Connecticut Mastery Test
Fourth Generation
Mathematics Handbook

Part One

CONTENTS

FOREWORD

The *Connecticut Mastery Test Fourth Generation Mathematics Handbook* is intended to provide teachers and other educators with important information about the mathematics subtests of the fourth generation of Mastery Tests that will be launched in the spring of 2006. This handbook is provided electronically and will be updated to include additional activities, instructional strategies and scored student work.

The materials contained in this handbook answer many of the questions Connecticut's educators have asked about the tests. Accordingly, one will find here:

- a summary of the changes made in the content to be assessed and in test formats;
- detailed test blueprints, including the number and types of items and the specific skills and concepts that will be assessed at Grades 3, 4, 5, 6, 7 and 8;
- sample items for each strand to be assessed at Grades 3 and 8;
- sample items for new skills and problem areas tested at Grades 4, 5, 6 and 7;
- generic scoring rubrics for open-ended items;
- grade-level mathematics vocabulary lists; and
- teaching suggestions and activities, including web links.

It is hoped that the materials in this handbook will help to continue the ongoing process of improving mathematics instruction in Connecticut's public schools.

Dr. Betty J. Sternberg
Commissioner of Education

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INTRODUCTION

The Fourth Generation of the Connecticut Mastery Test (CMT) in mathematics assesses student performance on a range of skills and concepts expected to be mastered by students in Grades 3, 4, 5, 6, 7 and 8. Connecticut's Mastery Test Program will be expanded in 2005-2006 to include Grades 3, 5 and 7, as mandated by the federal No Child Left Behind (NCLB) legislation. The skills and concepts are representative of and aligned with the content and performance standards in Connecticut's Mathematics Curriculum Framework. The framework includes mathematics content and instructional processes which are recommended by the National Council of Teachers of Mathematics (NCTM) and assessed on the National Assessment of Educational Progress (NAEP).

The *Connecticut Mastery Test Fourth Generation Mathematics Handbook* is designed to ensure closer links between what and how mathematics is taught in Connecticut schools, and how mathematics is assessed on the CMT. In addition, this handbook has been designed to ensure that all Connecticut educators – particularly teachers of mathematics in Grades K through 8 are familiar with the content, format and level of mastery expected on the mathematics CMT.

The CMT Mathematics Handbook is intended to be a resource for teachers as they develop meaningful mathematics programs for students in Grades K-8 that are aligned with the spirit and content of Connecticut's Mathematics Curriculum Framework as reflected by the CMT. The handbook is being released in two parts.

Part I provides:

- a summary of the changes incorporated into the fourth generation tests;
- test blueprints and content outlines;
- rubrics for scoring open-ended items;
- sample items for each strand to be assessed at Grades 3 and 8 and sample items for new skills being assessed and open-ended items at Grades 4, 5, 6 and 7;
- instructional strategies and activities linked to content standards at each grade level; and
- mathematics vocabulary, by grade level, with which all students should be familiar to be successful in mathematics.

Part II (to be released in fall 2005) will provide:

- a more comprehensive list of sample items for each strand at all six grade levels; and
- scored student work for open-ended items from spring test administration pilots at all six grade levels.

Overall, the mathematics content of the CMT should be viewed as one component of a comprehensive, standards-based, mathematics program designed to set and meet high expectations for all students. While the CMT mathematics objectives should not be viewed as a curriculum, all district-level mathematics curriculums should include the skills and concepts assessed on the CMT. Daily classroom instruction should not be limited to preparation for the CMT. However, high-quality instruction should naturally reflect what is assessed and how it is assessed on the CMT.

It is hoped that the content of this handbook will provide teachers of mathematics with the information and ideas they need to continue to build and implement high-quality programs that significantly improve the mathematical literacy of all Connecticut students.

Position Statement on Mathematics Education

Adopted June 21, 2000, by the Connecticut State Board of Education

As part of everyone's daily routine, we are regularly presented with problems that require us to accurately compute sums, differences, products and quotients, analyze data, make predictions, recognize patterns and draw conclusions. In all of these instances, the abilities to compute accurately and to make reasonable estimates are required. A strong mathematics program provides for a comprehensive and sequential approach in which the acquisition of basic skills (addition, subtraction, multiplication and division) serves as the foundation for more complex problem solving and conceptual understanding.

The State Board of Education believes that the recent debate pitting the acquisition of basic skills against the development of conceptual understanding argues a false dichotomy. Rather, basic skills and conceptual understanding are intertwined, and both are necessary before students can successfully apply mathematics to the solution of problems. A strong mathematics program will enable students to do each with ease.

Unfortunately, not enough students in Connecticut or in the nation are sufficiently developing the facility, understanding, level of confidence and interest in mathematics to meet our present and future societal needs. Therefore, we must fully engage in the quest to provide every student with a strong mathematics program, beginning in the earliest grades.

Accordingly, the Connecticut State Board of Education believes that every student needs and deserves a high-quality, comprehensive mathematics education program that develops mathematical facility in the basic skills and quantitative literacy in numbers, measurement, algebra, geometry and statistics. To meet this goal and to best serve Connecticut's students, we encourage educators to adopt the following measures:

- overall, set higher expectations for **all** students to ensure earlier and more equitable opportunity to learn mathematics;
- in curriculum, provide a more rigorous study of mathematical skills and concepts and their applications in today's world for both career and personal decisions, and a more coherent and coordinated pre-K-12 program of instruction;
- in teaching, create classrooms that are stimulating learning environments in which **all** students have the opportunity to reach their full mathematical potential and in which, working collaboratively with families, **all** students are inspired to do so;
- in learning, provide more active student involvement with mathematics, including mathematical problems that relate to their present world and their future career needs and demands, and the use of a variety of mathematical tools for solving those problems;

- in technology, foster more systematic and appropriate use of technological tools to enhance access to mathematics concepts;

- in professional development, provide more professional collaboration and teacher externships to provide a stronger focus on the underlying mathematics being taught; and

- in assessment, provide student evaluations that are continuous and based on many sources of evidence.

These measures, embodied in the goals and standards outlined in Connecticut's *Guide to K-12 Program Development in Mathematics* and in the *Connecticut Framework: Preschool Curricular Goals and Benchmarks*, should result in more mathematically powerful students who demonstrate the ability to:

- compute (using addition, subtraction, multiplication and division, when appropriate, with whole numbers, fractions, decimals and percentages) and use mathematical concepts and skills to make and justify decisions and predictions, to identify patterns and trends, to pose questions from data and situations, and to formulate and solve problems;

- select and use appropriate approaches and tools for solving computational, geometrical and algebraic problems, including estimation, mental computation, paper and pencil, manipulative materials, calculators, and computers with software for tabulating, charting, graphing, drawing, and transforming data and images;

- use mathematical skills and concepts to describe and analyze data and measurements of physical and social phenomena from other disciplines;

- communicate numerical, geometrical, algebraic and statistical ideas orally and in written forms with models, pictures, graphs and mathematical symbols, using paper and pencil, a variety of calculator displays, spreadsheets, graphing packages, word processing and other related computer software;

- use inductive and deductive reasoning to make, defend and evaluate conjectures and arguments, to justify assertions and verify tentative conclusions, and to solve mathematical problems; and

- identify and use connections within mathematics to identify interrelationships and equivalent representations, to construct mathematical models, and to investigate and appreciate mathematical structure.

We take these positions to ensure that all students, by the end of Grade 12, will apply proficiently a range of numerical, algebraic, geometric and statistical concepts and skills to formulate, analyze and solve real-world problems; to facilitate inquiry and the exploration of real-world phenomena; and to support continued development and appreciation of mathematics as a discipline.

SUMMARY OF CHANGES FROM THIRD GENERATION CMT TO FOURTH GENERATION CMT

Test

- A test is mandated for each grade, 3-8, inclusive.
- The test will be administered in the spring of the school year, beginning with spring 2006.
- There are no separate answer booklets. Students are expected to record their responses in the spaces provided in test booklets.
- There are no grid-in items for Grades 3 and 4.
- Grade-appropriate rulers are provided (see page 2).
- A formula sheet is provided for Grade 8 (see pages 3 and 89).
- The total number and percentage of multiple-choice items decreases while the total number and percentage of constructed-response items increases as the grade level increases.

Reporting Format

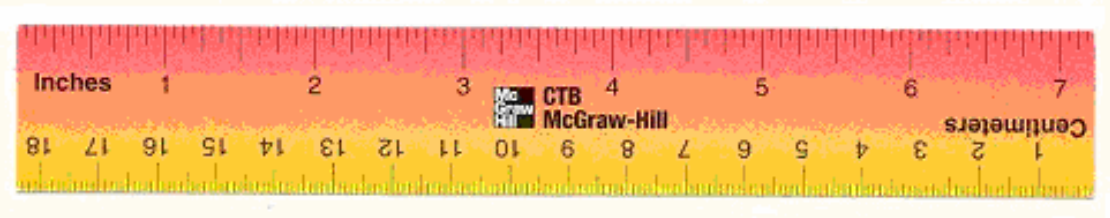
- The same 25 content strands are tested. The strands will be organized by the four standards outlined in the Mathematics Curriculum Framework, including:
    - numerical and proportional reasoning;
    - geometry and measurement;
    - working with data: probability and statistics; and
    - algebraic reasoning: patterns and functions.

The CMT scores will continue to be reported by strand.

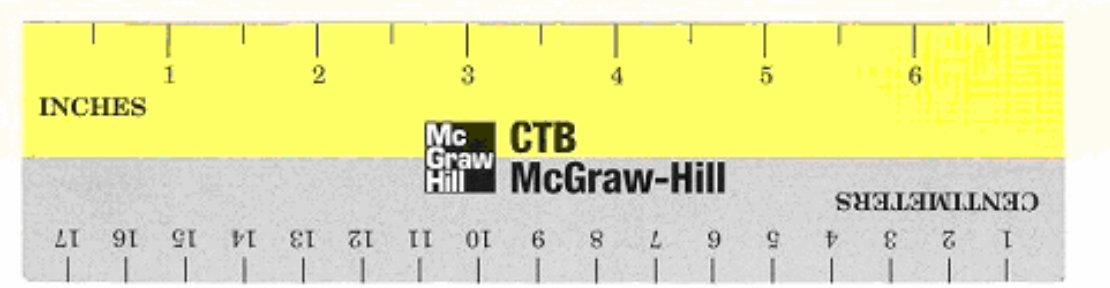
Handbook

- This document will be available on the CSDE website, on CD and in limited quantity in hard copy. The electronic version will be periodically updated with scored student work and suggested instructional strategies and activities.
- Information is organized by grade level.
- Vocabulary lists are cumulative. New vocabulary at a grade level is in bold print.

Rulers For Use During The Connecticut Mastery Test



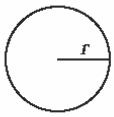
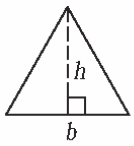
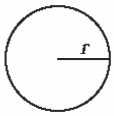
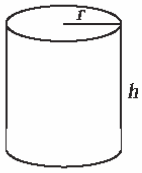
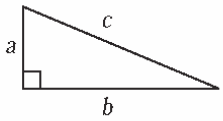
Grades 5, 6, 7 and 8



Grades 3 and 4

Grade 8

CMT Formula Chart

Circumference	circle	$C = 2\pi r$	
	pi = π	Use 3.14 OR $\frac{22}{7}$	
Area	triangle	$A = \frac{1}{2}bh$ 	circle $A = \pi r^2$ 
Volume	cylinder	$V = \pi r^2 h$	
Pythagorean Theorem	right triangle	$a^2 + b^2 = c^2$	

Measurement Conversion

Customary Length	1 mile = 5,280 feet
Customary Volume	1 gallon = 4 quarts 1 quart = 2 pints 1 pint = 2 cups 1 cup = 8 ounces
Customary Weight and Mass	1 ton = 2,000 pounds 1 pound = 16 ounces
Time	1 year = 365 days 1 year = 52 weeks

ORGANIZATION OF CMT STRANDS BY STANDARD

NUMERICAL and PROPORTIONAL REASONING
1. Place Value
2. Pictorial Representations of Numbers
3. Equivalent Fractions, Decimals and Percents
4. Order, Magnitude and Rounding of Numbers
5. Models for Operations
6. Basic Facts
7. Computation with Whole Numbers and Decimals
8. Computation with Fractions and Integers
9. Solve Word Problems
10. Numerical Estimation Strategies
11. Estimating Solutions to Problems
12. Ratios and Proportions
13. Computation with Percents
GEOMETRY and MEASUREMENT
14. Time
15. Approximating Measures
16. Customary and Metric Measures
17. Geometric Shapes and Properties
18. Spatial Relationships
WORKING with DATA: PROBABILITY and STATISTICS
19. Tables, Graphs and Charts
20. Statistics and Data Analysis
21. Probability
ALGEBRAIC REASONING: PATTERNS and FUNCTIONS
22. Patterns
23. Algebraic Concepts
24. Classification and Logical Reasoning
INTEGRATED UNDERSTANDINGS (May include content from one or more of the four Domains)
25. Mathematical Applications

SUMMARY OF CHANGES
FROM THIRD TO FOURTH GENERATION

CMT-3

Grade	4	6	8
# of Sessions	2	3	3
# of Reporting Strands	18	23	23
# of Items	94	116	121
Multiple-choice items	76	80	70
Open-ended Items	18	23	32
Grid-in Items	0	13	19

CMT-4

Grade	3	4	5	6	7	8
# of Sessions	2	2	3	3	3	3
# of Reporting Strands	18	22	23	23	23	21
# of Items	94	102	114	117	121	118
Multiple-choice items	76	84	80	71	70	59
Open-ended Items	18	18	21	28	32	37
Grid-in Items	None	None	13	18	19	22

CMT-4 Mastery Levels

Maximum Points In Strand	Points Needed for Mastery
4	3
6	4
8	6
9	6
10	7*
12	8*

***mastery level pending**

Calculators are NOT allowed for Grades 3 and 4. Calculators ARE allowed for Grades 5 through 8 in sessions 2 and 3.

Mastery Criteria Map for CMT Generation 4 Mathematics Strands

Standards and Content Strands	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
Numerical and Proportional Reasoning						
1. Place Value	**4 out of 6**	**4 out of 6**	**4 out of 6**	**4 out of 6**	**4 out of 6**	**3 out of 4**
2. Pictorial Representations of Numbers	**4 out of 6**	**4 out of 6**	**4 out of 6**	**4 out of 6**	**4 out of 6**	**NT**
3. Equivalent Fractions, Decimals and Percents	**NT**	**3 out of 4**	**3 out of 4**	**3 out of 4**	**3 out of 4**	**4 out of 6**
4. Order, Magnitude and Rounding of Numbers	**4 out of 6**	**6 out of 8**	**6 out of 8**	**6 out of 8**	**6 out of 8**	**4 out of 6**
5. Models for Operations	**6 out of 8**	**6 out of 8**	**6 out of 8**	**4 out of 6**	**4 out of 6**	**4 out of 6**
6. Basic Facts	**4 out of 6**	**4 out of 6**	**4 out of 6**	**3 out of 4**	**NT**	**NT**
7. Computation with Whole Numbers and Decimals	**4 out of 6**	**4 out of 6**	**4 out of 6**	**6 out of 8**	**4 out of 6**	**4 out of 6**
8. Computation with Fractions and Integers	**NT**	**3 out of 4**	**4 out of 6**	**4 out of 6**	**4 out of 6**	**4 out of 6**
9. Solve Word Problems	**4 out of 6**	**3 out of 4**	**4 out of 6**	**6 out of 8**	**6 out of 8**	**6 out of 8**
10. Numerical Estimation Strategies	**3 out of 4**	**3 out of 4**	**4 out of 6**	**3 out of 4**	**3 out of 4**	**NT**
11. Estimating Solutions to Problems	**3 out of 4**	**3 out of 4**	**3 out of 4**	***7 out of 10***	***7 out of 10***	**6 out of 8**
12. Ratios and Proportions	**NT**	**NT**	**NT**	**3 out of 4**	**3 out of 4**	**6 out of 8**
13. Computation with Percents	**NT**	**NT**	**NT**	**NT**	**3 out of 4**	**4 out of 6**
Geometry and Measurement						
14. Time	**4 out of 6**	**3 out of 4**	**3 out of 4**	**NT**	**NT**	**NT**
15. Approximating Measures	**4 out of 6**	**4 out of 6**	**4 out of 6**	**4 out of 6**	**4 out of 6**	**4 out of 6**
16. Customary and Metric Measures	**4 out of 6**	**3 out of 4**	**6 out of 8**	**6 out of 8**	**6 out of 8**	**6 out of 8**
17. Geometric Shapes and Properties	**4 out of 6**	**4 out of 6**	**4 out of 6**	**6 out of 8**	**6 out of 8**	**6 out of 8**
18. Spatial Relationships	**NT**	**NT**	**3 out of 4**	**4 out of 6**	**6 out of 8**	***8 out of 12***

Working with Data: Probability and Statistics						
19. Tables, Graphs and Charts	**6 out of 8**	**4 out of 6**	**4 out of 6**	**4 out of 6**	**4 out of 6**	**4 out of 6**
20. Statistics and Data Analysis	**NT**	**3 out of 4**	**3 out of 4**	**3 out of 4**	**4 out of 6**	**6 out of 8**
21. Probability	**3 out of 4**	**3 out of 4**	**4 out of 6**	**3 out of 4**	**4 out of 6**	**4 out of 6**
Algebraic Reasoning: Patterns and Functions						
22. Patterns	**4 out of 6**	**4 out of 6**	**4 out of 6**	**4 out of 6**	**4 out of 6**	**4 out of 6**
23. Algebraic Concepts	**NT**	**3 out of 4**	**3 out of 4**	**4 out of 6**	**6 out of 8**	***7 out of 10***
24. Classification and Logical Reasoning	**4 out of 6**	**4 out of 6**	**4 out of 6**	**4 out of 6**	**4 out of 6**	**4 out of 6**
Integrated Understandings						
25. Mathematical Applications	**4 out of 6**	**4 out of 6**	**6 out of 9**	**6 out of 9**	**6 out of 9**	**6 out of 9**

NT: Strand not tested at this grade level
Italicized: Mastery criteria is pending

Point Values For Each Standard On The CMT Generation 4 Test

Standard	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
Numerical and Proportional Reasoning	52	60	66	74	72	64
Geometry and Measurement	24	20	28	28	30	34
Working with Data: Probability and Statistics	12	14	16	14	18	20
Algebraic Reasoning: Patterns and Functions	12	16	16	18	20	22
Total Raw Points Minus Strand 25	**100**	**110**	**126**	**134**	**140**	**140**
Total Raw Points	**106**	**116**	**135**	**143**	**149**	**149**

INSTRUCTIONAL STRATEGIES

- 10 Practical Instructional Strategies for Grades K-8
- Lessons by Standard and Grade Level
- Lesson Descriptions and Web Links

10 PRACTICAL INSTRUCTIONAL STRATEGIES FOR GRADES K-8

Preparing students for the Connecticut Mastery Test (CMT) should be an ongoing process. The process requires sufficient instructional time and appropriate instructional strategies. While it is certainly appropriate to conduct some form of review, "cramming" is far less effective than an ongoing set of instructional practices that naturally and continually prepare students for the test specifically and for higher levels of understanding generally. A sound K-8 mathematics program embeds these strategies into all instructional planning.

