the new standards. You have decided to embrace a standards-based (backward design) process, but you are encountering objections.

1. Read the provocations below.
2. If needed, add additional ones that you would expect to hear from your colleagues.
3. Use your *Understanding by Design* book to try to find good answers to these provocations.
4. With other members of your group, take turns role playing the SBE advocate and the resister. Practice using your knowledge of backward design to convince the resister of its value.

Provocations:

"That means always using performance-based assessments. I still want to use traditional quizzes and tests."

"Teaching for understanding takes too much time. I can barely get through the textbook now."

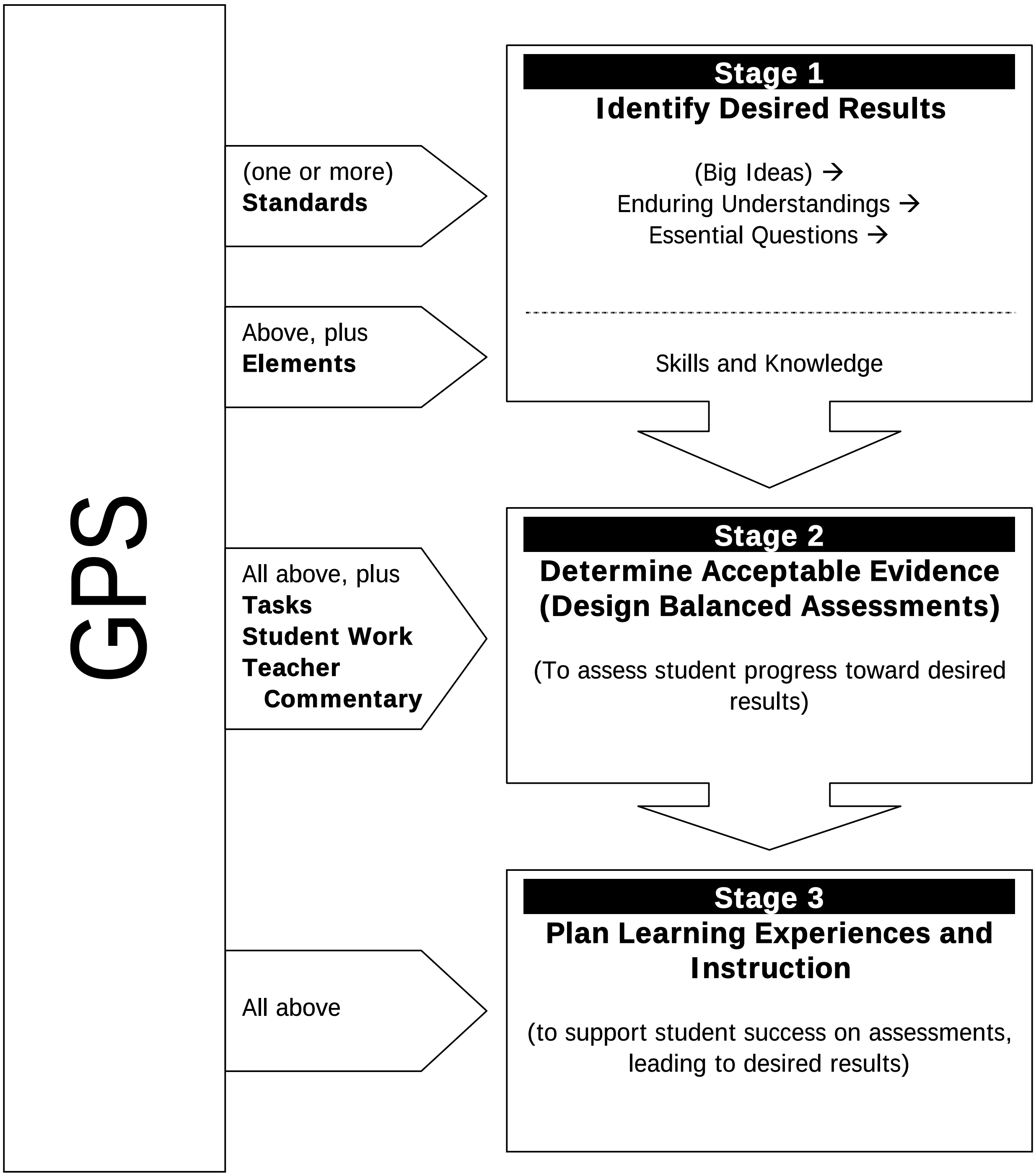
"I'm overwhelmed. How can I possibly teach to all the state content standards and our district curriculum objectives?"

