

Training for the New Georgia Performance Standards

Day 1: Standards, Content, and
Curriculum Mapping

**Content Participant's Guide
Mathematics Grade 8**

We will lead the nation in improving student achievement.



Use of This Guide

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

Materials (guides, presentations, etc.) will be available electronically on <http://www.georgiastandards.org> under the training tab after all trainings of Day 1 have occurred. Consult the trainer for availability.

For more information on this or other GPS training, contact Claire Pierce at (404) 657-7063 or cpierce@doe.k12.ga.us or Peggy Pool at (404) 657-9063 or ppool@doe.k12.ga.us.



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Agenda

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

Introduction

Overview of Standards

Standards-Based Teaching and Learning

Putting It All Together

Summary and Field Assignments

Training Goal

Demonstrate a deep understanding of the new Georgia Performance Standards and the standards-based education approach, through curriculum mapping, development of formative and summative assessments, study of classroom implementation, planning for differentiation, and design of instruction matched to standards and research-based best practices.

Key words from the goal:

- Deep understanding
- Georgia Performance Standards (GPS)
- Curriculum Mapping
- Assessments
- Implementation
- Differentiation
- Instruction

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



Module One Objectives

By the end of day one of training, participants will:

1. Understand the benefits of the GPS.
2. Know the various phases of the GPS rollout plan.
3. Define terms related to the GPS.
4. Identify four parts of each standard.
5. Develop and use a curriculum map.
6. Cultivate a strong awareness of standards-based teaching and learning.
7. Become familiar with the 8th grade mathematics GPS along with the expected depth and rigor.
8. Be aware of various support avenues available throughout the state of Georgia that will assist with implementation.
9. Have a deeper understanding of the content addressed within the module.

Eighth Grade Standards

Grade 8

By the end of grade eight, students will understand various numerical representations, including square roots, exponents and scientific notation; use and apply geometric properties of plane figures, including congruence and the Pythagorean theorem; use symbolic algebra to represent situations and solve problems, especially those that involve linear relationships; solve linear equations, systems of linear equations and inequalities; use equations, tables and graphs to analyze and interpret linear functions; use and understand set theory and simple counting techniques; determine the theoretical probability of simple events; and make inferences from statistical data, particularly data that can be modeled by linear functions.

Instruction and assessment should include the appropriate use of manipulatives and technology. Topics should be represented in multiple ways, such as concrete/pictorial, verbal/written, numeric/data-based, graphical, and symbolic. Concepts should be introduced and used, where appropriate, in the context of realistic phenomena.

Concepts/Skills to Maintain

Operations with rational numbers

Properties of equalities

Direct & inverse proportions

Solving multi-step equations

Properties of real numbers

Statistics

NUMBER AND OPERATIONS

Students will understand the numeric and geometric meaning of square root, apply properties of integer exponents and use scientific notation.

M8N1. Students will understand different representations of numbers including square roots, exponents, and scientific notation.

- a. Find square roots of perfect squares.
- b. Recognize the (positive) square root of a number as a length of a side of a square with a given area.

- c. Recognize square roots as points and as lengths on a number line.
- d. Understand that the square root of 0 is 0 and that every positive number has two square roots that are opposite in sign.
- e. Recognize and use the radical symbol to denote the positive square root of a positive number.
- f. Estimate square roots of positive numbers.
- g. Simplify, add, subtract, multiply, and divide expressions containing square roots.
- h. Distinguish between rational and irrational numbers.
- i. Simplify expressions containing integer exponents.
- j. Express and use numbers in scientific notation.
- k. Use appropriate technologies to solve problems involving square roots, exponents, and scientific notation.

GEOMETRY

Students will use and apply geometric properties of plane figures, including congruence and the Pythagorean theorem.

M8G1. Students will understand and apply the properties of parallel and perpendicular lines and understand the meaning of congruence.

- a. Investigate characteristics of parallel and perpendicular lines both algebraically and geometrically.
- b. Apply properties of angle pairs formed by parallel lines cut by a transversal.
- c. Understand the properties of the ratio of segments of parallel lines cut by one or more transversals.
- d. Understand the meaning of congruence: that all corresponding angles are congruent and all corresponding sides are congruent.

M8G2. Students will understand and use the Pythagorean theorem.

- a. Apply properties of right triangles, including the Pythagorean theorem.
- b. Recognize and interpret the Pythagorean theorem as a statement about areas of squares on the sides of a right triangle.

ALGEBRA

Students will use linear algebra to represent, analyze and solve problems. They will use equations, tables, and graphs to investigate linear relations and functions, paying particular attention to slope as a rate of change.

M8A1. Students will use algebra to represent, analyze, and solve problems.

- a. Represent a given situation using algebraic expressions or equations in one variable.
- b. Simplify and evaluate algebraic expressions.
- c. Solve algebraic equations in one variable, including equations involving absolute values.
- d. Interpret solutions in problem contexts.

M8A2. Students will understand and graph inequalities in one variable.

- a. Represent a given situation using an inequality in one variable.
- b. Use the properties of inequality to solve inequalities.
- c. Graph the solution of an inequality on a number line.
- d. Interpret solutions in problem contexts.

M8A3. Students will understand relations and linear functions.