Strategy 1: Asking "Why?"

Probably the best way to implement a "thinking curriculum" – a curriculum that is language-rich, focuses on meaning and values alternative approaches – is by regularly asking students "Why?" A simple, "How do you know that?" or "Can you explain how you got your answer?" or the basic, "Can you explain to the class why you think that?" forms the basis of a mathematics curriculum that goes beyond merely correct answers. A student who can explain his or her answers often has a stronger understanding of mathematics and can help other students develop understanding. Questions like, "How did you get 17?" or "Why did you add?" give students powerful opportunities to communicate their understandings and give teachers powerful tools to assess the degree of understanding. Classrooms where students are regularly explaining how and why, both orally and in writing, are classrooms that effectively prepare students for many of the open-ended items on the CMT.

Strategy 2: Embed In Context, Present As A Problem

Consider the vast difference between "Find the quotient of $20 \div 1.79$" on the one hand, and "How many hamburgers, each costing $1.79, can be purchased if you have a $20 bill?" Both problems expect that students can divide. However, the former directs students to a single long division algorithm with a three-digit divisor that isn't even tested on the CMT. The latter places the mathematics in a context and expects students to understand that division is an appropriate operation to use to solve a practical problem. In addition, the latter encourages estimation and raises the issue of sales tax, all of which is assessed on the CMT. Most importantly, the contextualized problem shows students that mathematics is a useful tool.

Strategy 3: Ongoing Cumulative Review

One of the most effective strategies for fostering mastery and retention of critical mathematical skills is daily, cumulative review at the beginning of every lesson. Rarely does one master something new after one or two lessons and one or two homework assignments. Many teachers call this "warm-ups" or daily-math. Five to eight quick problems to keep skills sharp can be delivered orally or via visual methods. Every day teachers should present:

- a fact of the day (e.g., 7 x 6);
- an estimate of the day (e.g., What is a rough estimate of the cost of 55 items at $4.79 each?);
- a measure of the day (e.g., About how many meters wide is our classroom?);
- a place value problem of the day (e.g., What number is 100 more than 1,584?);
- a word problem of the day; and
- any other exercise or problem that reinforces weaker, newer or problematic skills and concepts.

This form of review, often patterned after the types of items and item formats used on the CMT, embeds review for the test in what is recognized as sound instructional practice.

Strategy 4: Ensure A Language-Rich Classroom

Like all languages, mathematics must be encountered orally and in writing. Like all vocabulary, mathematical terms must be used again and again in context until they become internalized. Just as young children confuse left and right until they develop strategies and connections to distinguish between the two, older children confuse area and perimeter until they link area to *covering* and perimeter to *border*. A language-rich classroom, in which mathematical terminology is regularly used in discussions, solving problems and in writing, can make a big difference in how effectively children learn mathematics. Posting vocabulary in the room, perhaps on a word wall, is one way to ensure that mathematical terminology is used on a daily basis. While not exhaustive, the vocabulary word list found in each grade-level section of this handbook should be used to ensure that the language used and expected on the CMT is never new to students.

Strategy 5: Use Every Number As A Chance To Build Number Sense

The development of number sense is one of the overarching goals of mathematics at the elementary level. Number sense is a comfort with numbers that includes estimation, mental math, numerical equivalents, a sense of order and magnitude, and a well-developed understanding of place value. The development of number sense must be an ongoing feature of all instruction. A review of CMT 4 reveals how much of the test focuses on these critical number sense understandings. A simple strategy for incorporating number sense development into all instruction is to pause regularly and, regardless of the specific mathematics being taught, ask questions such as the following:

- Which is most or greatest? How do you know?
- Which is least or smallest? How do you know?
- What else can you tell me about those numbers? For example, "they are both odd," "all are mixed numbers," "their product is about 18 because you can round."
- How else can we express .2 (2/10, 1/5, 20%, .20)?

Incorporating this strategy into daily instruction creates a mind-set that the numbers in every problem posed and in every chart or graph used can strengthen and reinforce number sense. For example, in a simple word problem that asks students to find the sum of 57 and 67, teachers can first "pluck" the numbers from the problem and ask students to list four things they can say about the two numbers. Consider how much mathematics is reviewed when students suggest findings such as the following:

- I see two two-digit numbers.
- Both numbers are odd.
- There is a difference of 10 between the numbers.
- The 67 is greater than the 57.
- The ones digit is the same and the tens digit is one apart.
- One number is prime and the other is composite.
- I see 124.

Strategy 6: Draw A Picture (Mental or Real)

We say casually that "a picture is worth a thousand words" but we seldom connect mathematical concepts to their pictorial representations. A significant proportion of the CMT asks for pictorial equivalents of mathematics ideas. A powerful way to help students visualize the mathematics they are learning, or to reinforce understanding, is with mental images or pictures that students actually draw or create. Consider how infrequently we ask students to, "Show me with your hands about eight inches" or, "Use your fingers to show me an area of about 10 square inches." Consider how important it is that students can draw pictures of fractions and mixed numbers like ¾ or 2 ½ and of decimals like .3 and 1.2. Consider how powerful a class discussion about the different pictures for "three-quarters" can be when students show three quarters (25-cent pieces), a shaded pizza slice, a window pane, three stars out of four shapes, a ruler, a measuring cup and simply ¾! Consistently embedding, "Can you draw a picture of...?" and "Can you show me what that would look like?" into instruction can pay rich benefits in both student understanding and in CMT scores.

Strategy 7: Build From Graphs, Charts and Tables

Many real-world applications of mathematics arise from the data presented in graphs, charts and tables. This is why so many of the CMT items are based on data and include graphs, charts and tables. To best prepare students for these contexts, as well as develop the essential skills of making sense of data and drawing conclusions from data that is presented in graphs, charts and tables, teachers are encouraged to make far greater use of these forms of data presentation. Given a graph or table, students can be asked (similar to Strategy 5) to identify five things they see in the graph or table. In addition, students can be asked to draw two appropriate conclusions from the data and justify those conclusions. So consider "milking" the graphs and charts found in your textbook or data that students find during "data scavenger hunts" by copying the graph, chart or table for students and asking them to create five questions that could be answered by the information in the graph or table. Ask students to share their questions and generate a list of the best questions for future use.

Strategy 8: How Big? How Much? How Far?

No strand of mathematics assessed on the Connecticut Mastery Test produces student scores as consistently weak as the measurement strand. Rather than leave all measurement to a single chapter that is often skipped entirely, teachers are encouraged to make measurement an ongoing part of daily instruction. First, questions like, "How big?," "How much?," "How far?," "How heavy?" all help to develop measurement understanding. Second, measurements of things such as arm span, book weight, area of circles, or breath-holding times all provide great sets of data and, therefore, use measurement to gather data that is analyzed and generalized – integrating many important aspects of mathematics. Finally, more involved projects like determining the number of students that can fit in a classroom or the number of hours students have been alive are wonderful opportunities to keep measurement on the front burner of daily instruction.

Strategy 9: Omit What Is No Longer Important

A significant amount of time and energy is expended by teachers and students on skills considered less important by national and state standards and not even assessed on the CMT, the Connecticut Academic Performance Test (CAPT) or the SAT. District mathematics curriculums must become more focused on what is truly valued and teachers must give themselves and each other permission to skip textbook pages that no longer serve useful purposes. In fact, the proverbial "mile-wide, inch-deep" curriculum that results in far more coverage of topics than mastery of key concepts undermines many efforts to raise student achievement. In addition, time that is no longer spent on increasingly irrelevant skills – particularly those done most often with a calculator – frees up valuable minutes and hours for increasingly important skills like estimation, algebraic reasoning and problem solving. So carefully review what is NOT assessed on the CMT – particularly complex, multidigit computation – and redirect what is taught to focus on those skills and concepts that have lasting value and that ARE assessed.

Strategy 10: Focus On Sense-Making As Well As Correct Answers

One of the most powerful test-taking skills for multiple-choice items is the artful elimination of obviously absurd answers. However, identifying such "obviously absurd answers" – for example, a sales tax of $129 dollars instead of $1.29 on a $20 item – requires a mind-set that mathematics makes sense. This "minds-on" approach to instruction is in sharp contrast to the rote regurgitation of rules and procedures to get correct answers to exercises that all too often comprises mathematics instruction. For example, when teaching how to convert mixed numbers to improper fractions and vice versa, it is imperative to teach why these forms are equivalent. Students who only know how to multiply and add and not why 3 ¾ is equivalent to 15/4 are at a disadvantage in life and on the CMT. Focusing on the why – that is, focusing on understanding and sense-making – emerges from consistent use of many of the preceding strategies, particularly 1 and 6.

Teachers can improve instruction significantly by adopting the mind-set that good mathematics instruction begins with an answer. That is, when a student responds (for example) "17," the next question should be something like, "How did you get that?" When the student responds "I added" or "I rounded" or "I took about half," the next question should be something like, "Why did you do that?"

Sample Lessons and Activities by Standard and Grade Level

The following lessons and activities can be incorporated into mathematics instruction to address the concepts and skills in each of the indicated standards. These activities have been selected for their richness and potential to develop mathematical understanding. A description of each of these lessons and web links can be found on the pages that follow.

WORKING with DATA: PROBABILITY and STATISTICS

ALGEBRAIC REASONING: PATTERNS and FUNCTIONS

Sample Lesson and Activity Descriptions

NUMERICAL AND PROPORTIONAL REASONING

Let's Count to 10 – Grades PreK-2 – In this unit, students make groups of zero to 10 objects, connect number names to the groups, compose and decompose numbers, and use numerals to record the size of a group. Visual, auditory and kinesthetic activities are included in each lesson. The unit is most appropriate for students learning at the kindergarten and Grade 1 levels. The NCTM Process Standards of Communication and Reasoning and Proof play a major role in these lessons.
http://illuminations.nctm.org/index_o.aspx?id=147

Do It with Dominoes – Grades PreK-2 – In this unit plan, students explore the four models of addition (counting, sets, number line and balanced equations) using dominoes. They also learn about the order property, the relationship between addition and subtraction, and the result of adding 0. Students will also write story problems in which the operation of addition is required, and begin to memorize the addition facts.
http://illuminations.nctm.org/index_o.aspx?id=47

How Many More Fish? – Grades PreK-2 – This unit plan focuses on comparative subtraction. The students use fish-shaped crackers to explore all five meanings for the operations of subtraction (counting, sets, number line, balance and inverse of addition). In these lessons, the students use reasoning, then represent and communicate their findings.
http://illuminations.nctm.org/index_o.aspx?id=51

Estimation – Grades 3-5 – This computer interactive lesson is designed to show students how to make estimations.
http://www.shodor.org/interactivate/lessons/estimate.html

Fun With Estimation – Grades 3-5 – This activity is a timed game that allows students to practice their estimation skills while shopping for groceries. Students work in cooperative groups and are in competition with one another.
http://www.col-ed.org/cur/math/math24.txt

Parking at the Mall – Grades 3-5 – In this lesson, students participate in an activity in which they develop number sense in and around the shopping mall.
http://illuminations.nctm.org/index_d.aspx?id=265

A Conceptual Model for Solving Percent Problems – Grades 5-8 – In this lesson, students will use a 10 x 10 grid, which is a common model for visualizing percents, to solve various types of percent problems. This model offers a means of representing the given information as well as suggesting different approaches for finding a solution.
http://illuminations.nctm.org/index_d.aspx?id=249

Shops at the Mall – Grades 6-8 – In this lesson, students participate in an activity in which they develop number sense in and around the shopping mall.
http://illuminations.nctm.org/index_d.aspx?id=266

Developing Number Sense – Grades 6-8 – In this lesson, students develop number sense through a change in approach to the teaching and learning of mathematics. This approach focuses on students and their solution strategies rather than on a "right answer," on thinking rather than on the mechanical application of rules, and on student-generated solutions rather than on teacher-supplied answers.
http://illuminations.nctm.org/index_d.aspx?id=252

GEOMETRY AND MEASUREMENT

Shapes in Our Lives – Grades PreK-2 – Students go on a "Shape Hunt" to identify different shapes at school and home. They make shape cookies to talk about how shapes can change and bring digital photographs of their homes to discuss the shapes seen in each one. Eighth-grade buddies help them insert shapes into PowerPoint presentations.
http://www.microsoft.com/education/VCTShapes.aspx

Using Nonstandard Measurement – Grade 2 – This lesson incorporates nonstandard measurement into the classroom through the use of measurement stations for children to explore. Students will be measuring objects with their hands, feet and pinky fingers.
http://eduref.org/cgi-bin/printlessons.cgi/Virtual/Lessons/Mathematics/Measurement/MEA0208.html

Inch by Inch – Grades 2-3 – Inch by Inch is a lesson dealing with measurement and estimation. It integrates reading and art. Students will be able to calculate basic estimations and take measurements of linear objects. http://eduref.org/cgi-bin/printlessons.cgi/Virtual/Lessons/Mathematics/Measurement/MEA0201.html

Let's Measure! – Grades 3-5 – Through this extensive study of measurement, students will gain a better understanding of linear measurement, weight (mass) and capacity.
http://www.coreknowledge.org/CKproto2/resrcs/lessons/398Measure.htm

Tree Measurement – Grades 4-6 – This activity is used to help understand the vertical and horizontal measurement of large objects.
http://www.col-ed.org/cur/math/math32.txt

How Much is a Million? – Grades 4-6 – After listening to the story, *How Much is a Million?* , students work in groups to determine how long one million dollars would be, laid out end to end, and how tall a stack of one million pennies would be.
http://eduref.org/cgi-bin/printlessons.cgi/Virtual/Lessons/Mathematics/Measurement/MEA0204.html

Cool to Rule: A Game of Estimation and Measurement – Grades 5-6 – This activity provides an excellent opportunity for students to review their measurement and estimation skills.
http://eduref.org/Virtual/Lessons/Mathematics/Measurement/MEA0015.html

An Introduction to Area and Perimeter – Grades 6-8 – Students form rectangles by using tiles and measure area and perimeter by counting. They will also measure and record area and perimeter, describe dimensions of rectangles, and discover and apply rules for measuring area and perimeter.
http://www.iit.edu/~smile/ma9509.html

An UnCOMFORTable Situation – Grades 6-8 – Students explore the relationship between the area of square units and their perimeters in a hands-on activity. Observations are recorded, and students begin to recognize that shapes with the same area sometimes can have different perimeters.
http://www.beaconlearningcenter.com/search/details.asp?item=183

Circles: Diameter, Circumference, Radius and the Discovery of Pi – Grades 6-8 – This math lesson is designed to help students identify and measure the diameter, circumference and radius of a circle. Students should discover the approximate value of pi through the relationship between the diameter and circumference.
http://www.iit.edu/~smile/ma9709.html

Scavenger Hunt for Lengths – Grades 6-8 – Students will measure and estimate lengths, learn the difference between measuring and estimating, become more aware of linear measurements in the world, and communicate better about the significance of these measurements.
http://school.discovery.com/lessonplans/programs/lengths/

Tessellations: Geometry and Symmetry – Grades 6-8 – This lesson allows students to examine tessellations and their geometric properties. This activity and discussions may be used to develop students' understandings of polygons and symmetry, as well as their abilities to analyze patterns and explore the role of mathematics in nature and our culture.
http://www.shodor.org/interactivate/lessons/tessplane.html

Translations, Reflections and Rotations – Grades 6-8 – This interactive computer lesson is designed to introduce students to translations, reflections and rotations.
http://www.shodor.org/interactivate/lessons/trans.html

WORKING WITH DATA: PROBABILITY AND STATISTICS

Baby Weight – Grades PreK-2 – This lesson focuses on the application of mathematics to real-world situations. Students must deal with data to complete an organized chart for the purpose of transferring information to a graph or for generalizing a rule.
http://illuminations.nctm.org/index_d.aspx?id=170

Alphabet Soup – Grades 3-5 – In this lesson, students construct box-and-whisker plots. They use them to identify the mean, mode, median and range of the data set. Representation is the major focus of this lesson.
http://illuminations.nctm.org/index_d.aspx?id=356

Can You Picture It? – Grades 3-5 – Students collect data about favorite vegetables and record the data in a pictograph and interpret this representation. They also create and use legends for the pictograph.
http://illuminations.nctm.org/index_d.aspx?id=352

Comparing Categorical and Numerical Data – Grades 3-5 – In this series of three multiday lessons students will focus on the following NCTM Standard: Formulate questions that can be addressed with data and collect, organize and display relevant data to answer them.
http://illuminations.nctm.org/index_o.aspx?id=116

Every Breath You Take – Grades 3-5 – This activity focuses on collecting and analyzing data. Each student will estimate the number of breaths he or she takes each hour and make comparisons to the actual data collected from classmates.
http://illuminations.nctm.org/index_d.aspx?id=243

Glyphs for All Reasons – Grades 3-5 – In this lesson, students learn a powerful way to display data, the glyph. Representation, communication and problem solving are important parts of this lesson. http://illuminations.nctm.org/index_d.aspx?id=357

Eat Your Veggies – Grades 3-5 – In this unit, students collect and display data in a variety of ways, beginning with tallies and pictographs. Later lessons focus on representing data using bar graphs, line plots, circle graphs, box-and-whisker plots and glyphs. The students also compare graphs from two sets of data and find the range, median, mean and mode of each set. The unit highlights the NCTM Process Standards of Representation, Problem Solving, Connections and Communication.
http://illuminations.nctm.org/index_o.aspx?id=114

High Temperature – Grades 3-5 – This lesson focuses on the application of mathematics to real-world situations. Students must deal with data to complete an organized chart for the purpose of transferring information to a graph or for generalizing a rule.
http://illuminations.nctm.org/index_d.aspx?id=171

Numerical and Categorical Data – Grades 3-5 – In this series of three multiday lessons students will focus on the following NCTM Standard: Formulate questions that can be addressed with data and collect, organize and display relevant data to answer them.
http://illuminations.nctm.org/index_o.aspx?id=116

Weather Watchers – Grades 3-5 – In this lesson, students collect and analyze data about the weather and learn to make a stem-and-leaf plot. Students need access to a newspaper or other sources for collecting weather data.
http://illuminations.nctm.org/index_d.aspx?id=287

Skin Weight – Grades 5-6 – This lesson focuses on the application of mathematics to real-world situations. Students must deal with data to complete an organized chart for the purpose of transferring information to a graph, or for generalizing a rule.
http://illuminations.nctm.org/index_d.aspx?id=172

Statistical Concepts: Measures of Central Tendency and Dispersion – Grades 5-6 – This lesson is designed for students to gain conceptual understanding. The graphing calculator is valuable for checking to see if the sets of numbers students produce satisfy specifications.
http://www.eduref.org/cgi-bin/printlessons.cgi/Virtual/Lessons/Mathematics/Statistics/STA0001.html

Analyzing Numeric and Geometric Patterns of Paper Pool – Grades 6-8 –
The interactive paper pool game in this i-Math investigation provides an opportunity for students to further develop their understanding of ratio, proportion and least-common multiple.
http://illuminations.nctm.org/index_o.aspx?id=125

Probability: The Study of Chance – Grades 6-8 – The purpose of this activity is to begin the process of helping students to learn the basic principles of probability.
http://www.eduref.org/cgi-bin/printlessons.cgi/Virtual/Lessons/Mathematics/Probability/PRB0004.html

