Connecticut Mastery Test

Third Generation

Mathematics Handbook

Part 1

Connecticut State Board of Education — 1999

State of Connecticut

John G. Rowland, Governor

State Board of Education

Craig E. Toensing, Chairperson
Janet M. Finneran, Vice Chairperson
Amparo Adib-Samii
Beverly P. Greenberg
Michael Helfgott
Daniel G. Kruger
Terri L. Masters
Timothy J. McDonald
Danielle Robles
Allan B. Taylor
Annika L. Warren

Valerie F. Lewis (ex officio)
Acting Commissioner of Higher Education

Theodore S. Sergi
Commissioner of Education

Part I

Connecticut Mastery Test
Third Generation
Mathematics Handbook

CONTENTS

Foreword v
Introduction 1

Underlying Philosophy and Beliefs 2

PART I: The Third Generation Mathematics CMT 5

- Summary of Changes from Second to Third Generation 7
- Test Content and Blueprints 13
- Sample Items 33
  - Grade 4 35
  - Grade 6 49
  - Grade 8 67

PART II: Preparing Students for the Mathematics CMT 89

- General Instructional Strategies for Grades 1-7 91
- Questions and Answers About Preparing Students for the CMT 92
- CMT Mathematics Test-Taking Tips for Students 93
- Programmatic Shifts that Raise Student Achievement 94

PART III: Miscellaneous Resources 97

- Key Mathematics Vocabulary Expected for the CMT 99
- Test Blueprints for Off-Level Grades 3, 5 and 7 CMT 103
- Discipline-Based Professional Teaching Standards for Teachers of Mathematics 117

FOREWORD

This edition of the *Connecticut Mastery Test Third Generation Mathematics Handbook* has been developed to provide teachers and other educators with important information about the mathematics subtests on the new generation of Mastery Tests that will be launched in the fall of 2000.

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

- a summary of the changes being made in the content to be assessed and in test formats;
- detailed test blueprints, including the number and type of items and the specific skills and concepts that will be assessed at Grades 4, 6 and 8; and
- sample items for each skill and concept to be assessed.

In addition, this handbook contains an array of additional resources that teachers and administrators should find useful as they plan instruction and prepare students for the third generation of the Connecticut Mastery Test.

I urge you to carefully review the materials in this handbook, and I hope that it will help you to continue the ongoing process of improving mathematics programs in Connecticut's public schools.

A second publication, which includes instructional strategies designed to promote student learning in mathematics, will be printed in February.

Theodore S. Sergi
Commissioner of Education

INTRODUCTION

The Connecticut Mastery Test (CMT), Third Generation, **Mathematics Handbook** is designed 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 mathematical focuses of the CMT.

Like its first and second generation predecessors, the third generation of the Grades 4, 6 and 8 Mathematics CMT assesses student performance on a range of skills and concepts expected to be taught and mastered by the end of Grades 3, 5 and 7 respectively. The updated skills and concepts to be assessed on the third generation tests are representative of and aligned with the content and performance standards delineated in **Connecticut's K-12 Mathematics Curriculum Framework** (1998) and deemed important by the CMT Mathematics Advisory Committee.

This **CMT Mathematics Handbook** is designed to ensure closer links between what and how mathematics is taught in Connecticut schools and how that mathematics is assessed on the highly visible Mastery Test. In addition, this handbook has been designed to ensure that all Connecticut educators – but particularly teachers of mathematics in Grades 1 through 7 – are familiar with the content, formats and overall design of the CMT Mathematics subtests. Accordingly, the handbook provides:

- a summary of the changes incorporated into the third generation tests;
- test blueprints and content outlines;
- sample items for each skill or concept assessed;
- specific instructional strategies and activities linked to each content strand at each grade level (not included in the preliminary edition); and
- a set of additional resources relating to preparing students for the CMT and to raising the level of student achievement.

Overall, the CMT mathematics tests should be viewed as but 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 serve as a full curriculum in and of themselves, all district-level mathematics curriculums should include the skills and concepts assessed on the CMT. And while day-to-day classroom instruction should not be limited to preparation for the CMT, high-quality instruction should naturally reflect what is assessed on the CMT, and how it is assessed.

It is hoped that the contents of this handbook provide teachers of mathematics across the state with the information and ideas they need to continue the process of building and implementing high-quality programs of mathematics that raise significantly the mathematical literacy of all Connecticut students.

UNDERLYING PHILOSOPHY AND BELIEFS

Whether consciously or unconsciously, a set of core beliefs based on experience, observation and research underlies all decisions regarding the teaching, learning and assessment of mathematics. These beliefs provide a philosophical underpinning for determining what should be taught, how it should be taught, and how we determine whether and to what degree it is learned. We believe that it is essential to make these beliefs explicit so that they can be discussed, critiqued, revised and eventually implemented. These then are our beliefs – the beliefs upon which much of the design, content and item format of the CMT is based.