- a. Recognize a relation as a correspondence between varying quantities.
- b. Recognize a function as a correspondence between inputs and outputs where the output for each input must be unique.
- c. Distinguish between relations that are functions and those that are not functions.
- d. Recognize functions in a variety of representations and a variety of contexts.
- e. Use tables to describe sequences recursively and with a formula in closed form.
- f. Understand and recognize arithmetic sequences as linear functions with whole number input values.
- g. Interpret the constant difference in an arithmetic sequence as the slope of the associated linear function.
- h. Identify relations and functions as linear or nonlinear.
- i. Translate among verbal, tabular, graphic, and algebraic representations of functions.

M8A4. Students will graph and analyze graphs of linear equations.

- a. Interpret slope as a rate of change.
- b. Determine the meaning of the slope and y-intercept in a given situation.
- c. Graph equations of the form $y = mx + b$.
- d. Graph equations of the form $ax + by = c$.
- e. Determine the equation of a line given a graph, numerical information that defines the line, or a context involving a linear relationship.
- f. Solve problems involving linear relationships.

M8A5. Students will understand systems of linear equations and use them to solve problems.

- a. Given a problem context, write an appropriate system of linear equations.
- b. Solve systems of equations graphically and algebraically, using technology as appropriate.
- c. Interpret solutions in problem contexts.

DATA ANALYSIS AND PROBABILITY

Students will use and understand set theory and simple counting techniques; determine the theoretical probability of simple events; and make inferences from data, particularly data that can be modeled by linear functions.

M8D1. Students will apply basic concepts of set theory.

- a. Demonstrate relationships among sets through use of Venn diagrams.
- b. Determine subsets, complements, intersection, and union of sets.
- c. Use set notation to denote elements of a set.

M8D2. Students will determine the number of outcomes related to a given event.

- a. Use tree diagrams to find the number of outcomes.
- b. Apply the addition and multiplication principles of counting.

M8D3. Students will use the basic laws of probability.

- a. Find the probability of simple independent events.
- b. Find the probability of compound independent events.

M8D4. Students will organize, interpret, and make inferences from statistical data

- a. Gather data that can be modeled with a linear function.
- b. Estimate and determine a line of best fit from a scatter plot.

Terms/Symbols:

square root, radical, $\sqrt{\quad}$, rational, irrational, exponent, additive inverse, multiplicative inverse, scientific notation, significant digits, inequality, sequence, arithmetic sequence, recursive, linear function, function, relation, rate of change, slope, intercept, linear equation, linear inequality, like terms, system of linear equations, transversal, vertical angles, complementary angles, supplementary angles, alternate interior angles, alternate exterior angles, corresponding angles, Pythagorean theorem, legs, hypotenuse, set, $\{ \}$, element, \in , subset, \subset , complement of a set, intersection, \cap , union, \cup , Venn diagram, tree diagram, multiplication principle, addition principle, line of best fit

Process Standards

The following process standards are essential to mastering each of the mathematics content standards. They emphasize critical dimensions of the mathematical proficiency that all students need.

M8P1. Students will solve problems (using appropriate technology).

- a. Build new mathematical knowledge through problem solving.
- b. Solve problems that arise in mathematics and in other contexts.
- c. Apply and adapt a variety of appropriate strategies to solve problems.
- d. Monitor and reflect on the process of mathematical problem solving.

M8P2. Students will reason and evaluate mathematical arguments.

- a. Recognize reasoning and proof as fundamental aspects of mathematics.
- b. Make and investigate mathematical conjectures.
- c. Develop and evaluate mathematical arguments and proofs.
- d. Select and use various types of reasoning and methods of proof.

M8P3. Students will communicate mathematically.

- a. Organize and consolidate their mathematical thinking through communication.
- b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.
- c. Analyze and evaluate the mathematical thinking and strategies of others.
- d. Use the language of mathematics to express mathematical ideas precisely.

M8P4. Students will make connections among mathematical ideas and to other disciplines.

- a. Recognize and use connections among mathematical ideas.
- b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.
- c. Recognize and apply mathematics in contexts outside of mathematics.

M8P5. Students will represent mathematics in multiple ways.

- a. Create and use representations to organize, record, and communicate mathematical ideas.
- b. Select, apply, and translate among mathematical representations to solve problems.
- c. Use representations to model and interpret physical, social, and mathematical phenomena.

Reading Standard Comment

After the elementary years, students are seriously engaged in reading for learning. This process sweeps across all disciplinary domains, extending even to the area of personal learning. Students encounter a variety of informational as well as fictional texts, and they experience text in all genres and modes of discourse. In the study of various disciplines of learning (language arts, mathematics, science, social studies), students must learn through reading the communities of discourse of each of those disciplines. Each subject has its own specific vocabulary, and for students to excel in all subjects, they must learn the specific vocabulary of those subject areas *in context*. Beginning with the middle grades years, students begin to self-select reading materials based on personal interests established through classroom learning. Students become curious about science, mathematics, history, and literature as they form contexts for those subjects related to their personal and classroom experiences. As students explore academic areas through reading, they develop favorite subjects and become confident in their verbal discourse about those subjects. Reading across curriculum content develops both academic and personal interests in students. As students read, they develop both content and contextual vocabulary. They also build good habits for reading, researching, and learning. The Reading Across the Curriculum standard focuses on the academic and personal skills students acquire as they read in all areas of learning.