"Every year, parents and students are thrilled with the unit we do on jungle animals. I'm not giving it up just because there's no standard related to it. I know what keeps my kids interested in learning."

"If you develop your assessments first, then all you're doing is teaching to the test, and valuable learning gets lost."

"That might work for (name another grade level or subject matter), but not for us."

GPS and the Backward Design Process



Follow Up Assignment

Directions: Please complete this assignment before your next class. Bring all your products to class; you will be building on this work in the next workshop.

Complete your action plan. You should have at least one standard analyzed (Stage 1 in *Understanding by Design.*). This means identifying:

- Big ideas
- Understandings
- Essential questions
- Skills and knowledge

You may use one of the templates in *Understanding by Design: Professional Development Workbook*, such as the one on page 122 or 125, or you may create your own format, as long as it includes the categories above.

Action Plan

Directions: Complete the following chart to help shape your team's work before day two of training. You should analyze at least one standard in each strand, including big ideas, understandings, essential questions, and skills and knowledge. Here are some questions to consider:

- What do we need?
- What do we have?
- How can we obtain needed information or resources?
- What can we develop as a team?
- What is our plan for completing the work and learning together?

GPS Standards we will tackle:			
Step/Activity	**Who**	**By When**	How

Recommended Readings

Books

Dufour, R., & Eaker, R. (1998). *Professional Learning Communities at Work*. Bloomington, IN: National Educational Service.

The authors use Adlai Stevenson High School as the case study of how principals can create learning communities where student learning and achievement are center stage. The book lays out the school improvement process. No failing schools would exist if every school became a learning community modeled after DuFour's school. The book contains an extensive bibliography.

Hayes Jacobs, Heidi. *Mapping the Big Pictures: Integrating Curriculum and Assessment K-12*. Alexandria, VA: Association for Supervision and Curriculum Development. 1997.

In this step-by-step description of the process for creating and working with curriculum maps from data collection to ongoing curriculum review, Jacobs discusses the importance of "essential questions," as well as assessment design that reflects what teachers know about the students they teach. The benefits of this kind of mapping are obvious for integrating curriculum. Through the development of curriculum maps, educators can see not only where subjects already come together but also any gaps that may be present.

Literacy Across the Curriculum: Setting and Implementing Goals for Grades Six through 12. Southern Regional Education Board, 2004. Publication Orders Department, 592 10th St. N.W., Atlanta, GA 30318-5790, Fax: (404) 872-1477 (03V63, $10 each/$6.50 each for 10 or more.) http//www.sreb.org/main/Publications/catalog/howtoorder.asp.

This volume is essential for state, district, and school leaders who plan to implement schoolwide literacy programs. It provides concrete, research-based steps not only to raise reading and writing achievement but also to help students learn more in every class by using literacy skills. The guide focuses on five literacy goals: reading 25 books across the curriculum; writing weekly in all classes; using reading and writing strategies; writing research papers; and taking rigorous language-arts classes.

Marzano, Robert J., Debra J. Pickering, and Jane E. Pollock. *Classroom Instruction That Works: Research-Based Strategies for Increasing Student Achievement*. Alexandria, VA: Association for Supervision and Curriculum Development. 2001.

Using a meta-analysis of thousands of research studies, Marzano clearly answer the question, "Which instructional techniques are *proven* to work?" They provide 13 proven strategies that all teachers can useand they explain the research in a clear, practical manner.

Marzano, R., Norford, J., Paynter, D., Pickering, D., & Gaddy, B. (2001). *A Handbook for Classroom Instruction That Works*. Alexandria, VA: Association for Supervision and Curriculum Development.