Understanding Probability – Grades 6-8 – Students will learn what probability is, learn different ways to express probability numerically: as a ratio, a decimal and a percentage, and learn how to solve problems based on probability.
http://school.discovery.com/lessonplans/programs/probability/

Whale Weight – Grades 7-8 – This lesson focuses on the application of mathematics to real-world situations. Students must deal with data to complete an organized chart for the purpose of transferring information to a graph or for generalizing a rule.
http://illuminations.nctm.org/index_o.aspx?id=73

ALGEBRAIC REASONING: PATTERNS and FUNCTIONS

Balancing Act – Grades PreK-2 – This lesson will serve as an introduction to understanding equality as a balance. Students will develop an understanding of equality by comparing balanced and unbalanced pans, and will demonstrate quantitative relationships and equivalence through the use of concrete, pictorial and verbal representations.
http://illuminations.nctm.org/index_d.aspx?id=166

Calculating Patterns – Grades PreK-2 – In this sequence of lessons, students represent patterns in different ways. They solve problems; make, explain and defend conjectures; make generalizations; and extend and clarify their knowledge. You may adjust the length and pace of the lesson to fit the developmental needs of your students.
http://illuminations.nctm.org/index_o.aspx?id=146

Patterns That Grow – Grades 3-5 – In this unit plan, students use logical thinking to create, identify, extend and translate patterns. They make patterns with numbers and shapes and explore patterns in a variety of mathematical contexts. These lessons give students opportunities to create and analyze numeric and geometric patterns. Particular emphasis will be placed on growing patterns. Note that a pattern core is the unit in a pattern that repeats, and when you are presenting a pattern at least two repetitions of the core must be shown. Since growing patterns "grow" by a rule and are typically more difficult to solve than simple repeating patterns, the unit begins with the easier pattern type.
http://illuminations.nctm.org/index_o.aspx?id=103

The Variable Machine – Grades 3-5 – This lesson serves as an introduction to viewing variables as symbols that can be substituted for numbers. Students will express the idea of a variable as an unknown quantity by using a letter or a symbol.
http://illuminations.nctm.org/index_d.aspx?id=291

The "Mangoes Problem" – Grades 5-8 – This unit presents some classic problems that can be represented and solved in several ways. A variety of classroom solution attempts are described. Students work on the problems in groups to promote communication of mathematical ideas. NCTM publication-based lesson plans are adapted from NCTM's journals. This lesson plan appeared in the November-December 1994 edition of Mathematics Teaching in the Middle School.
http://illuminations.nctm.org/index_d.aspx?id=264

Sets and the Venn Diagram – Grades 6-8 – This lesson is designed to introduce students to the idea of a set and what it means to be contained in a set. Students will experiment with sets in conjunction with the Venn Diagram.
http://www.shodor.org/interactivate/lessons/vd1.html

Bouncing Tennis Balls – Grades 6-8 – Students will develop their skills in collecting and recording data using the real-world situation of a bouncing tennis ball. They will use the data collected to formulate the relationship between the dependent and independent variable in their experiment.
http://illuminations.nctm.org/index_d.aspx?id=246

Printing Books – Grades 6-8 – Students will explore the relationships among lines, slopes and y-intercepts using the real-world situation of the printing of their textbook. They will use the data from tables, graphs and an equation for problem solving.
http://illuminations.nctm.org/index_d.aspx?id=271

PRACTICE

Math Playground is a mathematics learning site for students in Grades K-6. Practice your math skills. Play a logic game and have fun!
http://www.mathplayground.com/index.html

The Math Forum's Problems of the Week (PoWs) are designed to provide creative, non-routine challenges for students in Grades 3-12. Problem solving and mathematical communication are key elements of every problem.
http://mathforum.org/pow/

Rubrics For
Scoring Open-Ended Items

Scoring rubrics will be used to score open-ended student responses on the Fourth Generation CMT. The number of points available for each item will depend on the type of question that is asked and the type of response that is required of students. These open-ended items will not be machine scored. There are three types of rubrics:

- 0-1 point rubric is used for responses that are correct (1 point) or incorrect (0 point)
- 0-2 point rubric is used where a complete response will be scored as a 2, a partial response will be scored as a 1, and an incorrect response will be scored as a 0
- 0-3 point rubric is only used for strand 25, Integrated Understanding questions. A response demonstrating full and complete understanding will be scored as a 3. A response demonstrating a reasonable understanding will be scored as a 2. A response demonstrating a partial understanding will be scored as a 1. A response demonstrating merely an acquaintance will be scored as a 0.

A detailed description of each rubric and score point is contained on pages 25-27.

Rubric for Scoring 1-Point Extended-Task (Dichotomous) Mathematics Items

Score Point 1

In an appropriate response, the student has demonstrated a **full and complete** understanding of all concepts and processes embodied in this application. The student has addressed the task in a mathematically sound manner. The response contains evidence of the student's competence in problem solving and reasoning, computing and estimating, and communicating to the full extent that these processes apply to the specified task. The response may, however, contain minor arithmetic errors that do not detract from a demonstration of full understanding.

Score Point 0

The student has **not demonstrated** a complete understanding of all concepts and processes embodied in this application.

Rubric for Scoring 2-Point Extended-Task Mathematics Items

Score Point 2

In an appropriate response, the student has demonstrated a **full and complete** understanding of all concepts and processes embodied in this application. The student has addressed the task in a mathematically sound manner. The response contains evidence of the student's competence in problem solving and reasoning, computing and estimating, and communicating to the full extent that these processes apply to the specified task. The response may, however, contain minor arithmetic errors that do not detract from a demonstration of full understanding.

Score Point 1

The student has demonstrated a **partial** understanding of some of the concepts and processes embodied in this application. The student's response contains some of the attributes of an appropriate response but lacks convincing evidence that the student fully comprehends the essential mathematical ideas addressed by this task. Such deficits include evidence of insufficient mathematical knowledge; errors in fundamental mathematical procedures; and other omissions or anomalies that bring into question the extent of the student's ability to solve problems of this general type.

Score Point 0

The student has demonstrated **merely an acquaintance** with the topic. The student's response is associated with the task in the item, but contains few attributes of an appropriate response. There are significant omissions or anomalies that indicate a basic lack of comprehension in regard to the mathematical ideas and procedures necessary to adequately address the specified task. No evidence is present to suggest that the student has the ability to solve problems of this general type.

Rubric for Scoring 3-Point Extended-Task Mathematics Items (Strand 25 Only)

Score Point 3

In an appropriate response, the student has demonstrated a **full and complete** understanding of all concepts and processes embodied in this application. The student has addressed the task in a mathematically sound manner. The response contains evidence of the student's competence in problem solving and reasoning, computing and estimating, and communicating to the full extent that these processes apply to the specified task. The response may, however, contain minor arithmetic errors that do not detract from a demonstration of full understanding.

Score Point 2

The student has demonstrated a **reasonable** understanding of the essential mathematical concepts and processes embodied in this application. The student's response contains most of the attributes of an appropriate response, including a mathematically sound approach and evidence of competence with applicable mathematical processes, but contains flaws that do not diminish countervailing evidence that the student comprehends the essential mathematical ideas addressed by this task. Such flaws include errors ascribable to faulty reading, writing or drawing skills; errors ascribable to insufficient, nonmathematical knowledge; and errors ascribable to negligent or inattentive execution of mathematical ideas or algorithms.

Score Point 1

The student has demonstrated a **partial** understanding of some of the concepts and processes embodied in this application. The student's response contains some of the attributes of an appropriate response but lacks convincing evidence that the student fully comprehends the essential mathematical ideas addressed by this task. Such deficits include evidence of insufficient mathematical knowledge; errors in fundamental mathematical procedures; and other omissions or anomalies that bring into question the extent of the student's ability to solve problems of this general type.

Score Point 0

The student has demonstrated **merely an acquaintance** with the topic. The student's response is associated with the task in the item, but contains few attributes of an appropriate response. There are significant omissions or anomalies that indicate a basic lack of comprehension in regard to the mathematical ideas and procedures necessary to adequately address the specified task. No evidence is present to suggest that the student has the ability to solve problems of this general type.

Grade Levels 3, 4, 5, 6, 7 and 8

Test Blueprint

Blueprints indicate the number and type of question for each strand tested.

Test Content

Test content outlines the specific content covered for each strand tested.

Sample Items

Sample items illustrate some of the questions used to test content skills and concepts. A more comprehensive list of sample items at each grade will be released in the fall of 2005. Scored student work will also be released in the fall of 2005.

Vocabulary Lists

Vocabulary lists represent the mathematics terms and language with which teachers and students at a particular grade level should be familiar.

Part I: Grade 3

- Test Blueprint
- Test Content
- Sample Items
- Vocabulary List

Connecticut Mastery Test – Fourth Generation

Mathematics Grade 3 Test Blueprint

Content Standards and Strands	# of multiple-choice items	# of open-ended items
Numerical and Proportional Reasoning		
1. Place Value	6	
2. Pictorial Representations of Numbers	4	2
3. Equivalent Fractions, Decimals and Percents	NT	NT
4. Order, Magnitude and Rounding of Numbers	6	
5. Models for Operations	4	2
6. Basic Facts	6	
7. Computation with Whole Numbers and Decimals	6	
8. Computation with Fractions and Integers	NT	
9. Solve Word Problems	6	
10. Numerical Estimation Strategies	4	
11. Estimating Solutions to Problems	4	
12. Ratios and Proportions	NT	NT
13. Computation with Percents	NT	NT
Geometry and Measurement		
14. Time	6	
15. Approximating Measures	6	
16. Customary and Metric Measures	3	3
17. Geometric Shapes and Properties	3	3
18. Spatial Relationships	NT	NT
Working with Data: Probability and Statistics		
19. Tables, Graphs and Charts	4	2
20. Statistics and Data Analysis	NT	NT
21. Probability	4	
Algebraic Reasoning: Patterns and Functions		
22. Patterns	2	2
23. Algebraic Concepts	NT	NT
24. Classification and Logical Reasoning	2	2
Integrated Understandings		
25. Mathematical Applications		2
TOTAL	76	18

* NT = Strand not tested at this grade level.

Connecticut Mastery Test – Fourth Generation

Mathematics Grade 3 Content

Strand	Concepts/Skills Assessed
1. Place Value	A. Solve problems involving 1 MORE/LESS or 10 MORE/LESS using 2-digit numbers. B. Identify alternative forms of expressing 3-digit whole numbers using expanded notation. C. Identify alternative forms of expressing 2-digit whole numbers using regrouping. D. Use place value concepts to identify and compare the magnitude and value of digits in 2- and 3-digit numbers.
2. Pictorial Representation of Numbers	A. Relate whole numbers to pictorial representations of base ten blocks and vice versa. B. Identify fractional parts of regions and sets using pictures and vice versa. C. Label and/or shade fractional parts of regions and sets.
3. Equivalent Fractions, Decimals and Percents	Not tested
4. Order, Magnitude and Rounding of Numbers	A. Order 2- and 3-digit whole numbers. B. Describe magnitude of 2- and 3-digit whole numbers. C. Round 2-digit whole numbers in context. D. Identify points representing 2- and 3-digit whole numbers on a number line and vice versa.
5. Models for Operations	A. Relate multiplication and division facts to rectangular arrays and pictures. B. Identify the appropriate operation or number sentence to solve a story problem. C. Write story problems from addition or subtraction number sentences.
6. Basic Facts	A. Add and subtract facts to 18. B. Multiply and divide by 2, 5 and 10.
7. Computation with Whole Numbers and Decimals	A. Add and subtract 1- and 2-digit whole numbers without regrouping. B. Add 1- and 2-digit whole numbers with regrouping.
8. Computation with Fractions and Integers	Not tested
9. Solve Word Problems	A. Solve simple story problems involving addition (with/without regrouping) or subtraction (without regrouping). B. Solve simple story problems involving addition (with/without regrouping) or subtraction (without regrouping) with extraneous information.
10. Numerical Estimation Strategies	A. Identify the best expression to find an estimate.
11. Estimating Solutions to Problems	A. Identify a reasonable estimate to a problem.
12. Ratios and Proportions	Not tested
13. Computation with Percents	Not tested
14. Time	A. Tell time to the nearest hour, half-hour and quarter-hour using analog and digital clocks. B. Solve problems involving time, elapsed time (15-minute increments) and calendars.

Strand	Grade 3 Concepts/Skills Assessed
15. Approximating Measures	A. Estimate lengths and areas by comparing.
16. Customary and Metric Measures	A. Measure lengths to the nearest inch or centimeter. B. Draw lengths to the nearest inch or centimeter. C. Identify appropriate customary or metric units of measure for a given situation (inches, feet, centimeters and meters).
17. Geometric Shapes and Properties	A. Identify and recognize 2-dimensional geometric shapes and figures, including number of angles and sides of polygons. B. Draw 2-dimensional geometric shapes and figures.
18. Spatial Relationships	Not tested
19. Tables, Graphs and Charts	A. Identify correct information from tables, bar graphs, pictographs and charts. B. Create bar graphs and pictographs from data in tables and charts.
20. Statistics and Data Analysis	Not tested
21. Probability	A. Identify correct solutions to problems involving elementary notions of probability.
22. Patterns	A. Extend or complete patterns, or identify rules using numbers and attributes. B. Extend or complete patterns and state rules using numbers and attributes.
23. Algebraic Concepts	Not tested
24. Classification and Logical Reasoning	A. Identify objects that are the same or different by one attribute. B. Sort objects into 2 groups by a common attribute.
25. Mathematical Applications	A. Solve extended numerical and statistical problems.

Connecticut Mastery Test – Fourth Generation
Mathematics Grade 3 Sample Items

NUMERICAL AND PROPORTIONAL REASONING

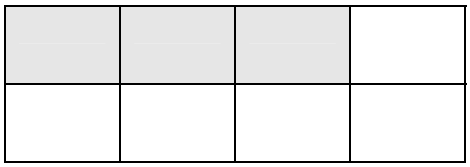
1.D Place Value

The value of 79 would change by how much if the 7 was replaced by a 5?

- ○ 2
- ○ 5
- ⊙ 20
- ○ 50

2.B Pictorial Representation of Numbers

What part of this shape is shaded?



- ○ $\frac{1}{8}$
- ○ $\frac{1}{3}$
- ⊙ $\frac{3}{8}$
- ○ $\frac{3}{5}$

4.C Order, Magnitude, Rounding of Numbers

Maria and her sister baked 48 cookies. Which number is **closest** to 48?

- ○ 60
- ⊙ 50
- ○ 40
- ○ 30

5.B Models for Operations

Malik has 12 animal books and 26 comic books. Which number sentence is best to use to find out how many **more** comic books he has than animal books?

- ○ 12 + 26 = ☐
- ⊙ 26 – 12 = ☐
- ○ 12 × 26 = ☐
- ○ 26 ÷ 12 = ☐

6.B Basic Facts

$2\overline{)\,18}$

- ○ 7
- ○ 8
- ⊙ 9
- ○ 16

7.B Computation with Whole Numbers and Decimals

58 + 25 =

- ○ 33
- ○ 73
- ⊙ 83
- ○ 84

9.A Solve Word Problems

Jon had 56 baseball cards. He gave 23 of them to his brother. How many baseball cards does Jon have left?

- ○ 23
- ⊙ 33
- ○ 34
- ○ 79

10.A Numerical Estimation Strategies

Kim wants to subtract 285 from 411. Which of the following would be **best** for Kim to use to **estimate** the answer?

- ○ 400 – 200
- ⊙ 400 – 300
- ○ 500 – 200
- ○ 500 – 300

11.A Estimating Solutions to Problems

Ms. Parker bought food for $18. She gave the cashier $50. **About** how much change did the cashier give Ms. Parker?

- ⊙ $30
- ○ $40
- ○ $60
- ○ $70

GEOMETRY AND MEASUREMENT

14.A Time

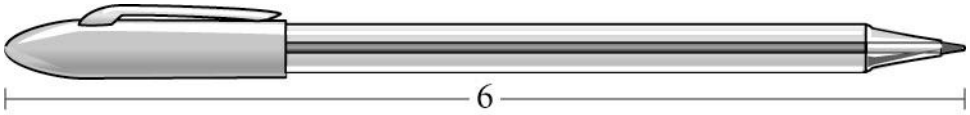
Carl's bedtime was at 9:00. Which clock shows that time?

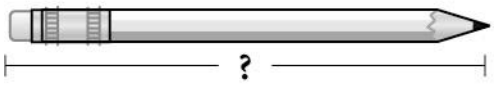
- ○ 
- ⊙ 
- ○ 
- ○ 

GEOMETRY AND MEASUREMENT

15.A Approximating Measures

The pen is 6 units long.





About how many units long is the pencil?

- ○ 2
- ◉ 3
- ○ 4
- ○ 5

16.B Customary and Metric Measures

Draw a line segment that is 12 centimeters long.

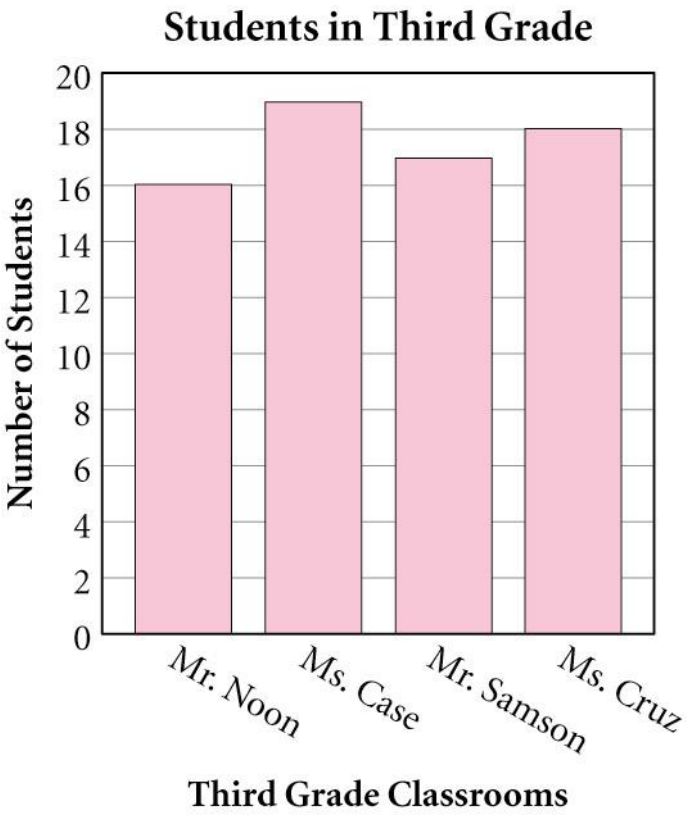
17.B Geometric Shapes and Properties

In the space below, draw a shape that has **exactly** 6 sides.

WORKING WITH DATA: PROBABILITY AND STATISTICS

19.A Tables, Graphs and Charts

The bar graph below shows the number of students in each third grade class.

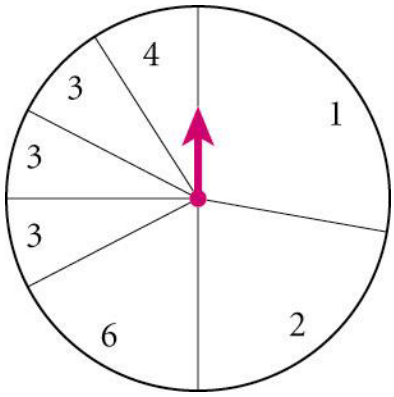


How many students are in Mr. Samson's class?