MRC. Students will enhance reading in all curriculum areas by:

- a. Reading in all curriculum areas
 - Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas
 - Read both informational and fictional texts in a variety of genres and modes of discourse
 - Read technical texts related to various subject areas
- b. Discussing books
 - Discuss messages and themes from books in all subject areas.
 - Respond to a variety of texts in multiple modes of discourse.
 - Relate messages and themes from one subject area to messages and themes in another area.
 - Evaluate the merit of texts in every subject discipline.
 - Examine author's purpose in writing.
 - Recognize the features of disciplinary texts.
- c. Building vocabulary knowledge
 - Demonstrate an understanding of contextual vocabulary in various subjects.
 - Use content vocabulary in writing and speaking.

Middle School Mathematics

	6 th Grade	7 th Grade	8 th Grade
Numbers and Operations	<ul style="list-style-type: none"> • Factors and multiples • Fundamental Theorem of Arithmetic • GCF and LCM • Compute with fractions and mixed numbers (unlike denominators) • Equivalent fractions, decimals, and percents 	<ul style="list-style-type: none"> • Absolute value • Compare & order rational numbers • Compute & solve problems with positive and negative rational numbers 	<ul style="list-style-type: none"> • Square roots of perfect squares • Rational vs Irrational numbers • Simplify expressions with integer exponents • Scientific Notation
Measurement	<ul style="list-style-type: none"> • Convert units using proportions • Volume of right rectangular prisms, right circular cylinders, pyramids and cones • Surface area of right rectangular prisms, right circular cylinders 		
Geometry	<ul style="list-style-type: none"> • Line & rotational symmetry • Ratio, proportion and scale factor with similar plane figures • Scale drawings • Compare/contrast right prisms/pyramids and cylinders/cones • Views of solid figures • Nets (prisms, cylinders, pyramids, and cones) 	<ul style="list-style-type: none"> • Basic constructions • Transformations • Properties of similarity • 3-D figures formed by translations & rotations in space • Cross sections of cones, cylinders, pyramids and prisms 	<ul style="list-style-type: none"> • Properties of parallel and perpendicular lines • Meaning of congruence • Pythagorean Theorem
Algebra	<ul style="list-style-type: none"> • Ratio for quantitative relationship • Write & solve proportions • Write & solve simple one-step equations 	<ul style="list-style-type: none"> • Algebraic expressions • Linear equations in one variable • Relationships between two variables 	<ul style="list-style-type: none"> • Represent, analyze, and solve problems • Inequalities in one variable • Relations and Linear functions
Data Analysis and Probability	<ul style="list-style-type: none"> • Question, Collect Data, Make Graphs • Experimental/ Theoretical Probability • Predictions from investigations 	<ul style="list-style-type: none"> • Question, Collect Data, Make Graphs, Interpret results 	<ul style="list-style-type: none"> • Set theory • Tree Diagrams/ Counting Principles • Basic laws of probability • Organize, interpret, make inferences form data
Process Skills	Problem Solving, Arguments, Communicate, Connections, Multiple Representations	Problem Solving, Arguments, Communicate, Connections, Multiple Representations	Problem Solving, Arguments, Communicate, Connections, Multiple Representations

Phase In Plan

Grade	Math Training	Math Teaching
K	05-06	06-07
1	05-06	06-07
2	05-06	06-07
3	06-07	07-08
4	06-07	07-08
5	06-07	07-08
6	04-05	05-06
7	05-06	06-07
8	06-07	07-08

Georgia Performance Standards: Sixth Grade Curriculum Map										
1st 9 weeks			2nd 9 weeks		3rd 9 weeks			4th 9 weeks		
Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9	Unit 10	Unit 11
4 weeks	3 weeks	5 weeks	2 weeks	4 weeks	2 weeks	3 weeks	4 weeks	3 weeks	3 weeks	3 weeks
Gathering Data	Fun and Games: Extending and Applying Number Theory	Fractions, Decimals, Ratios and Percents	One-Step Equations	Circles and Graphs	Symmetry	Scale Factor	Solids	Direct Proportion	Games of Chance	Show what we Know
All units will include skills to maintain and the Process Standards.										GPS Testing

NOTE: Mathematical standards are interwoven and should be addressed throughout the year in as many different units and activities as possible in order to stress the natural connections that exist among mathematical topics.

Georgia Performance Standards: Seventh Grade Curriculum Map

1 st 9 weeks		2 nd 9 weeks		3 rd 9 weeks		4 th 9 weeks	
Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8
5 weeks	4 weeks	5 weeks	4 weeks	6 weeks	3 weeks	3 weeks	6 weeks
Dealing with Data	Patterns and Relationships	Rational Reasoning	Flip, Slide, and Turn	Staying in Shape	Values that Vary	Slices and Shadows	Show What We Know

All units will include skills to maintain and the Process Standards.

NOTE: Mathematical standards are interwoven and should be addressed throughout the year in as many different units and activities as possible in order to stress the natural connections that exist among mathematical topics.

Assignment

- **Review the Eighth Grade Mathematics Georgia Performance Standards.**
- **Think about what evidence is necessary to access them? How good is good enough?**
- **Bring your GPS Training notebook with you to the Day 2 Training.**



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.

Provided Texts

Mathematics Resources:

Danielson, Charlotte. *A Collection of Performance Tasks and Rubrics: Middle School Mathematics*. Larchmont, NY: Eye on Education, 1997.

Northey, Sheryn Spencer. *Handbook on Differentiated Instruction of Middle and High Schools*. Larchmont, NY: Eye on Education, 2005.

Van de Walle, John A. *Elementary and Middle School Mathematics: Teaching Developmentally, Fifth Edition*. New York, NY: Longman Press, 2004.