A perfect resource for self-help or school study groups, this handbook makes it much easier to apply the teaching practices outlined in *Classroom Instruction That Works*. The authors guide the reader through the nine categories of instructional strategies that are most likely to maximize student achievement and provide everything needed to use the strategies quickly in classrooms. The book includes the following: exercises to check understanding; brief questionnaires to reflect on current beliefs and practices; tips and recommendations to implement the strategies; samples, worksheets, and other tools to help plan classroom activities; and rubrics to assess the effectiveness of the strategy with students.

Marzano, Robert J. *Classroom Management That Works: Research-Based Strategies for Every Teacher*. Alexandria, VA: Association for Supervision and Curriculum Development. 2003.

The authors analyze research from more than 100 studies on classroom management to answer the questions, "How does classroom management affect student achievement?" and "What techniques do teachers find most effective?" The authors provide action steps, along with real stories of teachers and students, to guide teachers in implementing the research findings.

Marzano, Robert J. *Transforming Classroom Grading*. Alexandria, VA: Association for Supervision and Curriculum Development. 2000.

Grading has the *potential* for being a valuable learning tool that helps both students and teachers clearly see how they can improve; however, this potential is seldom realized. In this book, Marzano presents viable alternatives to traditional assessment that are grounded in research and practical at the same time.

Strong, R., Silver, H., & Perini, M.. *Teaching What Matters Most: Standards and Strategies for Raising Student Achievement*. Alexandria, VA: Association for Supervision and Curriculum Development. 2001.

This practical book about the responsibility educators have to teach what matters most includes many examples of educators throughout the nation who have been successful in increasing student performance on state and national assessments. The authors also explore three changes that must take place to achieve this goal: responsible standards, responsible strategies, and responsible assessment practices.

Tomlinson, C. *The Differentiated Classroom: Responding to the Needs of All Learners*. Alexandria, VA: Association for Supervision and Curriculum Development. 1999.

Tomlinson explains the elements of differentiated instruction and the importance of differentiated instruction within the classroom. The book also serves as an instructional guide for educational leaders and instructors as differentiated strategies are implemented.

Tomlinson, C. *How to Differentiate Instruction in Mixed-Ability Classrooms*. Alexandria, VA: Association for Supervision and Curriculum Development. 2001.

This excellent resource includes concrete examples of instructional strategies matched to the readiness, interests, and talents of all students. Strategies include learning-centered, hands-on activities; contracts; and investigative projects. The author also offers lesson-planning strategies to provide scaffolding of the content, procedures used in learning, and products of learning.

Wiggins, Grant and Jay McTighe. *Understanding by Design*. Alexandria, VA: Association for Supervision and Curriculum Development. 1998.

This book explains the "backward design" process that is the backbone of standards-based education. The book explains both the underlying principles and the process teachers can use to put them into practice.

Wiggins, Grant and Jay McTighe. *Understanding by Design Study Guide*. Alexandria, VA: Association for Supervision and Curriculum Development. 2000.

This companion book to *Understanding by Design* provides discussion questions, graphic organizers, and summaries to support faculty study groups that are exploring *Understanding by Design*.

Wiggins, Grant and Jay McTighe. *Understanding by Design Professional Development Workbook*. Alexandria, VA: Association for Supervision and Curriculum Development. 2004.

This companion book to *Understanding by Design* is chock-full of templates and examples to help teachers put the process into place.

Professional Organizations

NCTE - http://www.ncte.org/
GCTE - http://www.gcte.org/
IRA - http://www.reading.org/
GRA - http://www.georgiareading.org/
National Council of Teachers of Mathematics (NCTM) - http://www.nctm.org
Georgia Council of Teachers of Mathematics (GCTM) – http://www.gctm.org

Web Sites

Read-Write-Think. NCTE/IRA. http://www.readwritethink.org/.

This site contains lessons, web resources, standards, and student materials. It provides quality practices and resources in reading and language arts instruction.

Illinois School Improvement Division. http://206.166.105.86/knowledge/standards_resources.asp.

This site provides Illinois Learning Standards Resources, including benchmark indicators, sample learning activities, and sample student work.