Steve Leinwand and Mari Muri
Connecticut Mathematics Consultants

Our Beliefs About Mathematics and Mathematics Programs

- We believe that mathematics is the language of data, the language of change, and the language of patterns, and that school mathematics programs must prepare students to "speak" and use this language fluently.
- We believe that mathematics is an essential tool for formulating, analyzing and solving problems, and that school mathematics programs must prepare students to apply proficiently a range of numerical, algebraic, geometric and statistical concepts and skills.
- We believe that the ability to use mathematics is increasingly the key to opportunity, and that every student deserves an excellent program of instruction to achieve at the high level required for productive citizenship and gainful employment.
- We believe that the widespread impact of technology on nearly every aspect of our lives requires changes of equal magnitude in the content and nature of school mathematics, and that students should be able to use calculators and computers to investigate mathematical concepts and enhance mathematical understanding.
- We believe that computational skills continue to be an essential component of the mathematics curriculum and that a knowledge of basic addition, subtraction, multiplication and division facts is more important than ever. However, we believe that facility estimating and computing mentally is far more important than doing multi-digit computation with pencil and paper when calculators are so much more efficient and accurate.
- We believe that if students are to receive a mathematical education appropriate to meeting society's needs they must study algebra, geometry, measurement and statistics, as well as number, at every grade level.
- We believe that teachers are in charge of their classrooms, guiding the learning process, managing their classrooms, using a broad repertoire of instructional approaches, and recognizing and valuing the variety of learning styles present in every class, so as to enable all students to learn.

- We believe that the assessment of mathematical understanding should be aligned with the content taught and instructional approaches used, and should draw upon multiple sources of information about what students know and can do.
- We believe that an effective mathematics program minimizes the ability grouping, sorting and tracking of students, while fully meeting the diverse needs of all students. That is, we believe that self-contained, heterogeneously grouped classes through Grade 5, and two or three flexible levels of departmentalized instruction beginning in Grade 6 can effectively meet students' needs, so long as the differences in ability groups are differences of pacing and depth, not of breadth or the quality of instruction.

Our Beliefs About Teaching and Learning Mathematics

We believe that all teaching of mathematics should reflect the following core beliefs about learning.

We believe that:

- Learning is maximized when teachers focus on thinking, imagining, reasoning, intuiting, questioning, creating, proving and other higher-order processes.
- Learning occurs best when instruction is active and engaging and involves thought-provoking tasks.
- Learning is enhanced in a dynamic and collaborative school culture that encourages reflection, analysis and risk-taking.
- Learning occurs best in school environments that recognize and value the wide variety of learning styles and the collective strengths that individual students bring to the classroom.
- Learning is maximized when content is placed in context and is connected to other content and when students are provided with multiple opportunities to construct their understandings.
- Learning is most effective when discrete skills and subject-matter content are not ends, but means toward the solution of meaningful problems.
- Learning is enhanced when all areas of the curriculum focus on concepts and applications and when the recall of facts, rules and procedures is not used to deny students access to reasoning and problem-solving activities.

Our Beliefs About the Professional Development of Teachers of Mathematics

We believe that every student must be taught by qualified teachers who have a sound knowledge of mathematics, who understand how children learn, who possess a broad repertoire of instructional strategies, and who hold high expectations for themselves and their students.

To attain this, we believe that we must model in our professional development practices that which we advocate for students. That is, what constitutes good instruction for our students is what also constitutes effective professional development for educators. More specifically we believe that:

- just as students need to be actively engaged in their own learning and construct their own understandings, so too must professional development for teachers actively engage them in the process of constructing understanding of mathematics, pedagogy and students;
- just as students need time to explore, practice, refine and apply new understandings, so too must professional development for teachers provide adequate time and support to explore, practice, discuss, refine, apply and reflect upon new ideas, techniques and practices;
- just as students need feedback and support from teachers and peers, so too do teachers need feedback and support from colleagues and supervisors, particularly when changes are being implemented;
- just as classrooms are the primary unit of focus for students, so too must school and department faculties be the primary unit of focus when implementing effective professional development; and
- just as student learning of mathematics is the ultimate goal of classroom instruction, so too must student learning of mathematics be the ultimate goal of all professional development.

Finally, we believe that an effective K-12 mathematics program translates these beliefs into appropriate policies and observable practices every day in every class in every school.

PART I

The Third Generation Mathematics CMT

- **Summary of Changes from second to third Generation**
- **Test Content and Blueprints**
- **Sample Items**

Summary of Changes from Second to Third Generation

Both the national mathematics scene and the Connecticut mathematics education environment continue to evolve. Standards are revised and refined, expectations rise, what was once revolutionary becomes mainstream, and by necessity, tests too must change. Accordingly, just as the original Connecticut Mastery Test (CMT) evolved in 1993 into the second generation, the periodic review and updating of the test now results in the third generation, to be launched in the fall of 2000.