Van de Walle, John I. And LouAnn Lovin. *Teaching Student-Centered mathematics: Grades 5-8*. Boston, MA: Pearson Allyn & Bacon, 2006.

Each school received one copy of each book listed below at the beginning of the previous school year. This box of books was addressed to the principal of the school.

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

Marzano, Robert J. *What Works in Schools: Translating Research into Action*. Alexandria, VA: Association for Supervision and Curriculum Development. 2003.

Robert J. Marzano, Debra Pickering, and Jay McTighe. *Assessing Student Outcomes: Performance Assessment Using the Dimensions of Learning Model*. Alexandria, VA: Association for Supervision and Curriculum Development. 1993.

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.

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

Strong, Richard W., Harvey F. Silver, and Matthew J. Perini. *Teaching What Matters Most: Standards and Strategies for Raising Student Achievement*. Alexandria, VA: Association for Supervision and Curriculum Development. 2001.

Tomlinson, Carol Ann. *How to Differentiate Instruction in Mixed-Ability Classrooms, 2nd edition*. Alexandria, VA: Association for Supervision and Curriculum Development. 2001.

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

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

Professional Organizations

National Science Teachers Association—NSTA—<http://www.nsta.org>

Georgia Science Teachers Association—GSTA—<http://www.georgiascienceteacher.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

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.

www.intermath-uga.gatech.edu/

<http://illuminations.nctm.org/>

National Library of Virtual Manipulatives <http://nlvm.usu.edu/en/nav/vlibrary.html>

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.idonline.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.

<p>M8N1. Students will understand different representations of numbers including square roots, exponents, and scientific notation.</p> <p>a. Find square roots of perfect squares.</p>	<p>M8N1. Students will understand different representations of numbers including square roots, exponents, and scientific notation.</p> <p>b. Recognize the (positive) square root of a number as a length of a side of a square with a given area.</p>	<p>M8N1. Students will understand different representations of numbers including square roots, exponents, and scientific notation.</p> <p>c. Recognize square roots as points and as lengths on a number line.</p>
<p>M8N1. Students will understand different representations of numbers including square roots, exponents, and scientific notation.</p> <p>d. Understand that the square root of 0 is 0 and that every positive number has two square roots that are opposite in sign.</p>	<p>M8N1. Students will understand different representations of numbers including square roots, exponents, and scientific notation.</p> <p>e. Recognize and use the radical symbol to denote the positive square root of a positive number.</p>	<p>M8N1. Students will understand different representations of numbers including square roots, exponents, and scientific notation.</p> <p>f. Estimate square roots of positive numbers.</p>
<p>M8N1. Students will understand different representations of numbers including square roots, exponents, and scientific notation.</p> <p>g. Simplify, add, subtract, multiply, and divide expressions containing square roots.</p>	<p>M8N1. Students will understand different representations of numbers including square roots, exponents, and scientific notation.</p> <p>h. Distinguish between rational and irrational numbers.</p>	<p>M8N1. Students will understand different representations of numbers including square roots, exponents, and scientific notation.</p> <p>i. Simplify expressions containing integer exponents.</p>
<p>M8N1. Students will understand different representations of numbers including square roots, exponents, and scientific notation.</p> <p>j. Express and use numbers in scientific notation.</p>	<p>M8N1. Students will understand different representations of numbers including square roots, exponents, and scientific notation.</p> <p>k. Use appropriate technologies to solve problems involving square roots, exponents, and scientific notation.</p>	<p>M8G1. Students will understand and apply the properties of parallel and perpendicular lines and understand the meaning of congruence.</p> <p>a. Investigate characteristics of parallel and perpendicular lines both algebraically and geometrically.</p>

<p>M8G1. Students will understand and apply the properties of parallel and perpendicular lines and understand the meaning of congruence. b. Apply properties of angle pairs formed by parallel lines cut by a transversal.</p>	<p>M8G1. Students will understand and apply the properties of parallel and perpendicular lines and understand the meaning of congruence. c. Understand the properties of the ratio of segments of parallel lines cut by one or more transversals.</p>	<p>M8G1. Students will understand and apply the properties of parallel and perpendicular lines and understand the meaning of congruence. d. Understand the meaning of congruence: that all corresponding angles are congruent and all corresponding sides are congruent.</p>
<p>M8G2. Students will understand and use the Pythagorean theorem. a. Apply properties of right triangles, including the Pythagorean theorem.</p>	<p>M8G2. Students will understand and use the Pythagorean theorem. b. Recognize and interpret the Pythagorean theorem as a statement about areas of squares on the sides of a right triangle.</p>	<p>M8A1. Students will use algebra to represent, analyze, and solve problems. a. Represent a given situation using algebraic expressions or equations in one variable.</p>
<p>M8A1. Students will use algebra to represent, analyze, and solve problems. b. Simplify and evaluate algebraic expressions.</p>	<p>M8A1. Students will use algebra to represent, analyze, and solve problems. c. Solve algebraic equations in one variable, including equations involving absolute values.</p>	<p>M8A1. Students will use algebra to represent, analyze, and solve problems. d. Interpret solutions in problem contexts.</p>
<p>M8A2. Students will understand and graph inequalities in one variable. a. Represent a given situation using an inequality in one variable.</p>	<p>M8A2. Students will understand and graph inequalities in one variable. b. Use the properties of inequality to solve inequalities.</p>	<p>M8A2. Students will understand and graph inequalities in one variable. c. Graph the solution of an inequality on a number line.</p>
<p>M8A2. Students will understand and graph inequalities in one variable. d. Interpret solutions in problem contexts.</p>	<p>M8A3. Students will understand relations and linear functions. a. Recognize a relation as a correspondence between varying quantities.</p>	<p>M8A3. Students will understand relations and linear functions. b. Recognize a function as a correspondence between inputs and outputs where the output for each input must be unique.</p>