Units (incorporating Learning Focused components). Connected Learning. http://www.title3.org/.

BOCES is a cooperative service organization that helps school districts save money by pooling resources and sharing costs.

Special Education Resources

Access, Participation, & Progress in the General K-12 Curriculum. National Center on Accessing the General Curriculum (ncaog.org).

Approximately 70 general and special educators and parents attended the National Capacity Building Institute on Access, Participation, and Progress in the General Curriculum, held on July 10, in Arlington, VA. The article includes the proceedings from the Institute.

Aligning Special Education with NCLB. www.ldonline.org.

The No Child Left Behind Act (NCLB) is a standards-based reform movement. This movement emphasizes standards and the alignment of curriculum and assessment to those standards. States established what is to be taught. The goal of standards is to increase academic achievement levels. A related goal is to close the achievement gap for students who have traditionally been at-risk for academic failure or lack of success. This group includes students with disabilities.

Thompson, S., Thurlow, M., Quenemoen, R.F., & Esler, A. (2001). *Addressing Standards And Assessments On State IEP Forms*, National Center on Educational Outcomes (NCEO Synthesis Report 38)

This article summarizes data on each State's use of standards in developing Individualized Education Programs (IEP) for students with disabilities. All fifty states were asked to send their IEP forms and to indicate whether the forms were required, recommended, or simply sample forms. Out of the 41 states with IEP forms, only 5 states specifically addressed the general curriculum on their forms. Recommendations for IEP forms that provide decision-making guidance involving access to the general curriculum are summarized.

Writing Standards-based IEPs. Colorado Department of Education. www.cde.org.

The Colorado Department of Education provides information for teachers on developing standards-driven IEPs. The summary includes a definition of standards-driven IEPs, characteristics of standards-driven IEPs, and a rationale for standards-driven IEPs.

Resources for Differentiation

Association for Supervision and Curriculum Development. *At Work in the Differentiated Classroom*. Alexandria, VA. Author. (video staff development set). 2001.

Chapman C. & Gregory, G. *Differentiated Instruction Strategies For Writing In The Content Areas*. Thousand Oaks, CA: Corwin Press. 2003.

Coil, C. *Standards-Based Activities And Assessments For The Differentiated Classroom*. Marion, IL: Pieces of Learning. 2004.

Tomlinson, C. *Fulfilling The Promise Of The Differentiated Classroom: Strategies And Tools For Responsive Teaching*. Alexandria, VA: Association for Supervision and Curriculum Development. 2003.

Winebrenner, S. *Teaching Gifted Kids In The Regular Classroom*. Minneapolis, MN: Free Spirit. 1992.

Mathematics/Numeracy Resources

"Algebraic Skills and Strategies for Elementary Teachers and Students." In Brief: K-12 Mathematics and Science Research and Implications. *Madison, WI: National Center for Improving Student Learning and Achievement in Mathematics and Science.*

This six-page booklet presents a case for including algebra at all grades from K to 12. It also provides an overview for how this can be accomplished. While not detailed enough to serve as a guide, this booklet would be useful to introduce the idea of "algebraic thinking."

Bottoms, Gene and Kathleen Carpenter. *Algebra in the Middle Grades: Setting Up More Students for Success.* Southern Regional Education Board. 2003.

This four-page report makes a case for holding all middle schoolers to high standards and offering the opportunity and support for all students completing the equivalent of Algebra I in middle school.

Cuevas, Gilbert, ed. *Reaching All Students with Mathematics.* Reston, VA: National Council of Teachers of Mathematics. 1993.

This book provides a case for numeracy and establishes the components of effective numeracy practice. Each chapter, written by a different author(s), looks at numeracy from a slightly different perspective.

Getting Students Ready for Algebra I: What Middle Grades Students Need to Know and Be Able to Do. Southern Regional Education Board. 2002. (available at www.sreb.org.)

This report is organized around 17 readiness indicators. Five process indicators represent the skills and concepts that should be incorporated into mathematics at all grade levels and in all courses. Twelve indicators address essential content-specific skills and concepts that prepare students for Algebra I. Each indicator is described and includes some examples of how the indicator relates to the preparation for algebra as well as suggestions to help teachers teach the skills and concepts that students need.