- ○ 16
- ◉ 17
- ○ 18
- ○ 19

21.A Probability

If Jack spins the spinner once, on which number is the arrow **most likely** to land?



- ◉ 1
- ○ 2
- ○ 3
- ○ 4

ALGEBRAIC REASONING: PATTERNS AND FUNCTIONS

22.A Patterns

Which rule was followed in the table below?

START	END
5	2
7	4
10	7
12	9

- ○ Add 2
- ◉ Subtract 3
- ○ Multiply by 2
- ○ Divide by 5

ALGEBRAIC REASONING: PATTERNS AND FUNCTIONS

22.B Patterns

These numbers follow a pattern.
11, 14, 17, 20, ___?___

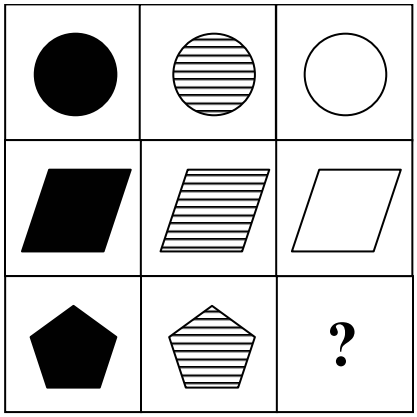
What number should come next in the pattern?

Answer _____

Explain why you think that number should be next in the pattern.

_____
_____
_____
_____
_____
_____

Which figure belongs in the empty box?



Draw the figure _____

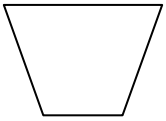
Show or explain how you found your answer.

_____
_____
_____
_____
_____
_____

24.B Classification and Logical Reasoning

Sort all 7 of these figures into 2 groups so that the figures in each group have something in common. Show how you grouped the figures by writing the **letter** (Q, R, S, T, U, V or W) of each figure on the chart.

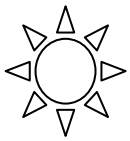
Q



R

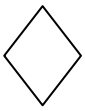
S

T



U

V



W

Group 1	Group 2

Explain why you grouped the figures the way you did.

_____
_____
_____
_____
_____
_____

25 Mathematical Applications

Jeff needs to raise $80 to go on a class trip. He can do different jobs to earn the money. Jeff can work at the following jobs for the pay listed.

JOB	PAY PER HOUR
Sweep garage	$1
Dust	$1
Return bottles	$2
Wash the car	$3
Baby-sit	$5

Use the information above to show one way that Jeff can raise the $80.

- Jeff can work for no more than 40 hours in all.
- No one job may be done for more than 10 hours.
- At least 3 different jobs must be picked.
- A total of exactly $80 must be raised.

Fill in the chart to show the number of hours each job was done in order to earn exactly $80.

JOB	HOURS WORKED	MONEY RAISED
Sweep garage		
Dust		
Return bottles		
Wash the car		
Baby-sit		
TOTALS:		

Connecticut Mastery Test – Fourth Generation
Mathematics Grade 3 Vocabulary List

Add
All together
A.M.
Angle(s)
Answer
Area
Array
Arrow
At least
Bar graph
Between
Cardinal numbers
Centimeter
Change (as in money)
Chart
Circle
Clock (analog and digital)
Closest to
Data
Day
Days of the week
Denominator
Difference
Different
Digit
Divide
Equal
Equation
Estimate
Exactly
Explain
Factor
Fair
Farthest
Fewer, fewest
Fewer than
Figure (as in geometric figure)
Foot
Fraction
Fractional part
Graph
Greatest
Group, grouped
Grid (dot paper)
Half
Height
Hour
How many more
How many less
Hundred (s)
Inch
In common
Larger/ larger than
Least
Length
Less
Less than
Likely
Line segment
Long, longer, longest
Measure
Meter
Minute
Missing
Month
More than
Most
Multiply
Nearest
No less than
No more than
Number fact
Number line
Number sentence
Numerator
Ones
Operation
Order (numbers)
Ordinal numbers (first, second, etc.)
Parallelogram
Pattern
Pictograph
P.M. (as in afternoon)
Point (on number line)
Polygon
Product
Quarter
Reasonable
Rectangle
Rectangular
Replaced
Ring (draw a ring around)
Rounding, rounded
Same/same as
Segment
Set
Shaded
Shape
Short, shorter, shortest
Side(s)
Size
Small/smaller than
Solve/solution
Sort
Spinner
Square
Story problem
Subtract
Sum
Table
Tall, taller, tallest
Tens
Triangle
Units (using dot paper, base ten blocks, and measurement)
Unshaded
Value
Venn diagram
Week
Weight
Width
Yard
Year

This list, while not exhaustive, includes vocabulary with which all teachers and students should be familiar.

Part II: Grade 4

- Test Blueprint
- Test Content
- Sample Items
- Vocabulary List

Connecticut Mastery Test – Fourth Generation

Mathematics Grade 4 Test Blueprint

Content Standards and Strands	# of multiple-choice items	# of open-ended items
Numerical and Proportional Reasoning		
1. Place Value	6	
2. Pictorial Representations of Numbers	4	2
3. Equivalent Fractions, Decimals and Percents	4	
4. Order, Magnitude and Rounding of Numbers	6	2
5. Models for Operations	4	2
6. Basic Facts	6	
7. Computation with Whole Numbers and Decimals	6	
8. Computation with Fractions and Integers	4	
9. Solve Word Problems	4	
10. Numerical Estimation Strategies	4	
11. Estimating Solutions to Problems	4	
12. Ratios and Proportions	NT	NT
13. Computation with Percents	NT	NT
Geometry and Measurement		
14. Time	4	
15. Approximating Measures	6	
16. Customary and Metric Measures	2	2
17. Geometric Shapes and Properties	2	2
18. Spatial Relationships	NT	NT
Working with Data: Probability and Statistics		
19. Tables, Graphs and Charts	2	2
20. Statistics and Data Analysis	4	
21. Probability	4	
Algebraic Reasoning: Patterns and Functions		
22. Patterns	2	2
23. Algebraic Concepts	4	
24. Classification and Logical Reasoning	2	2
Integrated Understandings		
25. Mathematical Applications		2
TOTAL	84	18

* NT = Strand not tested at this grade level.

Connecticut Mastery Test – Fourth Generation
Mathematics Grade 4 Content

Strand	Grade 4 Concepts/Skills Assessed
1. Place Value	A. Solve problems involving 10 MORE/LESS or 100 MORE/LESS than a given number. B. Identify alternative forms of expressing whole numbers ‹1000 using expanded notation. C. Identify alternative forms of expressing whole numbers ‹1000 using regrouping. D. Use place value concepts to identify and compare the magnitude and value of digits in 2- and 3-digit numbers.
2. Pictorial Representation of Numbers	A. Relate fractions and decimals to pictorial representations and vice versa. B. Relate fractions of regions and sets to pictures and vice versa. C. Label and/or shade fractional parts of regions and/or sets.
3. Equivalent Fractions, Decimals and Percents	A. Relate equivalent fractions to pictorial representations.
4. Order, Magnitude and Rounding of Numbers	A. Order whole numbers ‹10,000. B. Describe magnitude of 2- and 3-digit whole numbers, fractions, mixed numbers and decimals (tenths). C. Round 2- and 3-digit whole numbers in context. D. Identify points representing 2- and 3-digit whole numbers, fractions (halves, thirds, fourths) and decimals (tenths) on a number line and vice versa. E. Locate points representing 2- and 3-digit whole numbers, fractions (halves, thirds, fourths) and decimals (tenths) on a number line and vice versa.
5. Models for Operations	A. Identify members of multiplication and division fact families from arrays (factors of 2, 3, 4, 5 and 10). B. Identify the appropriate operation or number sentence to solve a story problem (2-digit numbers). C. Write a story problem that matches a given addition, subtraction or multiplication sentence. Use 1- and 2- digit numbers for addition and subtraction. Use 1-digit factors for multiplication.
6. Basic Facts	A. Find the missing product in a multiplication equation where one factor is 2, 3, 4, 5 or 10. B. Find the missing factor in a division equation where one factor is 2, 3, 4, 5 or 10.
7. Computation with Whole Numbers and Decimals	A. Add and subtract 2- and 3-digit whole numbers and money amounts less than $10 with and without regrouping. B. Multiply and divide 2-digit whole numbers by one digit.
8. Computation with Fractions and Integers	A. Add and subtract fractions with like denominators.
9. Solve Word Problems	A. Solve one-step story problems involving whole numbers and money amounts. Use 2- and 3-digit numbers in addition and subtraction problems. Use 1- and 2-digit numbers in multiplication problems. B. Solve one-step story problems involving addition or subtraction with extraneous information. Use 2-and 3-digit numbers in addition and subtraction problems.
10. Numerical Estimation Strategies	A. Identify the best expression to find an estimate.
11. Estimating Solutions to Problems	A. Identify a reasonable estimate to a problem, including estimating change from $1, $5 and $10.

Strand	Grade 4 Concepts/Skills Assessed
12. Ratios and Proportions	Not tested
13. Computation with Percents	Not tested
14. Time	A. Solve problems involving time, elapsed time (minutes and hours) and calendars. B. Solve problems involving conversions of measures of time.
15. Approximating Measures	A. Estimate lengths and areas by comparing.
16. Customary and Metric Measures	A. Measure lengths to the nearest inch, half-inch or centimeter. B. Draw lengths to the nearest inch, half-inch or centimeter. C. Identify appropriate customary or metric units of measure for a given situation.
17. Geometric Shapes and Properties	A. Identify 2-dimensional geometric shapes, including number of angles and sides of polygons. B. Identify, describe and draw 2-dimensional geometric shapes and figures.
18. Spatial Relationships	Not tested
19. Tables, Graphs and Charts	A. Identify correct information from tables, bar graphs, pictographs and charts. B. Create bar graphs and pictographs from data in tables and charts.
20. Statistics and Data Analysis	A. Draw and justify reasonable conclusions from data in tables, bar graphs, pictographs, circle graphs and charts.
21. Probability	A. Identify correct solutions to problems involving elementary notions of probability.
22. Patterns	A. Identify the missing terms in a pattern, or identify rules for a given pattern using whole numbers and attributes. B. Extend or complete patterns and state rules for given patterns using whole numbers and attributes.
23. Algebraic Concepts	A. Solve simple one-step algebraic equations involving addition, subtraction and fact families.
24. Classification and Logical Reasoning	A. Solve logic, counting and classification problems involving the organization of data. B. Sort or classify objects, and draw logical conclusions from data including Venn diagrams and transitive reasoning questions.
25. Mathematical Applications	A. Solve extended numerical and statistical problems.

Connecticut Mastery Test – Fourth Generation
Mathematics Grade 4 Sample Items

NUMERICAL AND PROPORTIONAL REASONING

5.B Models for Operations

A classroom received 4 boxes of new books. Each box contained 15 books. Which number sentence could be used to find out the **total** number of books in the 4 boxes?

- ○ 15 + 4 = □
- ○ 15 – 4 = □
- ⊙ 15 x 4 = □
- ○ 15 ÷ 4 = □

A box of 35 cookies was to be shared equally by 5 friends. Which could be used to find out how many cookies each friend would get?

- ○ Add 35 to 5
- ○ Subtract 5 from 35
- ○ Multiply 35 by 5
- ⊙ Divide 35 by 5

8.A Computations with Fractions and Integers

$$\begin{array}{r} \frac{7}{10} \\ -\ \frac{4}{10} \\ \hline \end{array}$$

- ○ $\frac{3}{1}$
- ○ $\frac{11}{10}$
- ○ $\frac{10}{11}$
- ⊙ $\frac{3}{10}$

10.A Numerical Estimation Strategies

Lance is buying a bike. One type costs $148 and another type costs $171. Which of the following would be **best** for Lance to use to **estimate** the difference in price between the two bikes?

- ○ $170 − $140
- ⊙ $170 − $150
- ○ $180 − $140
- ○ $180 − $150

11.A Estimating Solutions to Problems

Tanya bought a sandwich for $3.85 and a drink for $1.95. Which of the following would be a reasonable **estimate** of the amount Tanya spent?

- ○ a little less than $5
- ○ a little more than $5
- ⊙ a little less than $6
- ○ a little more than $6

Sam ran between 8 and 15 miles a week for 5 weeks. **About** how many miles could he have run?

- ⊙ 50
- ○ 80
- ○ 100
- ○ 130

GEOMETRY AND MEASUREMENT

14.A Time

January

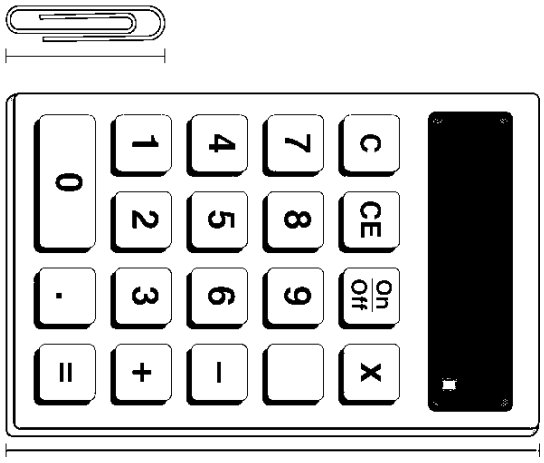
Sun	Mon	Tues	Wed	Thur	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

Tina had a bike race on the second Tuesday of the month shown above.
What date was that?

- ○ January 2
- ◉ January 9
- ○ January 10
- ○ January 16

15.A Approximating Measures

The paper clip is 3 units long.



About how many units long is the calculator?

- ○ 6
- ◉ 9
- ○ 12
- ○ 15

16.B Customary and metric measures

Use your ruler to draw a line segment that is 7 centimeters long.

WORKING WITH DATA: PROBABILITY AND STATISTICS

19.B Tables, Graphs and Charts

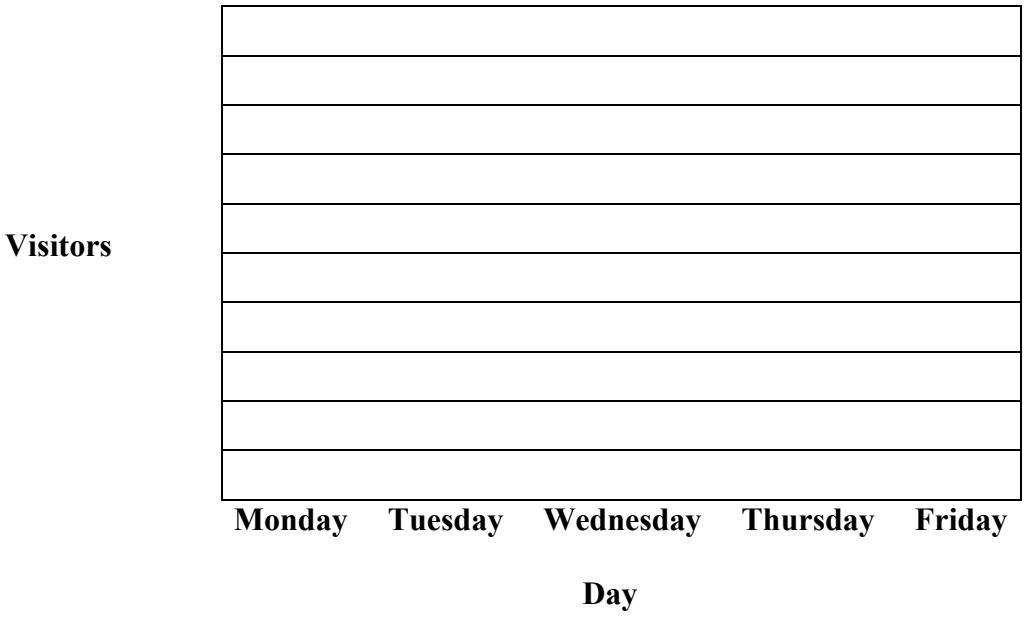
The table shows the number of visitors to an art show last week.

Art Show Visitors

Day	Number of Visitors
Monday	15
Tuesday	50
Wednesday	55
Thursday	80
Friday	65

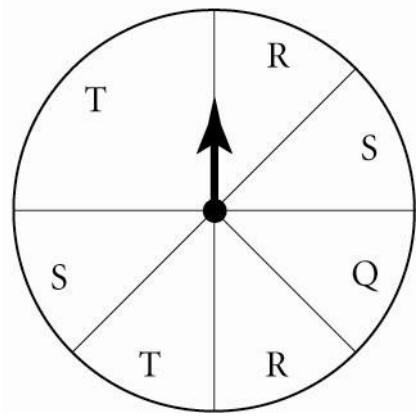
Label and complete a **bar graph** below to show the same information as in the table. Do **not** shade the bars.

Art Show Visitors



21.A Probability

Jess is playing a game with a spinner.



If Jess spins the arrow once, on which letter is it **least** likely to land?

- ○ T
- ○ S
- ○ R
- ◉ Q

ALGEBRAIC REASONING: PATTERNS AND FUNCTIONS

22.A Patterns

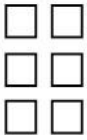
The numbers in the chart follow a pattern.

3	15	27
6	18	30
9	?	33
12	24	36

Which number is missing from the pattern?

- ○ 19
- ○ 20
- ◉ 21
- ○ 22

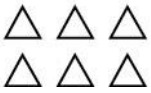
23.A Algebraic Concepts

If  = , then 

is equal to how many triangles?

○ 

○ 

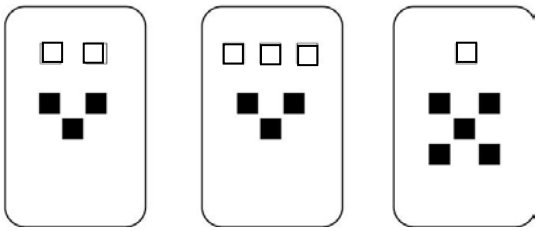
○ 

⊙ 

24.A Classification and Logical Reasoning

Jeremy, Bob and Don each picked one of the cards shown below.

- Jeremy's card has more white squares than Don's card.
- Bob's card has more total squares than Jeremy's card.



Which of these statements is true about the number of squares on the boys' cards?

○ Bob's card has 2 white squares.

○ Bob's card has 5 black squares.

⊙ Jeremy's card has a total of 5 squares.

○ Jeremy's card has a total of 6 squares.

INTEGRATED UNDERSTANDINGS

25 Mathematical Applications

Five students are raising money by participating in a walk-a-thon. The number of dollars they will earn for each mile they walk is shown in the table below.

Walk-a-thon

Student	Dollars Earned For Each Mile Walked	Miles Walked	Total Dollars Earned
Mike	$2		
Kristen	$4		
Troy	$7		
Emily	$3		
Andrea	$5		
		Total:	

Complete the table above.

- Each student must walk at least 1 mile.
- The total number of dollars earned must be exactly $90.
- Include the number of miles walked and the total dollars earned.