Much has occurred since the second generation CMT was first administered:

- The National Council of Teachers of Mathematics (NCTM) has released ***Principles and Standards for School Mathematics: Discussion Draft*** (October 1998) that updates, elaborates upon and clarifies earlier sets of standards;
- The Connecticut State Department of Education has created and broadly disseminated new curriculum frameworks during 1998, including the **Mathematics Curriculum Framework**, that is modeled on the NCTM Standards and delineates a broad set of content standards for all K-12 mathematics programs;
- Connecticut has also added – in 1994 – the Grade 10 Connecticut Academic Performance Test (CAPT) to its assessment system, including a mathematics test comprised entirely of open-ended, constructed-response problems; and
- With each passing year, Connecticut's mathematics educators have greater experience and comfort with open-ended assessment items and with effectively balancing mental, paper-and-pencil and calculator approaches to mathematical computation.

Given these changing conditions and the need to periodically review and update the content upon which the criterion-referenced Mastery Tests are build, a new CMT Mathematics Advisory Committee was empaneled. Working with State Department of Education consultants, the committee proposed, and the Department has implemented, a range of changes, improvements and revisions to the content that should be assessed and how this content should be assessed on the CMT mathematics subtests.

What Has Changed

The major changes that will improve the quality and the usefulness of the third generation CMT are:

- test specifications and reporting categories are closely aligned with the new Connecticut Mathematics Framework;
- there are fewer reporting categories, fewer items and a clearer delineation of the skills and concepts that are assessed;
- there is greater content coherence and more explicit mathematical development from Grade 4 to 6 to 8;
- each grade level will include new extended problem-solving tasks designed to assess integrated mathematical understanding;

- there is a better balance of item types on all three tests; and
- the number of items per strand and the mastery standard for each reporting strand will vary more than on previous tests.

Specifics On The Changes

Alignment with Framework: The first and second generation CMT mathematics tests were based loosely on Connecticut's 1981 *Guide to Curriculum Development in Mathematics*. This resulted in three partially connected lists of skills and concepts that were clumped into the four domains: concepts, number facts and computation, problem/solving applications, measurement/geometry, and at Grade 8, algebra. This mixing of process (concepts or computation) with content (measurement, geometry or algebra) was deemed to be no longer appropriate.

The development and publication in 1998 of Connecticut's *Mathematics Curriculum Framework* allowed the Mathematics Advisory Committee to restructure the content of the CMT to be aligned with this new framework and to provide a much more coherent structure for the test. Accordingly, the 10 content standards contained in the framework were subdivided into a set of 25 content strands (see page 16) that form the skeleton of all three grade-level tests.

Content Strands, Skills and Concepts, and Items: This framework-based organization results in fewer reporting categories (content strands in the third generation instead of objectives in the second generation) and fewer test items at each grade level. More specifically, the Grade 4 test is shifting from 30 objectives and 116 items in the second generation to 18 content strands and 96 items in the third generation. The Grade 6 test is shifting from 36 objectives and 142 items in the second generation to 23 content strands and 117 items in the third generation. The Grade 8 test is shifting from 40 objectives and 158 items in the second generation to 23 content strands and 122 items in the third generation. (This data is summarized in the tables on page 15).

In addition, each of the content strands upon which student mastery will be reported is further delineated by one or more specific skills or concepts that are similar to the objectives found in the second generation. To gauge the magnitude of change from the second generation to the third generation, the 30 objectives at Grade 4 are replaced by 37 skills and concepts, 25 of which represent no change from the second generation, 4 involve minor change and 8 of which are new. The 36 objectives at grade 6 are replaced by 51 skills and concepts, 27 of which represent no change from the second generation, 10 involve minor change and 14 of which are new. And the 40 objectives at grade 8 are replaced by 58 skills and concepts, 29 of which represent no change from the second generation, 16 involve minor change and 13 of which are new. (This data is also summarized in the tables on page 15).

Coherence: The second generation tests are based on three loosely connected lists of objectives. This has resulted in limited articulation of content and results from Grades 4 to 6 to 8. To increase this articulation and the coherence of the tests from grade level to grade level, the Advisory Committee recommended building far more "developmental trajectories" into the design of the third generation tests.

For example, in the second generation, solving problems involving 1 and 10 more or less was assessed at Grade 4, but never advanced. This skill is retained at Grade 4 in the third generation and supported by solving problems involving 100 and 1000 more or less at Grade 6 and solving problems involving 0.1 and 0.01 more or less at Grade 8 where place value was omitted altogether in the past.