"Improving Achievement in Mathematics and Science." Educational Leadership. February, 2004. (entire issue)

This issue of Educational Leadership contains many articles related to numeracy and mathematics instruction. Topics include instructional strategies, comparisons of US achievement to that of other countries, lesson study, problem-solving activities, number sense, mathematics magic, arithmetic, differentiation, and textbooks.

Mirra, Amy J. Administrator's Guide: How to Support and Improve Mathematics Education in Your School. *Reston, VA: The National Council of Teachers of Mathematics, Inc. 2003.*

This is a companion guide to the NCTM standards. See the description "Principals and Standards," below.

Principles and Standards for School Mathematics. *Reston, VA: The National Council of Teachers of Mathematics, Inc. 2000.*

This book lists and describes the organization's standards for K-12 mathematics. Standards are discussed by subject (e.g., numbers and operations, geometry, problem solving) as well as by grade level (K-2, 3-5, 6-8, 9-12). This book is useful for schools that want to see how their curriculum matches against a nationally recognized set of standards. The companion Administrator's Guide *provides a concise overview of the standards and how to use them.*

Sutton, John and Alice Krueger, eds. EDThoughts: What We Know About Mathematics Teaching and Learning. McREL, 2002.

This easy to use reference contains about three dozen questions about mathematics instruction that can be answered by an examination of the research. Each question is addressed in a clear two-page summary that includes a discussion of findings, recommendations, and references. The questions are organized into categories: Equity, instruction, assessment, curriculum, technology, and learning.

Steen, Lynn Arthur, ed. *Why Numbers Count: Quantitative Literacy for Tomorrow's America.* New York: The College Board. 1997.

This book is composed of chapters written by a diverse group of researchers, professors, journalists, and policy makers. Each chapter addresses the need for numeracy from a different perspective. Each chapter could be used as a book study with faculty.

Thomas, Ed. *Styles and Strategies for Teaching High School Mathematics.* Ho-Ho-Kus, NJ: Thoughtful Education Press. 2003.

This is a resource book for teachers of mathematics. It contains 27 research-based, classroom-tested instructional strategies; a sensible plan for learning style-based differenctation; and dozens of ready-to-use reproducible lessons.

Van de Walle, John A. *Elementary and Middle School Mathematics.* New York: Longman Press. 1998.

This book is both a textbook and a desktop idea book. It contains information on successful strategies to use to teach various mathematics concepts. Various approaches are explained, and many examples are included, along with tips on how to get the most learning out of each strategy. This is a great resource for mathematics teachers at any grade K-12.

Web Resources

http://teachers.bcp.org/amathurin/dept/

The web site for the Mathematics Department at Bellarmine College Preparatory, San Jose, California. This site provides detailed resources and course descriptions.

http://www.state.ct.us/sde/dtl/t-a/best/seminarseries/online_seminars/elem/4/print.htm

Web site from the Connecticut Department of Education that provides a lesson on using assessments effectively, with examples and external resources.

http://www.stolaf.edu/people/steen/Papers/numeracy.html

Paper on numeracy by Lynn Arthur Steen. Makes a case for practical, civic and professional numeracy.

http://mathforum.org/library/resource_types/professional

Provides a comprehensive list of professional organizations dealing with mathematics, along with Web sites and brief descriptions.

http://www.sofweb.vic.edu.au/eys/num/ENRP/wholeschdes/

Provides the final report of the Early Numeracy Research Project, a three-year research project commissioned by the Department of Education, Employment and Training, Victoria, Association of Independent Schools of Victoria, Catholic Education Office Melbourne Dioceses and conducted by the Australian Catholic University, in conjunction with staff from Monash University.

http://www.ncsl.org.uk/index.cfm?pageid=numeracy-index

Provides a numeracy self-evaluation planner, including four case studies of numeracy being implemented in primary schools.