Connecticut Mastery Test – Fourth Generation
Mathematics Grade 4 Vocabulary List

About
Add
All together
A.M.
Angle(s)
Answer
Area
Array
Arrange
Arrow
At least
Average
Axis
Bar graph
Between
Capacity
Cardinal numbers
Centimeter
Change (as in money)
Chart
Circle
Circle graph
Classify
Clock (analog and digital)
Closest to
Combine
Combina-tion
Compare
Conclusion
Cup
Data
Day
Days of the Week
Denominator
Describe
Different
Difference
Digit
Divide
Elapsed time
Equal
Equation
Equilateral triangle
Equivalen
Estimate
Exactly
Explain
Event
Factor
Fair
Farthest
Fewer, fewest
Fewer than
Figure (as in geometric figure)
Foot
Fraction
Fractional part
Gallon
Grams
Graph
Greatest
Grid (dot paper)
Group, grouped
Growing patterns
Half
Half-Inch
Height
Highest
Hour
How many more
How many less
Hundred (s)
Inch
In common
Interval
Kilogram
Kilometer
Larger/larger than
Least
Least likely
Length
Less
Less than
Likely
Line graph
Line plot
Line segment
Long, longer, longest
Lowest
Mass
Measure
Meter
Mile
Milliliter
Minute
Missing
Month
More than
Most
Most likely
Multiply
Nearest
No less than
No more than
Number fact
Number line
Number sentence
Numerator
Ones
Open sentence
Operation
Order (numbers)
Ordinal numbers (first, second…)
Ounce
Parallelogram
Pattern
Pentagon
Pictograph
Pint
P.M.
Point (on a number line)
Polygon
Possible
Pound
Predict
Probability
Product
Quadrilateral
Quart
Quarter
Reasonable
Rectangle
Rectangular
Rename
Repeating patterns
Replaced
Represents
Ring (draw a ring around)
Rounding
Same/same as
Scale (graphs)
Segment
Set
Shaded
Shape
Short, shorter, shortest
Side (s)
Size
Small/smaller than
Solve/solution
Sort
Spinner
Square
Square unit
Story problem
Subtract
Sum
Table
Tall, taller, tallest
Tens
Ton
Trapezoid
Trend
Triangle
Unit (using dot paper, base ten blocks, and measurement)
Unshaded
Value
Venn Diagram
Volume
Week
Weight
Width
Yard
Year

This list, while not exhaustive, includes vocabulary with which all teachers and students should be familiar. **Bold** words may be new vocabulary that should be used at this grade level.

Part III: Grade 5

- Test Blueprint
- Test Content
- Sample Items
- Vocabulary List

Connecticut Mastery Test – Fourth Generation

Mathematics Grade 5 Test Blueprint

Content Standards and Strands	# of multiple-choice items	# of open-ended items	# of grid-in items
Numerical and Proportional Reasoning			
1. Place Value	**6**		
2. Pictorial Representations of Numbers	**4**	**2**	
3. Equivalent Fractions, Decimals and Percents	**4**		
4. Order, Magnitude and Rounding of Numbers	**7**	**1**	
5. Models for Operations	**4**	**2**	
6. Basic Facts			**6**
7. Computation with Whole Numbers and Decimals	**2**		**4**
8. Computation with Fractions and Integers	**6**		
9. Solve Word Problems	**4**		**2**
10. Numerical Estimation Strategies	**6**		
11. Estimating Solutions to Problems	**4**		
12. Ratios and Proportions	**NT**	**NT**	**NT**
13. Computation with Percents	**NT**	**NT**	**NT**
Geometry and Measurement			
14. Time	**4**		
15. Approximating Measures	**6**		
16. Customary and Metric Measures	**3**	**2**	**1**
17. Geometric Shapes and Properties	**2**	**2**	
18. Spatial Relationships	**2**	**1**	
Working with Data: Probability and Statistics			
19. Tables, Graphs and Charts	**2**	**2**	
20. Statistics and Data Analysis	**2**	**1**	
21. Probability	**4**	**1**	
Algebraic Reasoning: Patterns and Functions			
22. Patterns	**2**	**2**	
23. Algebraic Concepts	**4**		
24. Classification and Logical Reasoning	**2**	**2**	
Integrated Understandings			
25. Mathematical Applications		**3**	
TOTAL	**80**	**21**	**13**

* NT = Strand not tested at this grade level.

Connecticut Mastery Test – Fourth Generation
Mathematics Grade 5 Content

Strand	Grade 5 Concepts/Skills Assessed
1. Place Value	A. Solve problems involving 100 MORE/LESS or 1,000 MORE/LESS than a given number. B. Identify alternative forms of expressing whole numbers ‹10,000 using expanded notation. C. Identify alternative forms of expressing whole numbers ‹10,000 using regrouping. D. Use place value concepts to identify and compare the magnitude and value of digits in numbers.
2. Pictorial Representation of Numbers	A. Relate decimals (0.01-2.99) to pictorial representations and vice versa. B. Relate fractions and mixed numbers to pictures and vice versa. C. Identify and/or shade fractional parts of regions, sets or mixed numbers in pictures.
3. Equivalent Fractions, Decimals and Percents	A. Rename equivalent fractions. B. Rename equivalent mixed numbers as improper fractions and vice versa.
4. Order, Magnitude and Rounding of Numbers	A. Order whole numbers ‹100,000. B. Order mixed numbers, fractions and decimals. C. Describe magnitude of whole numbers ‹100,000 and decimals. D. Describe magnitude of mixed numbers and fractions. E. Round whole numbers in context. F. Round decimals. G. Locate points (fractions, decimals and whole numbers) on number lines and scales.
5. Models for Operations	A. Identify the appropriate operation or number sentence to solve a story problem. B. Write story problems from multiplication or division number sentences, using 1- and 2-digit numbers.
6. Basic Facts	A. Multiply and divide facts.
7. Computation with Whole Numbers and Decimals	A. Add and subtract 2-, 3- and 4-digit whole numbers and money amounts less than $100. B. Multiply and divide multiples of 10 and 100 by 10 and 100. C. Multiply and divide 2- and 3-digit whole numbers and money amounts less than $10 by 1-digit numbers.
8. Computation with Fractions and Integers	A. Add and subtract fractions and mixed numbers with like denominators.
9. Solve Word Problems	A. Solve one-step story problems involving whole numbers and money amounts with or without extraneous information. Use all operations. B. Solve two-step story problems involving whole numbers and money amounts with or without extraneous information.
10. Numerical Estimation Strategies	A. Identify the best expression to find an estimate. B. Identify whether and why a particular strategy will result in an overestimate or an underestimate.

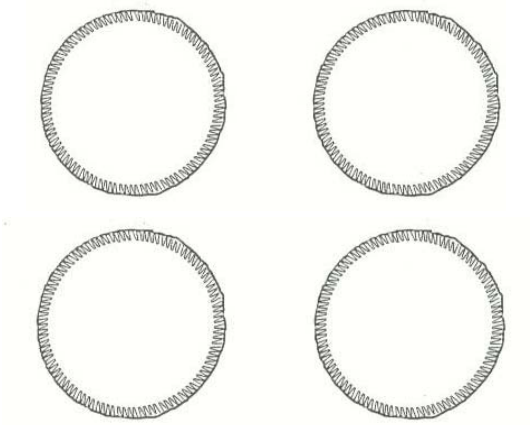
Strand	Grade 5 Concepts/Skills Assessed
11. Estimating Solutions to Problems	A. Identify a reasonable estimate to a problem, including estimating change.
12. Ratios and Proportions	Not tested
13. Computation with Percents	Not tested
14. Time	A. Solve problems involving elapsed time (a.m. and p.m.). B. Solve problems involving conversions of measures of time (minutes, hours and days).
15. Approximating Measures	A. Estimate lengths and areas.
16. Customary and Metric Measures	A. Measure lengths to the nearest quarter-inch or half-centimeter. B. Measure and determine perimeters and areas. C. Identify appropriate customary or metric units of measure (length, capacity and mass) for a given situation. D. Solve problems involving conversions of measures of length.
17. Geometric Shapes and Properties	A. Identify, describe and/or classify 2-dimensional geometric shapes and figures. B. Draw, describe and/or classify 2-dimensional geometric shapes and figures.
18. Spatial Relationships	A. Identify lines of symmetry. B. Draw lines of symmetry. C. Identify congruent figures. D. Locate points on grids.
19. Tables, Graphs and Charts	A. Identify correct information from tables, bar graphs, pictographs and charts. B. Create bar graphs and pictographs from data in tables and charts.
20. Statistics and Data Analysis	A. Draw reasonable conclusions from data in tables, bar graphs, pictographs, circle graphs and charts. B. State a conclusion and explain why a claim is or is not reasonable, based on the data.
21. Probability	A. Identify correct solutions to problems involving elementary notions of probability and fairness. B. Solve problems involving elementary notions of probability and fairness, including justifying solutions.
22. Patterns	A. Identify the missing terms in a pattern, or identify rules for a given pattern using whole numbers and attributes. B. Extend or complete patterns and state rules for given patterns using whole numbers and attributes.
23. Algebraic Concepts	A. Solve simple one-step algebraic equations involving addition, subtraction, multiplication and fact families.
24. Classification and Logical Reasoning	A. Solve logic, counting and classification problems involving the organization of data. B. Sort or classify objects and draw logical conclusions from data, including Venn diagrams and transitive reasoning questions.
25. Mathematical Applications	A. Solve extended numerical, statistical and spatial problems.

Connecticut Mastery Test – Fourth Generation
Mathematics Grade 5 Sample Items

NUMERICAL AND PROPORTIONAL REASONING

2.C Pictorial Representations of Numbers

Shade in $3\frac{2}{3}$ of the pies.



8.A Computation with Fractions and Integers

$$\begin{array}{r} 2\frac{1}{6} \\ +\,3\frac{4}{6} \\ \hline \end{array}$$

- ○ $6\frac{5}{6}$
- ⊙ $5\frac{5}{6}$
- ○ $5\frac{5}{12}$
- ○ $1\frac{1}{2}$

4.A Order, Magnitude and Rounding of Numbers

Julio made this table to show the number of visitors at 4 different beaches during one year.

Beach Visitors	
Beach	**Number of Visitors**
Alligator Point	12, 982
Port Bella	12,173
St. Joe's Island	13,104
Tucker's Sound	12,203

Which beach has **less** than 12,200 visitors?

- ○ Alligator Point
- ⊙ Port Bella
- ○ St. Joe's Island
- ○ Tucker's Sound

10.B Numerical Estimation Strategies

Ms. Harper's 5th grade class read 2,803 pages one month and 3,745 pages the next month. She estimated the total pages for both months by adding 3,000 and 4,000. Would her **estimate** be more or less than the actual answer?

- ○ **less**, because she rounded both numbers up
- ⊙ **more**, because she rounded both numbers up
- ○ **less**, because she rounded both numbers down
- ○ **more**, because she rounded both numbers down

11.A Estimating Solutions to Problems

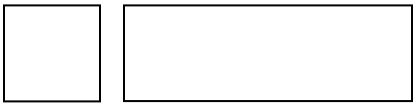
Keegan's mother bought groceries for a cookout. She spent $103 and gave the clerk $150. Which is a reasonable **estimate** of the change she received?

- ○ a little more than $40
- ○ a little less than $40
- ○ a little more than $50
- ⊙ a little less than $50

GEOMETRY AND MEASUREMENT

15.A Approximating Measures

If the area of the small rectangle is 4 square centimeters, **about** how many square centimeters is the large rectangle?



- ○ 4 centimeters
- ○ 8 centimeters
- ⊙ 12 centimeters
- ○ 16 centimeters

16.C Customary and Metric Measures

Which unit is **best** to use for measuring the length of a student's desk?

- ○ grams
- ⊙ centimeters
- ○ miles
- ○ kilometer

WORKING WITH DATA: PROBABILITY AND STATISTICS

19.B Tables, Graphs and Charts

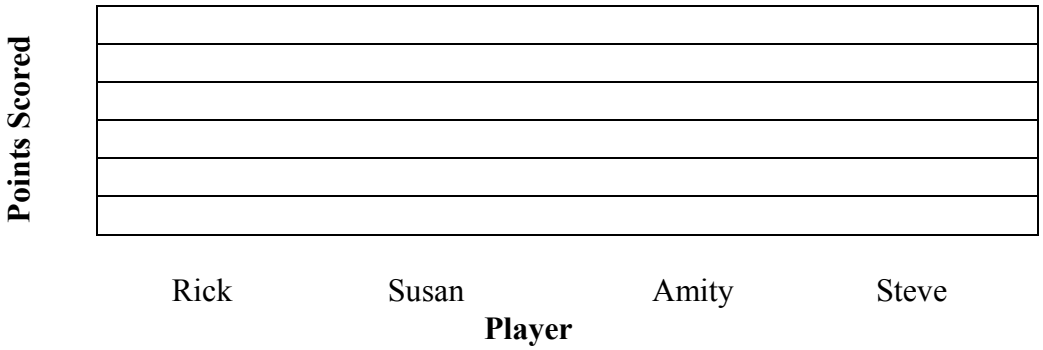
The table below shows how many points four players on the basketball team scored.

Points Scored by Players

Player	Points Scored
Rick	5
Susan	15
Amity	10
Steve	25

Label and complete a bar graph below to show the same information as in the table. Do not **shade** the bars.

Points Scored by Players



21.A Probability

Megan has a package of fruit snacks. Her package contains 3 red, 2 blue, 1 orange and 1 green. If she chooses one **without looking**, what is the probability that the fruit snack she picks will be blue?

- ○ 1 out of 7
- ◉ 2 out of 7
- ○ 3 out of 7
- ○ 5 out of 7

ALGEBRAIC REASONING: PATTERNS AND FUNCTIONS

22.B Patterns

The pattern below is missing a number.

77, 69, 61, 53, 45, **?**, 29

What number is missing from the pattern?

Answer_____

Explain why you think this is the missing number.

_____
_____
_____
_____
_____
_____

23.A Algebraic Concepts

What is the value of *n* in this equation?

$8 = 56 \div n$

- ⦿ 7
- ○ 64
- ○ 408
- ○ 448

24.A Classification and Logical Reasoning

Liam had to solve this problem in math class.

- The first digit of a 3-digit number is 1 less than the second digit.
- The third digit of a 3-digit number is double the second digit.
- The third digit is 8.

What is the 3-digit number?

- ○ 548
- ○ 438
- ⦿ 348
- ○ 238

INTEGRATED UNDERSTANDINGS

25 Mathematical Applications

You are going to have a Fourth of July picnic for your family. You estimate that:

- 25 people will have 2 hamburgers and 2 rolls each;
- 15 people will have 1 hamburger and 1 roll each; and
- 20 people will have 1 hamburger and no roll each.

Hamburgers and rolls are sold two ways each:

Hamburgers	Rolls
8 for $1.75	6 rolls for $0.75
12 for $2.15	18 rolls for $1.80

Use this information to order enough hamburgers and rolls for the people coming to your picnic. Show how many packages of each size of hamburgers and rolls you will buy. Compute the final cost of all the items. Show how you arrived at your answers

ITEMS	Number of Packages	Cost
8 hamburgers/$1.75		
12 hamburgers/$2.15		
6 rolls/$0.75		
18 rolls/$1.80		

Total Cost: _____

Connecticut Mastery Test – Fourth Generation
Mathematics Grade 5 Vocabulary List

About
Accurate
Add
All together
A.M.
Angle(s)
Answer
Area
Array
Arrange
Arrive at(as in determine)
Arrow
At least
Average
Axis
Bar graph
Between
Capacity
Cardinal numbers
Celsius degree
Centimeter
Change (as in money)
Chart
Circle
Circle graph
Classify
Clock (analog and digital)
Closest to
Column
Combine
Combination
Common attribute
Compare
Conclusion
Congruent
Coordinates
Cup
Data
Day
Days of the week
Decimal
Depth
Denominator
Describe
Design
Determined
Diagram
Difference
Different
Digit
Divide
Elapsed time
Equal
Equation
Equilateral
Equilateral triangle
Equivalent
Estimate
Exactly
Explain
Expression
Event
Factor
Fahrenheit degrees
Fair
Farthest
Fewer, fewest
Fewer than
Figure (as in geometric figure)
Foot
Fraction
Fractional Part
Gallon
Grams
Graph
Greatest
Grid (dot paper)
Grouped
Growing patterns
Half
Half-Inch
Height (s)
Hexagon
Highest
Hour
How many more
How many less
Hundred (s)
Improper fraction
Inch
In common
Integers
Interval
Kilogram
Kilometer
Larger/larger than
Least
Least likely
Length
Less
Less than
Likely
Line graph
Line of Symmetry
Line plot
Line segment
Liter
Locate
Long, longer, longest
Lowest
Mass
Mathematical thinking
Measure
Meter
Mile
Milliliter
Minute
Missing
Mixed number
Month
More
More than
Most
Most likely
Multiple
Multiply
Nearest
No less than
No more than
Number fact
Number line
Number sentence
Numerator
Odd number
Ones
Open Sentence
Operation
Order (numbers)
Ordinal numbers (first, second, etc.)
Ordered Pairs
Ounce
Parallel
Parallelogram
Pattern
Pentagon
Percent
Perimeter
Pictograph
Pint
P.M.
Point (on a number line)
Polygon
Possible
Pound
Predict
Probability
Product
Quadrilateral
Quart
Quarter
Reasonable
Rectangle
Rectangular
Rename
Repeating patterns
Replaced
Represents
Ring (draw a ring around)
Rounding, rounded
Row (s)
Same/ the same as
Scale (graphs)
Schedule
Segment
Set
Shaded
Shape
Short, shorter, shortest
Side (s)
Size
Smaller/ smaller than
Solve/Solution
Sort
Spinner
Square
Square centimeter
Square foot
Square inch
Square unit
Square yard
Story problem
Subtract
Sum
Symbol
Symmetry
Table
Tall, taller, tallest
Tens
Thousands
Ton
Trapezoid
Trend
Triangle
Unit (using dot paper, base ten blocks, and measurement)
Unshaded
Value
Venn diagram
Volume
Week
Weight
Width
Yard
Year

This list, while not exhaustive, includes vocabulary with which all teachers and students should be familiar. **Bold** words may be new vocabulary that should be used at this grade level.