<p>M8A3. Students will understand relations and linear functions. c. Distinguish between relations that are functions and those that are not functions.</p>	<p>M8A3. Students will understand relations and linear functions. d. Recognize functions in a variety of representations and a variety of contexts.</p>	<p>M8A3. Students will understand relations and linear functions. e. Use tables to describe sequences recursively and with a formula in closed form.</p>
<p>M8A3. Students will understand relations and linear functions. f. Understand and recognize arithmetic sequences as linear functions with whole number input values.</p>	<p>M8A3. Students will understand relations and linear functions. g. Interpret the constant difference in an arithmetic sequence as the slope of the associated linear function.</p>	<p>M8A3. Students will understand relations and linear functions. h. Identify relations and functions as linear or nonlinear.</p>
<p>M8A3. Students will understand relations and linear functions. i. Translate among verbal, tabular, graphic, and algebraic representations of functions.</p>	<p>M8A4. Students will graph and analyze graphs of linear equations. a. Interpret slope as a rate of change.</p>	<p>M8A4. Students will graph and analyze graphs of linear equations. b. Determine the meaning of the slope and y-intercept in a given situation.</p>
<p>M8A4. Students will graph and analyze graphs of linear equations. c. Graph equations of the form $y = mx + b$.</p>	<p>M8A4. Students will graph and analyze graphs of linear equations. d. Graph equations of the form $ax + by = c$.</p>	<p>M8A4. Students will graph and analyze graphs of linear equations. e. Determine the equation of a line given a graph, numerical information that defines the line, or a context involving a linear relationship.</p>
<p>M8A4. Students will graph and analyze graphs of linear equations. f. Solve problems involving linear relationships.</p>	<p>M8A5. Students will understand systems of linear equations and use them to solve problems. a. Given a problem context, write an appropriate system of linear equations.</p>	<p>M8A5. Students will understand systems of linear equations and use them to solve problems. b. Solve systems of equations graphically and algebraically, using technology as appropriate.</p>
<p>M8A5. Students will understand systems of linear equations and use them to solve problems. c. Interpret solutions in problem contexts.</p>	<p>M8D1. Students will apply basic concepts of set theory. a. Demonstrate relationships among sets through use of Venn diagrams.</p>	<p>M8D1. Students will apply basic concepts of set theory. b. Determine subsets, complements, intersection, and union of sets.</p>

<p>M8D1. Students will apply basic concepts of set theory. c. Use set notation to denote elements of a set.</p>	<p>M8D2. Students will determine the number of outcomes related to a given event. a. Use tree diagrams to find the number of outcomes.</p>	<p>M8D2. Students will determine the number of outcomes related to a given event. b. Apply the addition and multiplication principles of counting.</p>
<p>M8D3. Students will use the basic laws of probability. a. Find the probability of simple independent events.</p>	<p>M8D3. Students will use the basic laws of probability. b. Find the probability of compound independent events.</p>	<p>M8D4. Students will organize, interpret, and make inferences from statistical data a. Gather data that can be modeled with a linear function.</p>
<p>M8D4. Students will organize, interpret, and make inferences from statistical data b. Estimate and determine a line of best fit from a scatter plot.</p>	<p>M8P1. Students will solve problems (using appropriate technology). a. Build new mathematical knowledge through problem solving.</p>	<p>M8P1. Students will solve problems (using appropriate technology). b. Solve problems that arise in mathematics and in other contexts.</p>
<p>M8P1. Students will solve problems (using appropriate technology). c. Apply and adapt a variety of appropriate strategies to solve problems.</p>	<p>M8P1. Students will solve problems (using appropriate technology). d. Monitor and reflect on the process of mathematical problem solving.</p>	<p>M8P2. Students will reason and evaluate mathematical arguments. a. Recognize reasoning and proof as fundamental aspects of mathematics.</p>
<p>M8P2. Students will reason and evaluate mathematical arguments. b. Make and investigate mathematical conjectures.</p>	<p>M8P2. Students will reason and evaluate mathematical arguments. c. Develop and evaluate mathematical arguments and proofs.</p>	<p>M8P2. Students will reason and evaluate mathematical arguments. d. Select and use various types of reasoning and methods of proof.</p>

<p>M8P3. Students will communicate mathematically. a. Organize and consolidate their mathematical thinking through communication.</p>	<p>M8P3. Students will communicate mathematically. b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.</p>	<p>M8P3. Students will communicate mathematically. c. Analyze and evaluate the mathematical thinking and strategies of others.</p>
<p>M8P3. Students will communicate mathematically. d. Use the language of mathematics to express mathematical ideas precisely.</p>	<p>M8P4. Students will make connections among mathematical ideas and to other disciplines. a. Recognize and use connections among mathematical ideas.</p>	<p>M8P4. Students will make connections among mathematical ideas and to other disciplines. b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.</p>
<p>M8P4. Students will make connections among mathematical ideas and to other disciplines. c. Recognize and apply mathematics in contexts outside of mathematics.</p>	<p>M8P5. Students will represent mathematics in multiple ways. a. Create and use representations to organize, record, and communicate mathematical ideas.</p>	<p>M8P5. Students will represent mathematics in multiple ways. b. Select, apply, and translate among mathematical representations to solve problems.</p>
<p>M8P5. Students will represent mathematics in multiple ways. c. Use representations to model and interpret physical, social, and mathematical phenomena.</p>		

Reflections on the Day

Please take a few minutes and share your thoughts on the following four areas.