http://www.decs.act.gov.au/services/literacynumeracy.htm

Web site of the Literacy and Numeracy Team, established in 1998 as one of the initiatives of the Australian Capital Territory (ACT) Literacy Strategy, *Literacy Matters*, to coordinate literacy and numeracy programs in ACT Government primary and high schools.

http://www.literacynet.org/sciencelincs/

The National Institute for Literacy Science and Numeracy Special Collection provides annotated links to Internet sites that are useful for teaching and learning about science and numeracy. The topics have been arranged according to the national education standards in science and in numeracy.

http://www.teachingideas.co.uk/maths/contents.htm

This site contains links to (and descriptions of) all of the General Numeracy ideas on this site. This Numeracy section also contains number activities; shape, space and measurement activities; and data handling activities.

http://www.austhink.org/critical/pages/numeracy.html

Tim Van Gelder's Critical Thinking on the Web. A site of resources to promote numeracy.

http://www.literacyandnumeracy.gov.au/parents.htm

A web site promoting National Literacy and Numeracy Week in Australia, specifically targeting what parents can do.

http://www.literacyandnumeracy.gov.au/teachers.htm

A web site promoting National Literacy and Numeracy Week in Australia, specifically listing resources for teachers.

Glossary

CONTENT STANDARDS:	Content standards state the purpose and direction the content is to take, and are generally followed by elements. Content standards define what students are expected to know, understand, and be able to do.
CURRICULUM DOCUMENT:	The Georgia Performance Standards document is the curriculum document that contains all standards that should be learned by all students.
ELEMENTS:	Elements are part of the content standards that identify specific learning goals associated with the standard.
PERFORMANCE STANDARDS:	Performance standards define specific expectations of what students should know and be able to do and how well students must perform to achieve or exceed the standard. Georgia's performance standards are composed of four components: content standards, tasks, student work, and teacher commentary.
PROCESS STANDARDS:	Process standards define the means used to develop patterns of thought and behavior that lead to conceptual understanding.
STANDARD:	Something set up and established by authority as a rule for the measure of quantity, weight, extent, value, or quality.
STANDARDS-BASED EDUCATION:	In standards-based classrooms, standards are the starting point for classroom instruction that ensures high expectations for all students.
STRAND:	A strand is an organizing tool used to group standards by content. For example, the English language arts curriculum contains strands of reading, writing, listening, speaking, and viewing. K-5 science curriculum contains a life science strand, physical science strand, and an earth science strand.
STUDENT WORK:	Examples of successful student work are included to specify what it takes to meet the standard and to enable both teachers and students to see what meeting the standard "looks like."

TASKS:	Keyed to the relevant standards, tasks provide a sample performance that demonstrates to teachers what students should know and be able to do during or by the end of the course. Some tasks can serve as activities that will help students achieve the learning goals of the standard, while others can be used to assess student learning; many serve both purposes. Although the Georgia Performance Standards include tasks, teachers may develop their own tasks.
TEACHER COMMENTARY:	Teacher commentary is meant to open the pathways of communication between students and the classroom teacher as well as within faculty in order to ensure consistency within assessment and expectations. Commentary shows students why they did or did not meet a standard and enables them to take ownership of their own learning.