Part IV: Grade 6

- Test Blueprint
- Test Content
- Sample Items
- Vocabulary List

Connecticut Mastery Test – Fourth Generation

Mathematics Grade 6 Test Blueprint

Content Standards and Strands	# of multiple-choice items	# of open-ended items	# of grid-in items
Numerical and Proportional Reasoning			
1. Place Value	6		
2. Pictorial Representations of Numbers	4	2	
3. Equivalent Fractions, Decimals and Percents	4		
4. Order, Magnitude and Rounding of Numbers	6	2	
5. Models for Operations	2	2	
6. Basic Facts			4
7. Computation with Whole Numbers and Decimals	2		6
8. Computation with Fractions and Integers	6		
9. Solve Word Problems	2	2	2
10. Numerical Estimation Strategies	4		
11. Estimating Solutions to Problems	2	4	
12. Ratios and Proportions	4		
13. Computation with Percents	NT	NT	NT
Geometry and Measurement			
14. Time	NT	NT	NT
15. Approximating Measures	6		
16. Customary and Metric Measures	2	2	2
17. Geometric Shapes and Properties	4	2	
18. Spatial Relationships	3	2	
Working with Data: Probability and Statistics			
19. Tables, Graphs and Charts	2	2	
20. Statistics and Data Analysis	2		2
21. Probability	2	1	
Algebraic Reasoning: Patterns and Functions			
22. Patterns	2	2	
23. Algebraic Concepts	4		2
24. Classification and Logical Reasoning	2	2	
Integrated Understandings			
25. Mathematical Applications		3	
TOTAL	71	28	18

* NT = Strand not tested at this grade level

Connecticut Mastery Test – Fourth Generation
Mathematics Grade 6 Content

Strand	Concepts/Skills Assessed
1. Place Value	A. Solve problems involving 100, 1,000 or 10,000 MORE/LESS and 0.1 MORE/ LESS than a given number. B. Identify alternative forms of expressing whole numbers ‹10,000 using expanded notation and regrouping. C. Use place value concepts to identify and compare the magnitude and value of digits in numbers.
2. Pictorial Representation of Numbers	A. Relate fractions, mixed numbers, decimals and percents to their pictorial representations and vice versa. B. Identify and/or shade fractional parts of regions or sets, decimals (tenths and hundredths) and mixed numbers in pictures.
3. Equivalent Fractions, Decimals and Percents	A. Rename equivalent fractions and mixed numbers. B. Rename improper fractions and mixed numbers as equivalent decimals and vice versa.
4. Order, Magnitude and Rounding of Numbers	A. Order whole numbers up to 6 digits and decimals (tenths and hundredths). B. Order mixed numbers, fractions and decimals. C. Describe magnitude of whole numbers up to 6 digits and decimals (tenths and hundredths). D. Describe magnitude of fractions and mixed numbers. E. Round whole numbers up to 6 digits, fractions and decimals in context. F. Identify points on number lines and scales, including fractions, decimals and integers. G. Locate points on number lines and scales, including fractions, decimals and integers.
5. Models for Operations	A. Identify the appropriate operation or number sentence to solve a story problem. B. Write story problems from equations involving fractions and decimals, including money amounts, using all operations.
6. Basic Facts	A. Multiply and divide facts.
7. Computation with Whole Numbers and Decimals	A. Add and subtract 2-, 3- and 4-digit whole numbers, money amounts and decimals. B. Multiply and divide whole numbers and decimals by 10, 100 and 1,000. C. Multiply and divide 2- and 3-digit whole numbers and money amounts by 1-digit numbers and 1-digit decimals. D. Identify the correct placement of the decimal point in multiplication and division of decimals by one-digit numbers.
8. Computation with Fractions and Integers	A. Add and subtract fractions and mixed numbers with reasonable and appropriate denominators. B. Multiply whole numbers and fractions by fractions and mixed numbers.

Strand	Grade 6 Concepts/Skills Assessed
9. Solve Word Problems	A. Solve one-step story problems involving whole numbers, decimals and money amounts with or without extraneous information. B. Solve two-step story problems involving whole numbers, decimals, fractions and money amounts without extraneous information. C. Solve two-step problems involving whole numbers and decimals with extraneous information. D. Solve two-step problems involving whole numbers, decimals or money amounts, and explain how the answer was determined.
10. Numerical Estimation Strategies	A. Identify the best expression to find an estimate. B. Identify whether and why a particular strategy will result in an overestimate or an underestimate.
11. Estimating Solutions to Problems	A. Identify a reasonable estimate to a problem, including estimating change. B. Determine a reasonable estimate, and describe the strategy used to arrive at the estimate. C. Given an estimate as a solution, judge its reasonableness and justify the decision.
12. Ratios and Proportions	A. Solve problems involving simple ratios.
13. Computation with Percents	Not tested
14. Time	Not tested
15. Approximating Measures	A. Estimate lengths, areas and angle measures.
16. Customary and Metric Measures	A. Measure and determine perimeter, area and volume. Explain or show how the solution was determined. B. Identify appropriate customary or metric units of measure (length, temperature, capacity, mass) for a given situation. C. Identify the correct solution to problems involving the conversions of measures of length, mass, capacity and time. D. Solve problems involving conversions of measures of length, mass, capacity and time.
17. Geometric Shapes and Properties	A. Identify and classify 2- and 3-dimensional geometric shapes and figures. B. Draw, describe and classify 2-dimensional geometric shapes and figures.
18. Spatial Relationships	A. Identify lines of symmetry. B. Draw lines of symmetry. C. Identify congruent and similar figures. D. Identify geometric reflections, rotations and translations. E. Locate and draw points on grids.
19. Tables, Graphs and Charts	A. Identify correct information from tables, line graphs, bar graphs, stem-and-leaf plots, and charts. B. Create bar graphs and line graphs from data in tables and charts.
20. Statistics and Data Analysis	A. Draw reasonable conclusions from data in tables, pictographs, line graphs, circle graphs, stem-and-leaf plots, and charts. B. Solve problems involving means, medians and modes of sets of data.

Strand	Grade 6 Concepts/Skills Assessed
21. Probability	A. Identify correct solutions to problems involving elementary notions of probability and fairness. B. Solve problems involving elementary notions of probability and fairness, including justifying solutions.
22. Patterns	A. Identify the missing terms in a pattern, or identify rules for a given pattern using numbers and attributes. B. Extend or complete patterns and state rules for given patterns using numbers and attributes.
23. Algebraic Concepts	A. Solve simple 1-step algebraic equations. B. Evaluate equations, identify fact-family relationships and use formulas provided.
24. Classification and Logical Reasoning	A. Solve logic, counting and classification problems involving the organization of data. B. Sort or classify objects, and draw logical conclusions from data including Venn diagrams and transitive reasoning questions.
25. Mathematical Applications	A. Solve extended numerical, statistical and spatial problems.

Connecticut Mastery Test – Fourth Generation
Mathematics Grade 6 Sample Items

NUMERICAL AND PROPORTIONAL REASONING

1.C Place Value

In which number does the 2 have the **least** value?

- ○ 2954
- ○ 3286
- ○ 6125
- ⊙ 9052

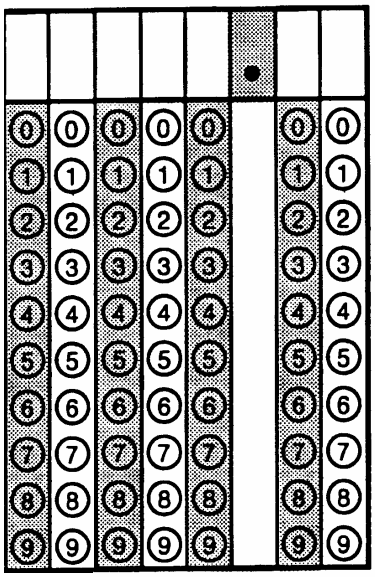
3.B Equivalent Fractions, Decimals and Percents

Which fraction means the same as 0.5?

- ○ $\frac{1}{10}$
- ○ $\frac{1}{5}$
- ⊙ $\frac{1}{2}$
- ○ $\frac{5}{100}$

7.A Computations with Whole Numbers and Decimals

1170 + 790 =



10.B Numerical Estimation Strategies

To estimate the product of 187.3 X 29.4, Deirdre multiplied 190 x 30. Would Deirdre's **estimate** be **more** or **less** than the actual product?

- ○ **less**, because she rounded both numbers up
- ⊙ **more**, because she rounded both numbers up
- ○ **less**, because she rounded both numbers down
- ○ **more**, because she rounded both numbers down

11.B Estimating Solutions to Problems

Tillman wants to estimate the product of 7 ¾ and 5. What is a good estimate of the answer?

Answer_____

Show or explain how you used estimation to determine your answer.

_____
_____
_____
_____
_____
_____
_____

GEOMETRY AND MEASUREMENT

15.A Approximating Measures

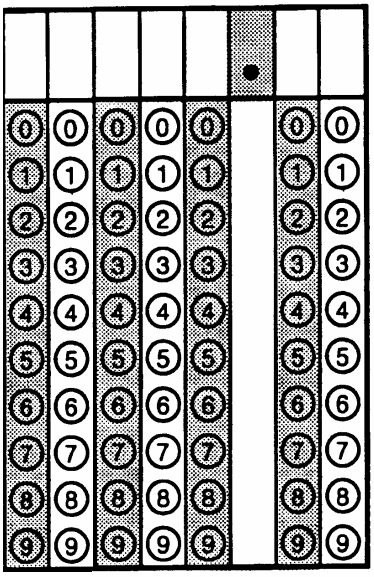
What is the approximate measure of the angle shown above?

- ○ 100°
- ○ 110°
- ◉ 170°
- ○ 190°

16.A Customary and Metric Measures

Anna picked 8 pints of strawberries. How many **quarts** of strawberries did she pick?

2 pints = 1 quart



WORKING WITH DATA: PROBABILITY AND STATISTICS

19.A Tables, Graphs and Charts

The stem-and-leaf plot shows the number of videos rented by sixth grade students.

Number of Videos Rented

0	1 3 1 4 6 8 9
1	0 3 1 4 2 0
2	1 2 0 3
3	1 0 2

How many sixth-graders rented more than 10 videos?

- ○ 10
- ◉ 11
- ○ 12
- ○ 13

Strand 21.B Probability

The table below shows the number of colored marbles Maury has in his collection.

Marble Collection

Color	Number of Marbles
Purple	13
Blue	34
Red	30
Green	23

If Maury picks a marble without looking, what is the probability he will pick a blue marble?

Answer_____

Show your work or explain how you determined your answer.

ALGEBRAIC REASONING: PATTERNS AND FUNCTIONS

Strand 22.B Patterns

The shapes below follow a pattern.

In the space below, draw the next shape in the pattern.

Explain why the shape you drew is the next shape in the pattern.

_____
_____
_____
_____
_____
_____

23.B Algebraic Concepts

Solve this equation for n.

$$244 \times n = 3{,}172$$

- ○ 10
- ◉ 13
- ○ 17
- ○ 24

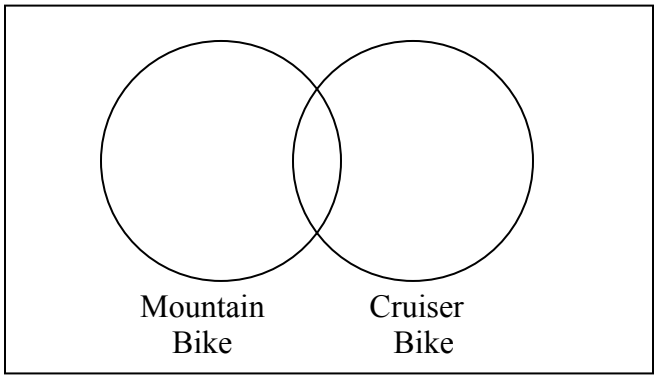
Strand 24.B Classification and Logical Reasoning

A bike store surveyed customers about their favorite type of bike to ride. Customers could choose either mountain bikes or cruiser bikes. The store reported whether their customers liked mountain bikes, cruiser bikes or both. Forty-five customers participated in the survey.

28 people liked cruisers
26 people liked mountain bikes
9 people liked both mountain bikes and cruiser bikes

Complete the Venn diagram to help you solve the problem.

Bike Survey Results



How many customers liked only cruiser bikes?

Answer_____

How many customers liked only mountain bikes?

Answer_____

ALGEBRAIC REASONING: PATTERNS AND FUNCTIONS

Strand 25 Mathematical Applications

A local car dealership sold a total of 1,320 cars last year. Complete the table below that shows the amount of cars the dealership could have sold each month assuming that the dealership:

- sold exactly 210 cars in January and exactly 200 cars in February;
- sold at least 40 cars in every other month;
- did not sell more than 250 cars in any month during the year; and
- sold the most cars in August.

Monthly Car Sales

Month	Total Sales
March	
April	
May	
June	
July	
August	
September	
October	
November	
December	

The car dealership made a profit of $450 for every car sold. Using the total sales from the chart above, calculate the profit of the dealership during November and December.

Show how you determined your answer in the space provided below.

Answer_____

Connecticut Mastery Test – Fourth Generation
Mathematics Grade 6 Vocabulary List

About
Accurate
Add
All together
A.M.
Angle (s)
Answer
Area
Array
Arrange
Arrived at (as in determined)
Arrow
At least
Average
Axis
Bar graph
Between
Capacity
Cardinal numbers
Celsius degree
Centimeter
Change (as in money)
Chart
Circle
Circle graph
Classify
Clock (analog and digital)
Closest to
Column (s)
Combine
Combination
Common attribute
Compare
Conclusion
Congruent
Coordinates
Cube
Cup
Cylinder
Data
Day
Days of the week
Decimal
Denominator
Depth
Describe
Design
Determined
Diagram
Different
Difference
Digit
Divide
Elapsed time
Equal
Equation
Equilateral
Equilateral triangle
Equivalent
Estimate
Event
Exactly
Explain
Expression
Factor
Fahrenheit degrees
Fair
Farthest
Fewer, fewest
Fewer than
Figure (as in geometric figure)
Foot
Fraction
Fractional Part
Gallon
Grams
Graph
Greatest
Grid (dot paper)
Grouped
Growing patterns
Half
Half-Inch
Height (s)
Hexagon
Highest
Hour
How many more
How many less
Hundred (s)
Improper fraction
Inch
In common
Integers
Interval
Kilogram
Kilometer
Larger/larger than
Least
Least likely
Length
Less
Less than
Likely
Line graph
Line of Symmetry
Line Plot
Line segment
Liter
Locate (d)
Long, longer, longest
Lowest
Mass
Mathematical thinking
Mean
Measure
Median
Meter
Mile
Milligram
Milliliter
Minute
Missing
Mixed number
Mode
Month
More
More than
Most
Most likely
Multiple
Multiply
Nearest
No less
No more than
Number fact
Number line
Number sentence
Numerator
Odd number
Ones
Open Sentence
Operation
Order (numbers)
Ordinal numbers (first, second…)
Ordered Pairs
Ounce
Parallel
Parallelogram
Pattern
Pentagon
Percent
Perimeter
Pictograph
Pint
P.M.
Point (on a number line)
Polygon
Possible
Pound
Predict
Probability
Product
Quadrilateral
Quart
Quarter
Reasonable
Rectangle, rectangular
Rectangular prism
Reflection
Rename
Repeating patterns
Replaced
Represents
Ring (draw a ring around)
Rounding, rounded
Row (s)
Same/ the same as
Scale (graphs)
Schedule
Second
Segment
Set
Shaded
Shape
Short, shorter, shortest
Side (s)
Size
Smaller/ smaller than
Solve
Solution
Sort
Sphere
Spinner
Square
Square centimeter
Square foot
Square inch
Square unit
Square yard
Stem-and-leaf plot
Story problem
Subtract
Sum
Symbol
Symmetry
Table
Tall, taller, tallest
Tens
Thousands
Ton
Transformation
Translation
Trapezoid
Trend
Triangle
Unit
Unshaded
Value
Venn diagram
Volume
Week
Weight
Width
Yard
Year

This list, while not exhaustive, includes vocabulary with which all teachers and students should be familiar. **Bold** words may be new vocabulary that should be used at this grade level.

Part V: Grade 7

- Test Blueprint
- Test Content
- Sample Items
- Vocabulary List

Connecticut Mastery Test – Fourth Generation

Mathematics Grade 7 Test Blueprint

Content Standards and Strands	# of multiple-choice items	# of open-ended items	# of grid-in items
Numerical and Proportional Reasoning			
1. Place Value	6		
2. Pictorial Representations of Numbers	4	2	
3. Equivalent Fractions, Decimals and Percents	4		
4. Order, Magnitude and Rounding of Numbers	6	2	
5. Models for Operations	2	2	
6. Basic Facts	NT	NT	NT
7. Computation with Whole Numbers and Decimals			6
8. Computation with Fractions and Integers	6		
9. Solve Word Problems	2	2	2
10. Numerical Estimation Strategies	4		
11. Estimating Solutions to Problems	2	4	
12. Ratios and Proportions	4		
13. Computation with Percents			4
Geometry and Measurement			
14. Time	NT	NT	NT
15. Approximating Measures	6		
16. Customary and Metric Measures	3	1	3
17. Geometric Shapes and Properties	4	2	
18. Spatial Relationships	3	3	
Working with Data: Probability and Statistics			
19. Tables, Graphs and Charts	2	2	
20. Statistics and Data Analysis	2	1	2
21. Probability	2	2	
Algebraic Reasoning: Patterns and Functions			
22. Patterns	2	2	
23. Algebraic Concepts	4	2	2
24. Classification and Logical Reasoning	2	2	
Integrated Understandings			
25. Mathematical Applications		3	
TOTAL	70	32	19

* NT = Strand not tested at this grade level.

Connecticut Mastery Test – Fourth Generation

Mathematics Grade 7 Content

Strand	Grade 7 Concepts/Skills Assessed
1. Place Value	A. Solve problems involving 0.1 MORE/LESS or 0.01 MORE/LESS than a given number. B. Identify alternative forms of expressing whole numbers and decimals using expanded notation. C. Identify alternative forms of expressing numbers using scientific notation.
2. Pictorial Representation of Numbers	A. Relate fractions, mixed numbers, decimals and percents to their pictorial representations and vice versa. B. Identify and/or shade fractional parts of regions or sets, decimals and mixed numbers in pictures.
3. Equivalent Fractions, Decimals and Percents	A. Rename fractions and mixed numbers as equivalent decimals and vice versa. B. Rename fractions and decimals (up to 1.00) as equivalent percents and vice versa.
4. Order, Magnitude and Rounding of Numbers	A. Order whole numbers and decimals. B. Order fractions and decimals including mixed numbers in context. C. Describe magnitude of whole numbers and decimals in and out of context. D. Describe magnitude or order of fractions and mixed numbers in context. E. Round whole numbers, fractions and decimals in context. F. Locate points on number lines and scales, including fractions, mixed numbers, decimals and integers.
5. Models for Operations	A. Identify the appropriate operation or equation to solve a story problem. B. Write a story problem from an equation.
6. Basic Facts	Not tested
7. Computation with Whole Numbers and Decimals	A. Add and subtract 2-, 3- and 4-digit whole numbers, money amounts and decimals. B. Multiply and divide 2- and 3-digit whole numbers, money amounts and decimals by 1-digit numbers and decimals (multiply only). C. Multiply and divide whole numbers and decimals by 10, 100 and 1,000.
8. Computation with Fractions and Integers	A. Add and subtract fractions and mixed numbers with reasonable and appropriate denominators. B. Multiply whole numbers and fractions by fractions and mixed numbers. C. Add positive and negative integers (range -20 to 20).
9. Solve Word Problems	A. Solve one-step story problems involving whole numbers, fractions, decimals and money amounts with or without extraneous information. B. Solve multistep problems involving fractions and mixed numbers with or without extraneous information. C. Solve multistep problems involving whole numbers, decimals, money amounts and mixed numbers, including means. D. Solve multistep problems involving whole numbers, decimals or money amounts, and explain how the solution was determined.
10. Numerical Estimation Strategies	A. Identify the best expression to find an estimate. B. Identify whether and why a particular strategy will result in an overestimate or an underestimate.