Important things I've learned or had reaffirmed. . .

Today's experiences have left me feeling. . .

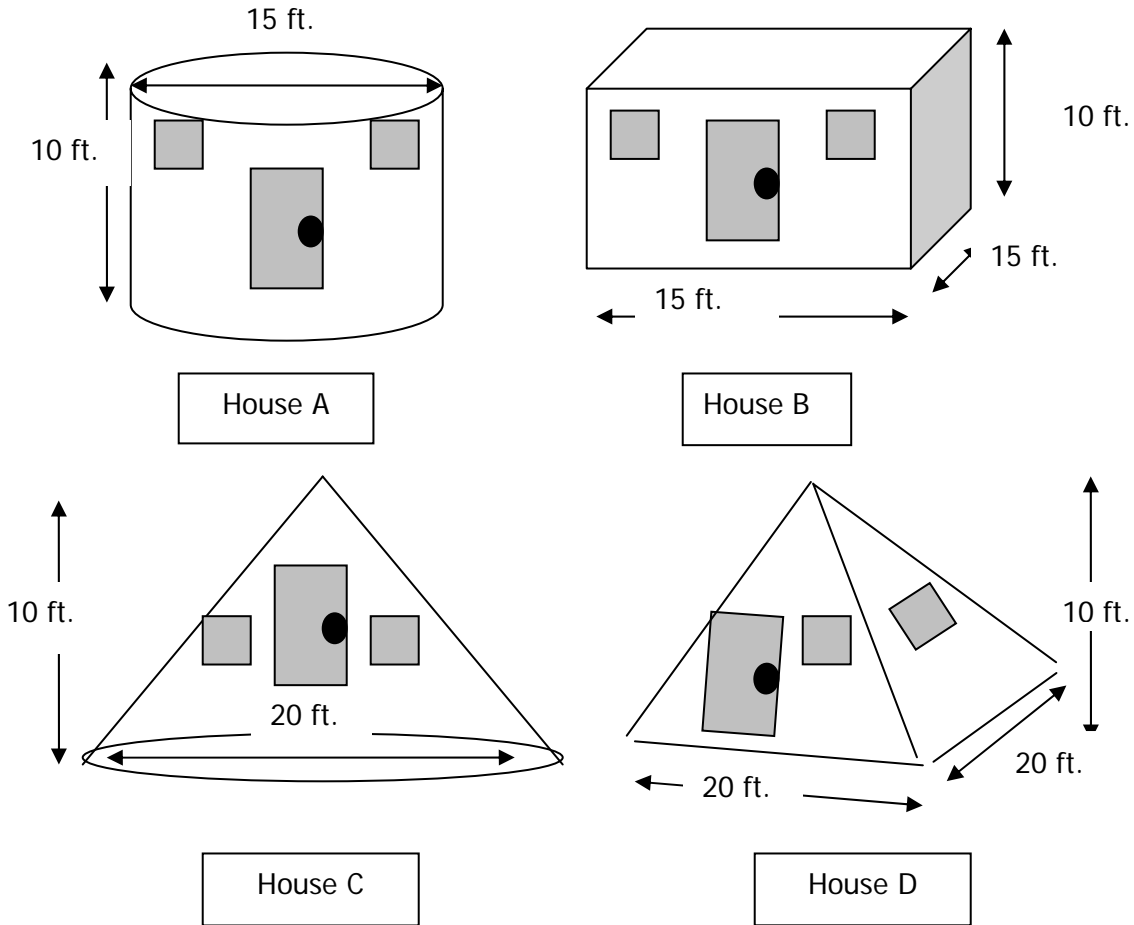
Questions I want answered now. . .

What I will do when I return to my workplace. . .

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COLORED
PAPER!**

Three Little Pig Builders continued

Three Little Pig Builders have gone into business building the prefabricated homes shown below.



- Give the geometric name for each house and estimate its volume.
- Three Little Pig Builders have decided to charge \$30,000 for House A. What is the fair market value of each of the other homes assuming that the cost of each home is proportional to its volume?
 Make a table to organize your data. Use words and symbols (including proportions and formulas) to explain your reasoning.
- Estimate the surface area of House A and House B.
- The inside of House A and House B are in need of painting before they can be sold. Each home has a 3 ft. by 5 ft. door and two 2 ft. by 2 ft. windows that do not need painting. All of the walls need painting including the floors and ceilings. A gallon of paint costs \$25 and covers 300 ft². Three Little Pig Builders require that a work order be submitted for approval before making any purchases. Write a work order that explains how much paint needs to be purchased and the cost of the purchase. Be sure that your work order explains in detail how you know the amount of paint and money needed for the purchase.