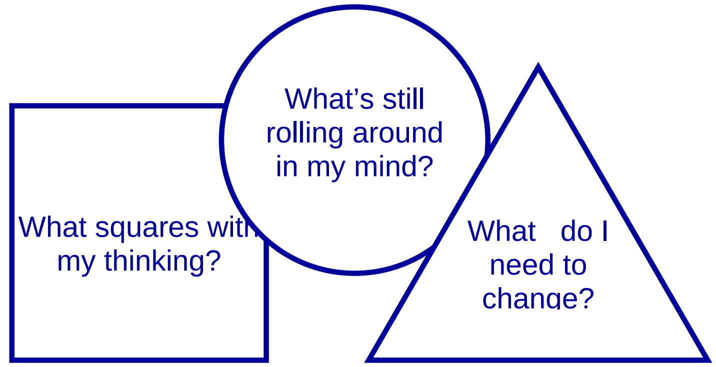
Grade Six Mathematics Terms

Bar Graph	A graph in which quantities are represented by bars.
Circle Graph	A graph that divides a circle into sectors in order to compare different parts of a data set to the entire set.
Cone	A three-dimensional figure with a circular base and vertex.
Customary System of Measurement	A system of measurement used in the U. S. The system includes units for measuring length, capacity, weight , and temperature.
Cylinder	A three-dimensional figure with two parallel and congruent curves (usually circles) as bases, which are joined by a curved surface.
Decompose	To break a number up into other numbers.
Direct Proportion	Two quantities that always have the same ratio.
Evaluate	To find the value of a mathematical expression.
Event	A possible result, or outcome, in probability.
Experimental Probability	A statement of probability based on the results of a series of trials.
Exponent	The number that tells how many equal factors there are.
Factor	An integer that divides into another with no remainder. In 9*4=36, 9 and 4 are factors of 36.
Frequency Distribution	Range of the numbers of times that the outcome occurred.
Frequency Table	A table that shows how often each item, number, or range of numbers occurs in a set of data.
Function	A relation in which every value of x has a unique value of y.
Fundamental Theorem of Arithmetic	Any composite number can be written as a unique product of prime numbers. 6=2*3.

Geometric Figures	A shape formed by a combination of points, lines, curves, or surfaces.
Geometric Solid	A three-dimensional shape or object, such as a sphere or a cube.
Greatest Common Factor (GCF)	The greatest number that divides into two or more numbers with no remainder. The greatest common factor of 16,20, and 36 is 4.
Histogram	A bar graph in which the labels for the bars are numerical intervals, so the bars touch each other.
Least Common Multiple (LCM)	The smallest number, greater than zero, found in all of the lists of multiples of two or more numbers. The LCM of 6 and 9 is 18.
Line Graph	A graph that uses line segments, a curve, or a ray to show how one or more quantities change over a period of time.
Line Plot	A diagram showing frequency of data on a number line.
Line Symmetry	A figure that can be folded along a line so that the two halves match exactly has line symmetry.
Metric System of Measurement	A system of measurement based on tens. The basic unit of capacity is the Liter. The basic unit of length is meter. The basic unit of mass is gram. Temperature is measured in Celsius..
Multiple	The product of a whole number and any whole number. A multiple of 16 is 64 (4*16=64).
Net	A two- dimensional shape that can be folded into a three- dimensional figure is a net of that figure.
Non-Routine Problem Solving	Word problems that require a variety of strategies in order to solve.
Pictograph	A graph that uses pictures or symbols to represent data.
Population	The complete collection of elements to be studied.
Positive Rational Number	A positive number that can be expressed as a ratio of two whole numbers (a fraction).
Prime Factorization	The expression of a number as the product of prime factors.

Proportion	An equation showing that two ratios are equal.
Proportional Reasoning	A way of thinking and solving problems using proportions.
Proportional Relationships	Varying in a constant ratio to another quantity.
Pyramid	A polyhedron whose base is a polygon and whose other faces are triangles that share a Common vertex. A pyramid is named by its base.The base of square pyramid is a square.
Random Sample	A sample in which every person, object, or event in the population has an equal chance of being selected for the sample.
Ratio	A comparison of two numbers or measures using division.
Relation	A set of ordered pairs for which all x and y are related in the same way.
Right Prism	A polyhedron with two parallel opposite faces, called bases, that are congruent polygons. The other faces, called lateral faces, are parallelograms and form right angles to the bases.
Rotational Symmetry	A geometrical transformation in which a figure is moved rigidly around a fixed point. Some figures are unchanged by certain rotations.
Sampling	The selection of a representative subset from a whole population.
Scale Drawing	Drawings that are similar to a "full size" drawing.
Scale Factor	The ratio of the lengths of corresponding sides of two similar figures.
Similar Plane Figures	Figures whose corresponding sides are proportional and whose corresponding angles are congruent.
Surface Area	The total area of the faces (including the bases) and curved surfaces of a solid figure.
Theoretical Probability	Finding the probability of an event without doing an experiment of analyzing data.
Varying Quantities	Amounts that are different.

Learning Journal



Learning Journal