Strand	Grade 7 Concepts/Skills Assessed
11. Estimating Solutions to Problems	A. Identify a reasonable estimate to a problem. B. Determine a reasonable estimate, and describe the strategy used to arrive at the estimate. C. Given an estimate as a solution, judge its reasonableness and justify the decision.
12. Ratios and Proportions	A. Solve problems involving ratios. B. Solve 1-step problems involving proportions in context.
13. Computation with Percents	A. Find percents of whole numbers or the percent a given number is of another number. B. Solve 1-step problems involving percents in context.
14. Time	Not tested
15. Approximating Measures	A. Estimate lengths, areas and angle measures.
16. Customary and Metric Measures	A. Measure and determine perimeters, areas and volumes. Explain or show how the solution was determined. B. Determine perimeters, areas and volumes. C. Identify appropriate customary or metric units of measure for a given situation. D. Solve problems involving conversions of customary or metric units of measure. E. Solve problems involving conversions of time units.
17. Geometric Shapes and Properties	A. Identify, describe or classify 2- and 3-dimensional geometric shapes and figures. B. Draw, describe and classify 2- dimensional geometric shapes and figures.
18. Spatial Relationships	A. Identify lines of symmetry. B. Draw lines of symmetry. C. Identify congruent and similar figures. D. Identify and explain congruent or similar figures. E. Locate and draw points on grids. F. Identify geometric transformations (reflections, rotations and translations). G. Draw geometric transformations (reflections and rotations). H. Relate 2- and 3-dimensional representations and visa versa.
19. Tables, Graphs and Charts	A. Identify correct information from tables, graphs and charts. B. Create bar graphs, line graphs and stem-and-leaf plots from data in tables and charts.
20. Statistics and Data Analysis	A. Draw reasonable conclusions from data in tables, graphs and charts. B. State a conclusion and explain why an answer is or is not reasonable based on the data. C. Solve problems involving means, medians, modes and ranges of sets of data.
21. Probability	A. Identify correct solutions to problems involving elementary notions of probability and fairness expressed as fractions, decimals or percents. B. Solve problems involving elementary notions of probability and fairness expressed as fractions, decimals or percents and justify solutions. C. Solve problems involving expected outcomes or predictions and justify solutions.
22. Patterns	A. Identify the missing terms in a pattern, or identify rules for a given pattern using numbers and attributes. B. Extend or complete patterns and state rules for given patterns using numbers and attributes.

Strand	Grade 7 Concepts/Skills Assessed
23. Algebraic Concepts	A. Solve simple 1- or 2-step algebraic equations. B. Use order of operations. C. Evaluate expressions or solve equations and use formulas. D. Represent situations with algebraic expressions. E. Write an expression to represent a situation.
24. Classification and Logical Reasoning	A. Solve problems involving the organization of data. B. Sort or classify objects, and draw logical conclusions from data including Venn diagrams, combinations, permutations and transitive reasoning questions.
25. Mathematical Applications	A. Solve extended numerical, statistical and spatial problems.

Connecticut Mastery Test – Fourth Generation
Mathematics Grade 7 Sample Items

NUMERICAL AND PROPORTIONAL REASONING

4.D Order, Magnitude and Rounding of Numbers

The table below show the numbers of packages sent to a shipping company over a five-day period.

Shipping Log

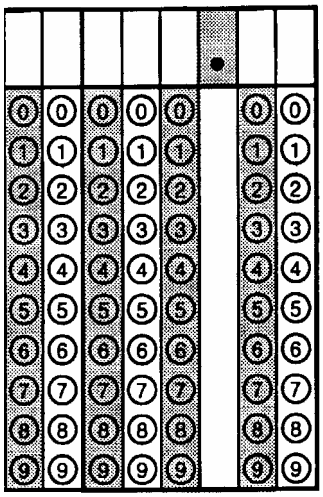
Day	Number of Packages
Monday	324,883
Tuesday	413,443
Wednesday	403,132
Thursday	314,590
Friday	423,062

Which day had a **greater** number of packages sent than Tuesday?

- ○ Monday
- ○ Wednesday
- ○ Thursday
- ⊙ Friday

7.C Computation with Whole Numbers and Decimals

1894 ÷ 100 =



9.D Solve Word Problems

Matt worked in a library and earned $5.40 per hour. He usually earns $324 per month. However, last month he worked 30 minutes extra on 20 days.
How much **more** did he earn last month? _____

Show your work or explain how you found your answer.

_____
_____
_____
_____
_____
_____
_____
_____

10.B Numerical Estimation Strategies

To estimate the sum of $2.95 and $17.93, Mason added $3 + $18. Would Mason's estimate be more or less than the actual sum?

⊙ MORE, because Mason rounded both numbers up

○ MORE, because Mason rounded both numbers down

○ LESS, because Mason rounded both numbers up

○ LESS, because Mason rounded both numbers down

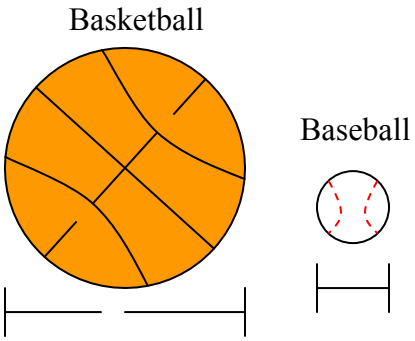
11.B Estimating Solutions to Problems

Javier sold 583 spirit flags for the homecoming game. Each flag sold for $2.75. Javier predicted that he made a little less than $1800 selling spirit flags. Explain how Javier can use **estimation** to decide if his prediction was **reasonable.**

GEOMETRY AND MEASUREMENT

15.A Approximating measures

Look at the baseball and basketball below.

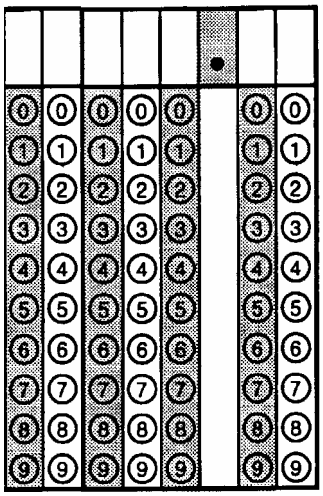


The diameter of the baseball is 7 centimeters. Which is the **best** approximation of the **diameter**, in centimeters, of the basketball?

- ○ 14
- ◉ 21
- ○ 28
- ○ 35

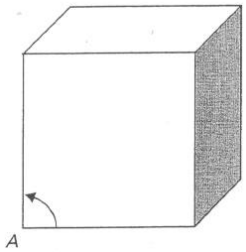
16.D Customary and Metric Measures

Karen filled a pitcher with 1800 milliliters of water. How many liters is that?



17.A Geometric Shapes and Properties

Identify the type of angle indicated below.



- ◉ Right angle
- ○ Isosceles angle
- ○ Acute angle
- ○ Obtuse angle

WORKING WITH DATA: PROBABILITY AND STATISTICS

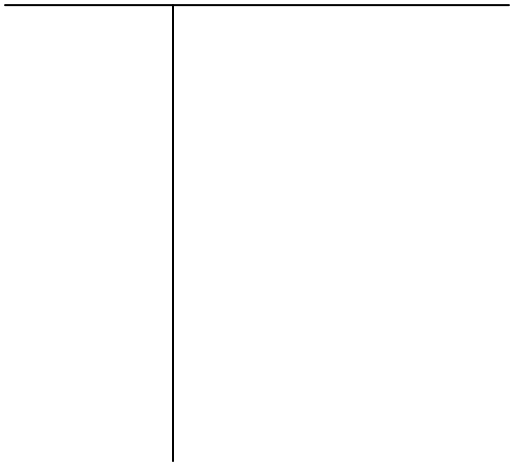
19.B Tables, Graphs and Charts

The table below shows the prices of new bicycle tires.

Bicycle Tire Prices (in dollars)					
39	43	23	34	33	42
29	32	45	34	37	38

Complete the **stem-and-leaf** plot to show the same information.

Bicycle Tire Prices



20.C Statistics and Data Analysis

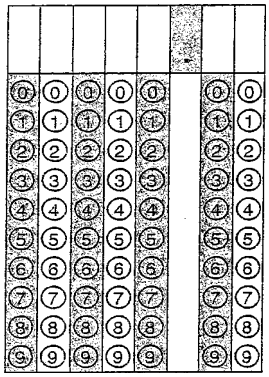
This **stem-and-leaf** plot shows the number of scooters sold for several months.

Scooters Sold

0	3 3 5 7
1	4 8 9 9
2	0 0 1 3 4 4 7 7 8 8 8 9
3	2 2 3 4 7 7 8
4	5 6 6

1 | 9 represents 19 scooters

Which number is the **mode** in this plot?



21.A Probability

There were 2 blue beads and 3 yellow beads in a bag. Jill took out a bead without looking and then put it back in the bag. She then took out another bead without looking. What is the probability that Jill picked a yellow bead both times?

- ○ $\frac{2}{5}$
- ○ $\frac{4}{25}$
- ○ $\frac{3}{5}$
- ⊙ $\frac{9}{25}$

ALGEBRAIC REASONING: PATTERNS AND FUNCTIONS

22.B Patterns

The numbers below follow a pattern.

15, 32, 49, 66, ?

What is the next term in the pattern?

Answer _____

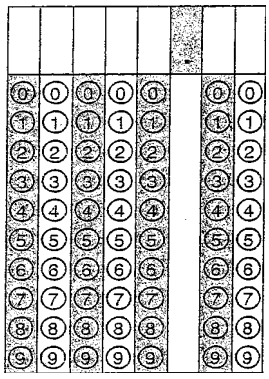
Show your work or explain how you determined your answer.

_____
_____
_____
_____
_____
_____
_____

23.A Algebraic Concepts

What value of *x* makes this equation true?

$92 = 2x$



23.B Algebraic Concepts

$54 - 36 \div 9 =$

- ⊙ 50
- ○ 18
- ○ 4
- ○ 2

24.A Classification and Logical Reasoning

Samantha, Joe and Carl were the only three runners in a race.They each finished the race at different times. In how many different ways can first and second place ribbons be awarded to these three runners?

- ○ 2
- ○ 4
- ⊙ 6
- ○ 12

INTEGRATED UNDERSTANDINGS

25 Mathematical Applications

Emma has volunteered to help raise money for the local library by running laps in a jog-a-thon. She plans to gather pledges from her friends and neighbors for the event, which will take place at the high school track. Here is what Emma knows:

- She gathered pledges from 10 people.
- Each of the 10 people pledged between $0.50 and $1 for each lap.
- For each lap she runs, she receives the amount of money pledged by all 10 people.
- She hopes to raise a total of about $200.

If Emma wants to raise a total of **about** $200, what is a **reasonable** estimate for the number of laps Emma will need to run? _____

Show your work or explain how you arrived at your estimated answer.

_____
_____
_____
_____
_____
_____
_____
_____
_____

Connecticut Mastery Test – Fourth Generation
Mathematics Grade 7 Vocabulary List

About
Accurate
Acute angle
Add
All together
A.M.
Angle (s)
Answer
Approximate
Arc
Area
Array
Arranged
Arrived at (as in determined)
Arrow
At least
Average
Axis
Bar graph
Between
Categories
Capacity
Celsius degree
Centimeter
Chance
Change (as in money)
Chart
Chord
Circle
Circle graph
Classify
Clock (analog and digital)
Closest to
Column (s)
Combine
Combination
Common attribute
Compare
Conclusion
Cone
Congruent
Coordinates
Coordinate grid
Cube
Cup
Cylinder
Data
Day
Days of the week
Decimal
Degree (s)
Denominator
Depth
Describe
Design
Determined
Diagram
Diameter
Different
Digit
Divide
Double Bar Graph
Double Line Graph
Dozen
Elapsed time
Equal
Equation
Equilateral
Equilateral triangle
Equivalent
Estimate
Exactly
Explain
Exponents (positive & negative)
Expression
Evaluate
Event
Factor
Fahrenheit degrees
Fair
Farthest
Fewer, fewest
Fewer than
Figure (as in geometric figure)
Foot
Formulas
Fraction
Fractional part
Gallon
Geometric solid
Grams
Graph
Greatest
Grid (dot paper and coordinate)
Group
Grouped
Growing patterns
Half
Half-Inch
Height (s)
Hexagon
Highest
Hour
How many more/less
Hundred (s)
Hundredth
Improper fraction
Inch
In common
Input
Integers
Intersect
Intersection
Interval
Isosceles triangle
Kilogram
Kilometer
Larger/larger than
Least
Least likely
Length
Less
Less than
Likely
Line graph
Line of symmetry
Line plot
Line segment
Liter
Locate (d)
Long, longer, longest
Lowest
Mass
Mathematical thinking
Maximum
Mean
Measure
Measurement
Median
Meter
Mile
Milligram
Milliliter
Millimeter
Minimum
Minute
Missing
Mixed number
Mode
Month
More than
Most
Most likely
Multiple
Multiply
Nearest
No less than
No more than
Number fact
Number line
Number sentence
Numerator
Obtuse angle
Octagon
Odd number
One-dimensional
Ones
Open sentence
Operation
Order of Operations
Order (numbers)
Ordinal words (first, second, etc.
Ordered pairs
Ounce
Outlier
Output
Parallel
Parallelogram
Pattern
Pentagon
Percent
Perimeter

This list, while not exhaustive, includes vocabulary with which all teachers and students should be familiar.
Bold words may be new vocabulary that should be used at this grade level.

Mathematics Grade 7 Vocabulary List (Continued)

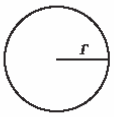
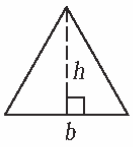
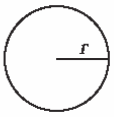
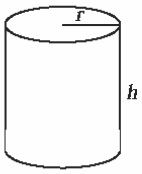
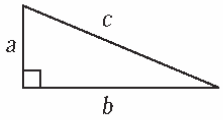
Perpendicular
Pictograph
Pint
P.M.
Point (on a graph)
Point (on a number line)
Polygon
Possible
Pound
Predict
Probability
Product
Proportion
Pyramid
Quadrilateral
Quart
Quarter
Quotient
Radius
Range
Ratio
Reasonable
Rectangle
Rectangular prism
Reflection
Regular polygon
Rename
Repeating patterns
Replaced
Represents
Rhombus
Right angle
Right triangle
Ring (draw a ring around)
Rotation (including clockwise and counterclockwise
Rounded, rounding
Row (s)
Same/ the same as
Scale
Scalene triangle
Scientific notation
Schedule
Second
Segment
Set
Shaded
Shape
Short, shorter, shortest
Side (s)
Size
Similar
Smaller/smaller than
Solve/Solution
Sort
Sphere
Spinner
Square
Square centimeter
Square foot
Square inch
Square meter
Square unit
Square yard
Stem-and-Leaf plot
Story problem
Subtract
Sum
Symbol
Symmetry
Table
Tall, taller, tallest
Temperature
Tens
Tenth (s)
Term (in a pattern)
Thousands
Three-dimensional
Ton
Transformation
Translation
Trapezoid
Trend
Triangle
Two-dimensional
Unit (using dot paper, base 10 blocks, and measurement)
Unreasonable
Unshaded
Value
Venn diagram
Vertical axis
Volume
Week
Weight
Width
X-axis
Y-axis
Yard
Year

This list, while not exhaustive, includes vocabulary with which all teachers and students should be familiar.
Bold words may be new vocabulary that should be used at this grade level.

Part VI: Grade 8

- Formula Chart
- Test Blueprint
- Test Content
- Sample Items
- Vocabulary List

CMT Formula Chart

Circumference	circle	$C = 2\pi r$	
	pi = π	Use 3.14 OR $\frac{22}{7}$	
Area	triangle	$A = \frac{1}{2}bh$	
	circle	$A = \pi r^2$	
Volume	cylinder	$V = \pi r^2 h$	
Pythagorean Theorem	right triangle	$a^2 + b^2 = c^2$	

Measurement Conversion

Customary Length	1 mile = 5,280 feet
Customary Volume	1 gallon = 4 quarts 1 quart = 2 pints 1 pint = 2 cups 1 cup = 8 ounces
Customary Weight and Mass	1 ton = 2,000 pounds 1 pound = 16 ounces
Time	1 year = 365 days 1 year = 52 weeks

Connecticut Mastery Test – Fourth Generation

Mathematics Grade 8 Test Blueprint

Content Standards and Strands	# of multiple-choice items	# of open-ended items	# of grid-in items
Numerical and Proportional Reasoning			
1. Place Value	**4**		
2. Pictorial Representations of Numbers	**NT**	**NT**	**NT**
3. Equivalent Fractions, Decimals and Percents	**4**	**2**	
4. Order, Magnitude and Rounding of Numbers	**4**	**2**	
5. Models for Operations	**2**	**2**	
6. Basic Facts	**NT**	**NT**	**NT**
7. Computation with Whole Numbers and Decimals			**6**
8. Computation with Fractions and Integers	**6**		
9. Solve Word Problems	**2**	**2**	**2**
10. Numerical Estimation Strategies	**NT**	**NT**	**NT**
11. Estimating Solutions to Problems		**4**	
12. Ratios and Proportions	**4**	**2**	
13. Computation with Percents			**6**
Geometry and Measurement			
14. Time	**NT**	**NT**	**NT**
15. Approximating Measures	**4**		**2**
16. Customary and Metric Measures	**2**	**2**	**2**
17. Geometric Shapes and Properties	**4**	**2**	
18. Spatial Relationships	**7**	**4**	
Working with Data: Probability and Statistics			
19. Tables, Graphs and Charts	**2**	**2**	
20. Statistics and Data Analysis	**4**	**1**	**2**
21. Probability	**2**	**2**	
Algebraic Reasoning: Patterns and Functions			
22. Patterns	**2**	**2**	
23. Algebraic Concepts	**4**	**3**	**2**
24. Classification and Logical Reasoning	**2**	**2**	
Integrated Understandings			
25. Mathematical Applications		**3**	
TOTAL	**59**	**37**	**22**

* NT = Strand not tested at this grade level

Connecticut Mastery Test – Fourth Generation
Mathematics Grade 8 Content

Strand	Grade 8 Concepts/Skills Assessed
1. Place Value	A. Identify alternative forms of expressing numbers using scientific notation.
2. Pictorial Representation of Numbers	Not tested
3. Equivalent Fractions, Decimals and Percents	A. Rename fractions and mixed numbers as equivalent decimals and vice versa. B. Rename fractions and decimals as equivalent percents and vice versa. C. Identify and/or shade decimals, fractions or percents of regions or sets.
4. Order, Magnitude and Rounding of Numbers	A. Order fractions and decimals including mixed numbers in context. B. Describe magnitude or order of mixed numbers, fractions and decimals in context. C. Round mixed numbers, fractions and decimals in context. D. Locate points on number lines and scales, including fractions, mixed numbers, decimals and integers.
5. Models for Operations	A. Identify the appropriate operation or equation to solve a story problem. B. Write a story problem from an equation.
6. Basic Facts	Not tested
7. Computation with Whole Numbers and Decimals	A. Add and subtract 3-, 4- and 5-digit whole numbers, money amounts and decimals. B. Multiply 2- and 3-digit whole numbers, money amounts and decimals by 1- or 2-digit numbers and decimals. Divide 2- and 3- digit whole numbers, money amounts and decimals by 1-digit whole numbers and decimals. C. Multiply and divide whole numbers and decimals by 10, 100, 1,000, 0.1 and 0.01.
8. Computation with Fractions and Integers	A. Add and subtract fractions and mixed numbers with reasonable and appropriate denominators. B. Multiply whole numbers and fractions by fractions and mixed numbers. C. Add or multiply positive and negative integers.
9. Solve Word Problems	A. Solve multistep problems involving fractions, mixed numbers, decimals and money amounts with or without extraneous information. B. Solve multistep problems involving whole numbers, mixed numbers, money amounts and decimals. C. Solve multistep problems involving whole numbers, fractions, mixed numbers, decimals or money amounts, and explain how the solution was determined.
10. Numerical Estimation Strategies	Not tested
11. Estimating Solutions to Problems	A. Determine a reasonable estimate, and describe the strategy used to arrive at the estimate. B. Given an estimate as a solution for problems involving whole numbers, mixed numbers, decimals and percents, judge its reasonableness and justify the decision.
12. Ratios and Proportions	A. Solve problems involving ratios. B. Solve problems involving proportions in context. C. Solve multistep problems involving ratio or proportion, and explain how the solution was determined.
13. Computation with Percents	A. Find percents of whole numbers or the percent a given number is of another number. B. Solve problems involving percents in context.
14. Time	Not tested