Three Little Pig Builders continued

Eighth grade:

- e) Estimate the surface area of House C and House D.
- f) The inside of House C and House D are in need of painting before they can be sold. Each home has a 3 ft. by 5 ft. door and two 2 ft. by 2 ft. windows that do not need painting. All of the walls need painting including the floors. A gallon of paint costs \$25 and covers 300 ft². Three Little Pig Builders require that a work order be submitted for approval before making any purchases. Write a work order that explains how much paint needs to be purchased and the cost of the purchase. Be sure that your work order explains in detail how you know the amount of paint and money needed for the purchase.

To the Dump Activity

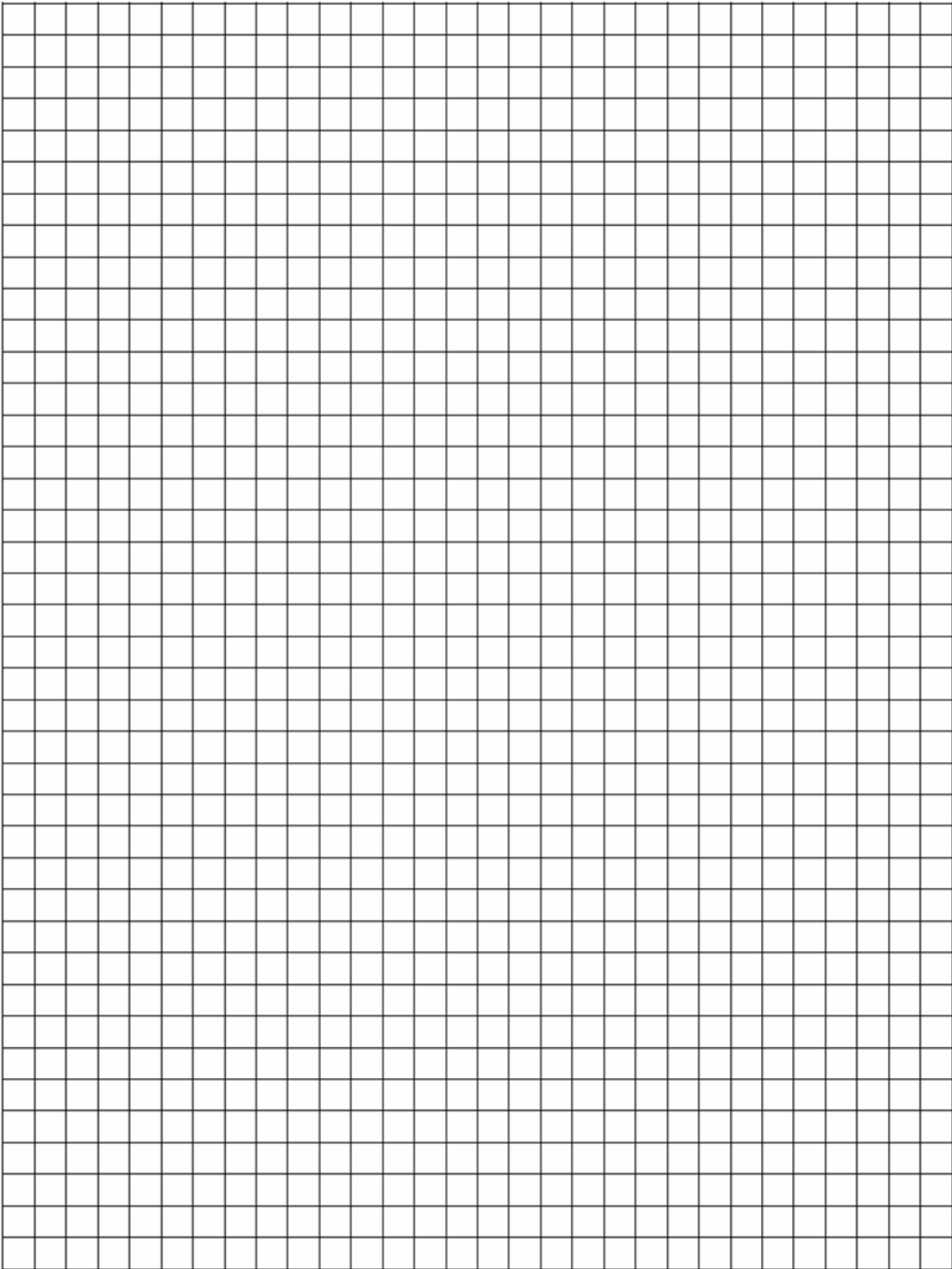
Adapted from *Intermediate Projects*, Resource Kit for TI Graphing Calculators



In the town of Sunshine, it was reported at the March town meeting that there were currently 198,000 tons of trash in the town landfill and that each month another 1,210 tons of garbage are added to the landfill. The mayor is concerned that at this rate, the landfill will be full before the end of the year. The landfill manager has told the city council that the dump will hold approximately 225,000 tons of garbage. You have been hired to find out if the mayor is correct in her prediction and to determine when the landfill will be full. You are to present your findings at the next city council meeting.

If the city council could reduce the amount of trash dumped in the landfill by two-thirds, how many more months would the council have before the landfill was completely full? Explain how you reached your decision and support it with graphs and tables.

- Prepare a statement supporting or refuting the mayor's prediction.
- Create a poster or a PowerPoint presentation of the information collected and an analysis of the data. (Include a graph, table, and written explanation.)



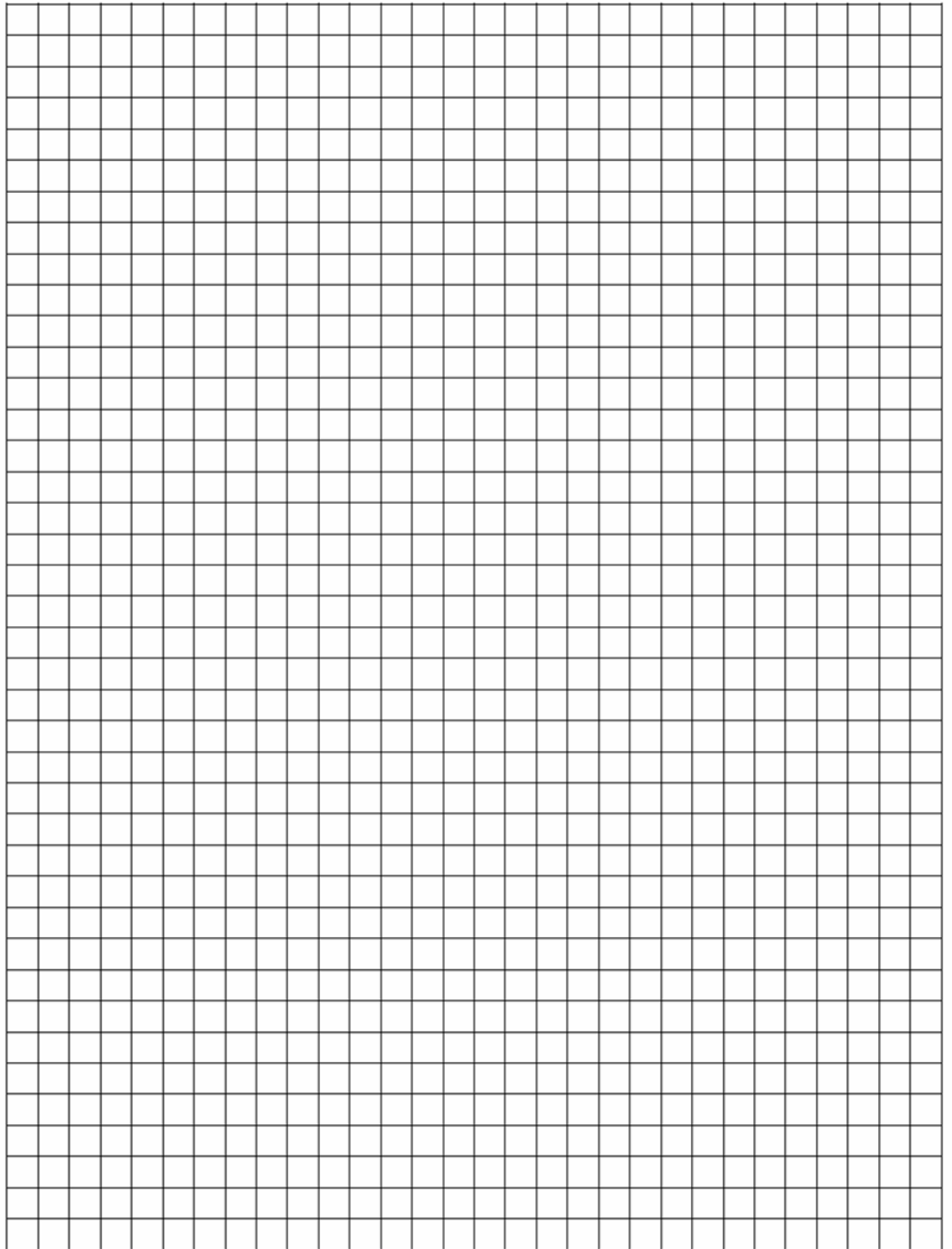
To the Dump Data Collection Sheet



Adapted from *Intermediate Projects*, Resource Kit for TI Graphing Calculators
 ©Teacher Created Materials, Inc. #10258 (i1420) – *Intermediate TI Graphing Calculators*

1. What do you know about the city council's problems?	
2. Do you believe the mayor's prediction is correct?	
3. Write an equation to represent the growing amount of garbage in the city dump.	
4. Use the graphing calculator to graph the equation. Sketch the graph of the equation.	
5. What is the slope? What does it represent on the graph?	
6. How are you going to determine when the dump will be full? Is there more than one way to determine when the dump will be full? If so, what are they?	
7. Was the mayor's prediction correct? In what month will the dump be completely full? How many months will this actually take?	

Provide a statement for the city council based on your investigation of the problem.



To the Dump Data Collection Sheet



Adapted from *Intermediate Projects*, Resource Kit for TI Graphing Calculators
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Curriculum Map Template GPS Mathematics

Unit #									
# of weeks									
Topic								Putting it all together	
Key Standards/ Elements ----- Supporting Standards/ Elements ----- Concepts/ Skills to Maintain								All standards	
All units will include skills to maintain and the Process Standards.									GPS Testing

Curriculum Map Template GPS Mathematics

Unit #									
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All in the Family

You have just found out that your best friend's mother is expecting quintuplets!

She says that she can't wait to have five new little sisters. You are trying to explain to her that she may have some brothers on the way. To settle the debate, find the probability for each combination of brothers and sisters your friend may end up with and justify your answer showing how you know.

Because you are so excited about this news, you want to go ahead and purchase a gift for each of the babies (pink for the girls and blue for the boys).

Using the probabilities found above, make a wise financial decision about how many of each color gift you should buy to most likely have enough of the right colors when the babies arrive. Explain why you made your decision.