Strand	Grade 8 Concepts/Skills Assessed
15. Approximating Measures	A. Estimate lengths, areas, volumes and angle measures.
16. Customary and Metric Measures	A. Measure and determine perimeters, areas and volumes. Explain or show how the solution was determined. B. Determine perimeters, areas and volumes. C. Solve problems involving conversions and/or operations within customary or metric units of measure.
17. Geometric Shapes and Properties	A. Identify, describe and classify 2- and 3-dimensional geometric shapes and figures. B. Draw, describe and classify 2- and 3-dimensional geometric shapes and figures.
18. Spatial Relationships	A. Identify congruent and similar figures. B. Draw, classify, describe and/ or explain why figures are similar. C. Locate and draw points on four-quadrant coordinate grids. D. Identify geometric transformations (reflections, rotations and translations). E. Draw geometric transformations (reflections, rotations and translations). F. Relate 2- and 3-dimensional representations and vice versa.
19. Tables, Graphs and Charts	A. Identify correct information from tables, graphs and charts. B. Create graphs from data in tables and charts.
20. Statistics and Data Analysis	A. Draw reasonable conclusions from data in tables, graphs and charts. B. State a conclusion and explain why an answer is or is not reasonable based on the data. C. Solve problems involving means, medians, modes and ranges of sets of data.
21. Probability	A. Identify correct solutions to problems involving elementary notions of probability and fairness expressed as fractions, decimals or percents. B. Solve problems involving elementary notions of probability and fairness expressed as fractions, decimals or percents and justify solutions. C. Solve problems involving expected outcomes or predictions and justify solutions.
22. Patterns	A. Identify the missing terms in a pattern, or identify rules for a given pattern using numbers and attributes. B. Extend or complete patterns and state rules for given patterns using numbers and attributes.
23. Algebraic Concepts	A. Solve simple equations, including 2-step equations. B. Solve multistep problems using algebraic concepts. C. Evaluate expressions or solve equations and use formulas. D. Represent situations with algebraic expressions or equations. E. Write an expression or equation to represent a situation.
24. Classification and Logical Reasoning	A. Solve problems involving the organization of data. B. Sort or classify objects, and draw logical conclusions from data including Venn diagrams, combinations, permutations and transitive reasoning questions.
25. Mathematical Applications	A. Solve extended numerical, statistical and spatial problems.

Connecticut Mastery Test – Fourth Generation
Mathematics Grade 8 Sample Items

NUMERICAL AND PROPORTIONAL REASONING

1.A Place Value

Which number is equal to 3.02×10^4 ?

- ○ 0.000302
- ○ 0.0302
- ⊙ 30,200
- ○ 3,020,000

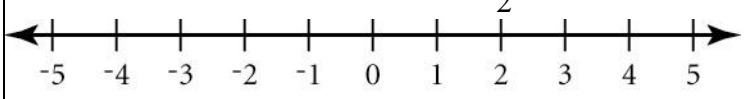
3.B Equivalent Fractions, Decimals and Percents

At a school bake sale, $\frac{2}{5}$ of the number of pies sold were apple pies. Which percent is equal to $\frac{2}{5}$?

- ○ 10%
- ○ 20%
- ⊙ 40%
- ○ 60%

4.D Order, Magnitude and Rounding of Numbers

Mark an X on the number line at $-\frac{1}{2}$.



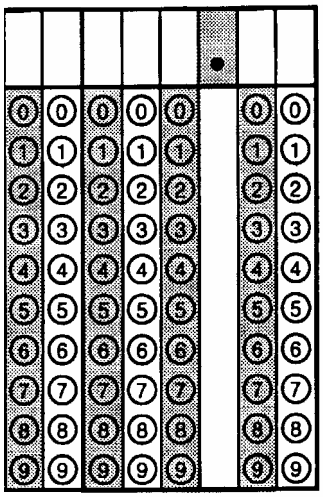
5.B Models for Operations

Write a story problem that can be solved using the following equation.

$$7.20 + 25.35 = y$$

7.A Computation with Whole Numbers and Decimals

5,006.2 − 2,904.88 =



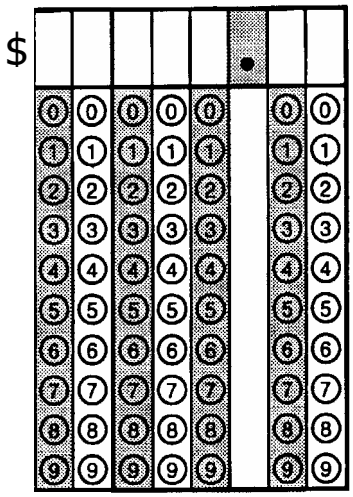
8.A Computation with Fractions and Integers

$$2\frac{1}{6} + 1\frac{3}{5} =$$

- ⊙ $3\frac{23}{30}$
- ○ $3\frac{18}{30}$
- ○ $3\frac{4}{30}$
- ○ $3\frac{4}{11}$

9.B Solve Word Problems

Kwan went shopping for new clothes. He bought 2 shirts for $18.95 each and 3 pairs of shorts for $15.50 each. If he gave the cashier $100, how much change should he get back?



11.A Estimating Solutions to Problems

During the school year, Murphy received scores of 87, 93, 81, 98 and 92 on his English papers. He added the scores together to determine his total score.

What is a reasonable **estimate** of Murphy's total score?

Answer _____

Show or explain how you made your **estimate**.

_____
_____
_____
_____
_____

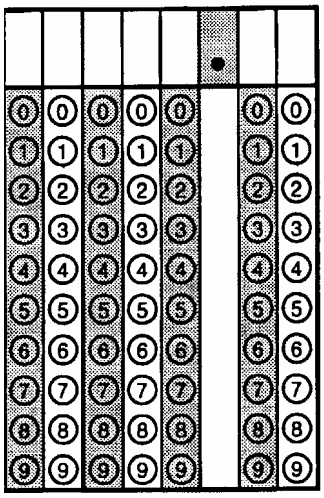
12.B Ratios and Proportions

The ratio of pitchers to catchers at a baseball camp was 11:4. If there were 64 catchers, how many pitchers were at the camp?

- ○ 44
- ○ 64
- ⊙ 176
- ○ 256

13.A Computation with Percents

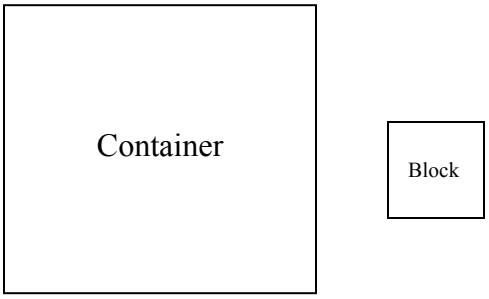
What is 76% of 56?



GEOMETRY AND MEASUREMENT

15.A Approximating Measures

The large square below is the base of a container. The small square is the base of a block.



Pablo filled the container evenly to the top with blocks stacked 4 high. Which is the **best** approximation for the number of blocks needed to fill the container evenly?

- ○ 9
- ○ 16
- ⊙ 36
- ○ 64

16.A Customary and Metric Measures

Eli's car weighs 3,350 pounds. How many **tons** does the car weigh?

- ○ 0.1675
- ○ 0.675
- ⊙ 1.675
- ○ 16.75

17.B Geometric Shapes and Properties

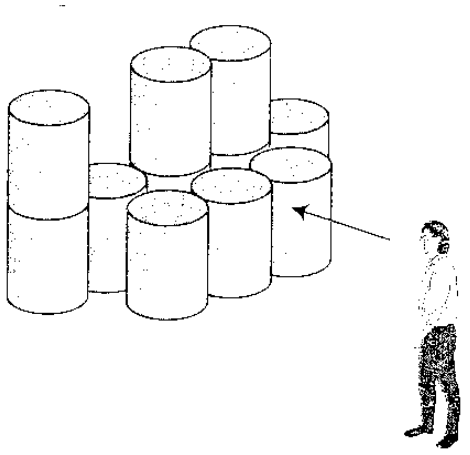
Jorge drew a quadrilateral with all equal sides but with **no** right angles. In the space below, draw the shape.

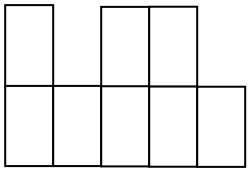
What is another geometric name for the quadrilateral you drew?

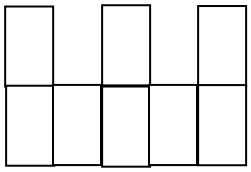
Answer _____

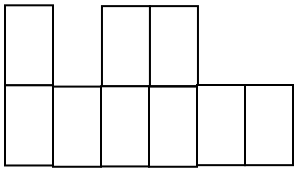
18.F Spatial Relationships

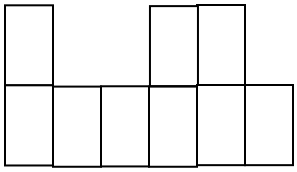
What view of the barrels is seen by the person in the picture?



⊙ 

○ 

○ 

○ 

WORKING WITH DATA: PROBABILITY AND STATISTICS

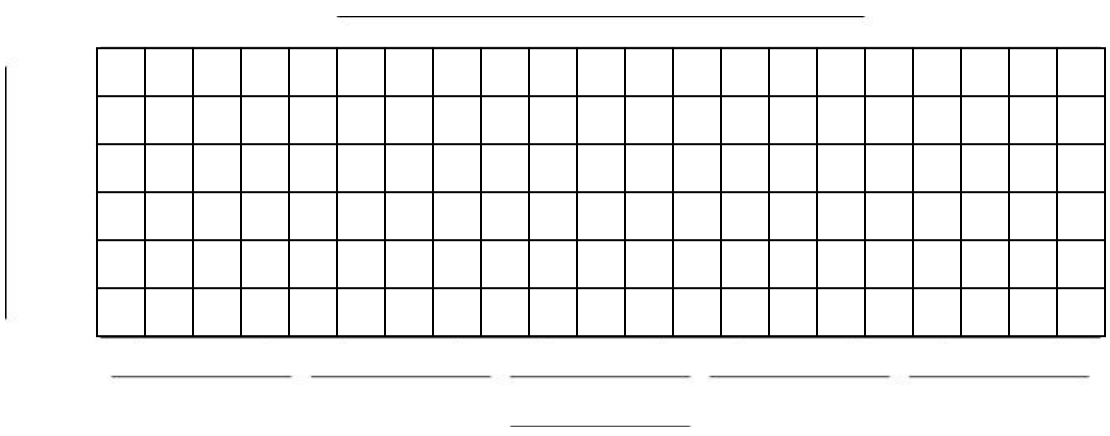
19.B Tables, Graphs and Charts

The table shows the heights of 5 basketball players.

Heights of Basketball Players

Name	Height (in inches)
Harry	78
Fred	72
Mark	76
Justin	77
Kevin	77

Label and complete the **bar graph** to show the same information. Do **not** shade the bars.



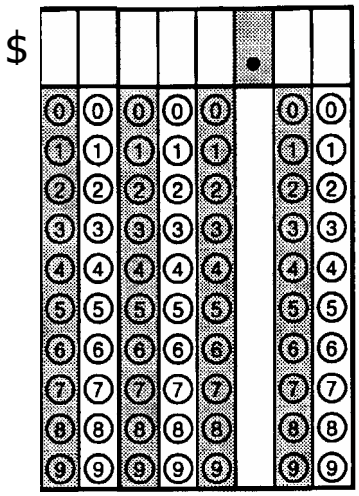
20.C Statistics and Data Analysis

Louis works at a supermarket. His earnings from his last four paychecks are shown below.

$187.53 $168.76

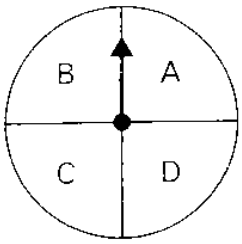
$205.64 $252.71

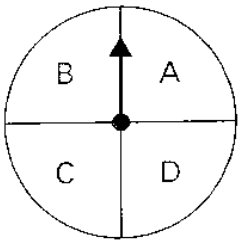
What is the **mean** of Louis' earnings from these four paychecks?



21.A Probability

The spinners below are each divided into 4 equal sections





If each spinner is spun once, what is the probability that the arrows will **both** land on A?

- ○ $\frac{1}{4}$
- ○ $\frac{2}{4}$
- ○ $\frac{2}{16}$
- ⊙ $\frac{1}{16}$

ALGEBRAIC REASONING: PATTERNS AND FUNCTIONS

22.B Patterns

The numbers below follow a pattern.

3, 7, 15, 31, 63, __?__ , 255

What number is missing from the pattern?

Answer _____

Show your work or explain how you determined your answer.

_____

_____

_____

_____

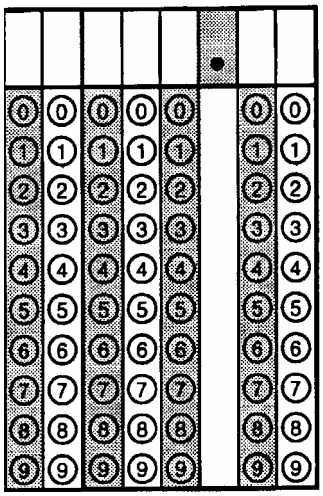
_____

_____

23.A Algebraic Concepts

What is the value of x in this equation?

$$2x - 4.01 = 7.13$$



24.B Classification and Logical Reasoning

Mrs. Donovan has 3 children. The sum of their ages is 14. The product of their ages is 36. The oldest is **more** than 2 times the age of the child in the middle.

What are the ages of each of Mrs. Donovan's children?

Answer _____, _____, and _____

Show your work or explain how you determined your answer.

INTEGRATED UNDERSTANDINGS

25 Mathematical Applications

Norma made quilts and sold them at a craft show. The cost of fabric for each quilt was $13.55. She sold each quilt for $35. The number of quilts that Norma sold is represented by n.

Write an expression that represents the amount of money Norma made as profit if she sold n quilts.

Answer _____

Norma wants to make a total profit of $200. What is the **least** number of quilts she must sell?

Answer _____

Show your work or explain how you determined your answer.

Connecticut Mastery Test – Fourth Generation
Mathematics Grade 8 Vocabulary List

About
Accurate
Acute angle
Add
Algebraic term
All together
A.M.
Angle (s)
Answer
Approximate
Arc
Area
Array
Arranged
Arrived at (as in determined)
Arrow
At least
Average
Axis
Bar graph
Between _ and _
Categories
Capacity
Celsius degree
Centimeter
Chance
Change (as in money)
Chart
Chord
Circle
Circle graph
Circular face
Classify
Clock (analog and digital)
Closest to
Column (s)
Combine
Combination
Common attribute
Compare
Complementary angles
Conclusion
Cone
Congruent
Coordinates
Coordinate grid
Cube
Cubic (feet, meters, etc)
Cubic millimeter
Cup
Cylinder
Data
Day
Days of the week
Decimal
Degree (s)
Denominator
Density
Depth
Describe
Design
Determined
Diagram
Diameter
Different
Digit
Divide
Double Bar Graph
Double Line Graph
Dozen
Edge
Elapsed time
Elliptical base
Equal
Equation
Equilateral
Equilateral triangle
Equivalent
Estimate
Exactly
Explain
Exponents (positive & Negative)
Expression
Evaluate
Event
Exponent
Face
Factor
Fahrenheit Degrees
Fair
Farthest
Fewer, fewest
Fewer than
Figure (as in geometric figure)
Foot
Formulas
Fraction
Fractional part
Frequency table
Gallon
Geometric solid
Grams
Graph
Greatest
Grid (coordinate and dot paper)
Group
Grouped
Growing patterns
Half
Half-Inch
Height (s)
Hexagon
Highest
Hour
How many more
How many less
Hundred (s)
Hundredth
Improper fraction
Inch
In common
Input
Integers
Intersect (ion)
Interval
Irregular
Isosceles triangle
Kilogram
Kilometer
Larger/larger than
Least
Least Likely
Length
Less
Less than
Likely
Line of best fit
Line graph
Line of symmetry
Line plot
Line segment
Liter
Locate (d)
Long, longer, longest
Lowest
Mass
Mathematical thinking
Maximum
Mean
Measure
Measurement
Median
Meter
Midpoint
Mile
Milligram
Milliliter
Millimeter
Minimum
Minute
Missing
Mixed number
Mode
Month
More
More than
Most
Most likely
Multiple
Multiply
Nearest
Net (flat pattern)
No less
No more than
Number fact
Number line
Number sentence
Numerator
Obtuse angle
Obtuse triangle
Octagon
Odd number
One-dimensional
Ones

Mathematics Grade 8 Vocabulary List (Continued)

Open sentence
Operation
Order of Operations
Order (numbers)
Ordinal numbers (first, second, etc)
Ordered pair
Ounce
Outlier
Output
Parallel
Parallelogram
Pattern
Pentagon
Percent (% of 100)
Perfect square
Perfect cube
Perimeter
Perpendicular
Pictograph
Pint
P.M.
Point (on a graph)
Point (on a number line)
Polygon
Possible
Pound
Predict
Probability
Product
Proportional
Pyramid
Pythagorean Theorem
Quadrilateral
Quart
Quarter
Quotient
Radii
Radius
Range
Ratio
Reasonable
Rectangle, rectangular
Rectangular prism
Reflection
Regular polygon
Rename
Repeating patterns
Replaced
Represents
Rhombus
Right angle
Right trapezoid
Right triangle
Ring (draw a ring around)
Rotation (including clockwise and counterclockwise)
Rounding, rounded
Row (s)
Same/ the same as
Scale
Scalene triangle
Scatter plot
Scientific notation
Schedule
Second
Segment
Set
Shaded
Shape
Short, shorter, shortest
Side (s)
Size
Similar
Smaller/smaller than
Solve/Solution
Sort
Sphere
Spinner
Square
Square centimeter
Square feet
Square inch
Square meter
Square number
Square unit
Square yard
Stem-and-Leaf plot
Story problem
Subtract
Sum
Surface area
Symbol
Symmetry
Table
Tall, taller, tallest
Temperature
Tens
Tenth (s)
Term (in a pattern)
Thousands
Three-dimensional
Ton
Transformation
Translation
Trapezoid
Trend
Triangle
Two-dimensional
Unit (using dot paper, base ten blocks, and measurement)
Unreasonable
Unshaded
Value
Venn diagram
Vertical axis
Vertices
Vertex
Volume
Week
Weight
Width
X-axis
Y-axis
Yard
Year

This list, while not exhaustive, includes vocabulary with which all teachers and students should be familiar. **Bold** words may be new vocabulary that should be used at this grade level.