Similarly, fourth graders have been assessed on their ability to write story problems from addition and subtraction number sentences. But once again, this never advanced to Grades 6 and 8. This skill is retained at Grade 4 in the third generation and supported by writing story problems from multiplication and division number sentences at Grade 6 and writing story problems from equations with fractions, decimals and unknowns at Grade 8.

Another example of increasing coherence across tests can be found in the numerical estimation strategies and estimating solutions to problems strands. Instead of three very different sets of objectives at Grades 4, 6 and 8 as was the case on the second generation tests, a common set of skills and concepts carry from Grade 4 to 6 to 8 on the third generation, with only the complexity of the numbers and situations changing.

A review of the content specifications on pages 21-32 will reveal numerous examples of this mathematical coherence and the development of deeper understanding as one progresses from Grade 4 to 6 to 8.

Extended Problem-Solving Tasks: In light of the state's experiences with the CAPT mathematics subtest, one of the shortcomings the Advisory Committee identified was the absence of extended, open-ended tasks that would assess integrated understandings and students' abilities to communicate their understanding and demonstrate their reasoning. Accordingly, for the third generation tests, two extended tasks (one numerical and one statistical) will be included on the Grade 4 test. Similarly, three extended tasks (one numerical, one statistical and one spatial) will be included on the Grades 6 and 8 tests. There will be one such task on each session of the test and it is expected that these tasks will take approximately five minutes each to complete. Examples of these extended tasks can be found among the sample items in this handbook.

Balance of Item Types: At each grade level of the second generation CMT tests, approximately 80 percent of the items are multiple-choice, 10 percent are grid-in, and 10 percent are open-ended. In designing the third generation tests, a much more deliberate effort was made to match item formats to the most effective ways of assessing particular content. This has resulted in a significant increase in the percent of constructed-response (grid-in and open-ended) items. More specifically, at Grade 4, of the 96 items, 74 (or 77 percent) are multiple-choice and 22 (or 23 percent) are open-ended. Due to concerns

about too many testing formats, there will no longer be grid-in items at Grade 4. At Grade 6, of the 117 items, 70 (or 60 percent) are multiple-choice, 31 (or 26 percent) are open-ended, and 16 (or 14 percent) are grid-in. At Grade 8, of the 122 items, 70 (or 57 percent) are multiple-choice, 33 (or 27 percent) are open-ended and 19 (or 16 percent) are grid-in. (This data is summarized in the tables on page 15 and on pages 17-19).

Mastery: There were four items for nearly all of the objectives on the second generation of the test. Mastery was set at 3 of out 4 items correct for these objectives. In the few cases where open-ended items (some worth 2 points) resulted in objectives with more than four points, mastery levels varied (e.g., 4 points out of a possible six).

On the third generation tests, each content strand will be assessed with between 3 and 8 items, worth 1, 2 or 3 points, depending on the type of item. Accordingly, mastery will be set as some number of points out of the total possible number of points for each content strand at each grade level. For example, for a content strand with 6 multiple-choice items worth a total of 6 points, mastery will likely be four points out of six. Similarly, for a content strand with 2 multiple-choice items, two grid-in items and two open-ended items worth a total of 8 points, mastery will likely be five or six points out of eight.

Mastery standards for each of the content strands will be determined after the final forms of the test have been constructed during the spring of 2000.

What Has NOT Changed

Two major areas of the test will not change at all:

- the pencil-and-paper computation expectations; and
- calculator use policy or procedure.

Specifics On What Has NOT Changed

Computation: There is no change in the mental and paper-and-pencil computational expectations set for the second generation tests and now carried over to the third generation. This means that fourth graders will continue to be expected to have mastery of:

- addition and subtraction facts to 18;
- multiplication and division facts involving factors of 2, 5 and 10;
- addition and subtraction of 1- and 2-digit numbers without regrouping; and
- addition of 1- and 2- digit numbers with regrouping.

Fourth graders will continue **not** to be expected to demonstrate pencil-and-paper mastery of:

- subtraction with regrouping.

Similarly, sixth graders will continue to be expected to have mastery of:

- multiplication and division facts;
- addition and subtraction of 2-, 3- and 4-digit whole numbers and money amounts less than $100;
- multiplication and division of multiples of 10 and 100 by 10 and 100;
- multiplication and division of 2- and 3-digit whole numbers and money amounts less than $10 by 1-digit numbers; and
- addition and subtraction of fractions and mixed numbers with like denominators.

Sixth graders will continue **not** to be expected to demonstrate pencil-and-paper mastery of:

- addition and subtraction of numbers greater than 10,000 or money amounts greater than $100;
- multiplication and division by 2-digit or larger factors or divisors;
- addition and subtraction of fractions with unlike denominators; and
- computation with non-money decimals.

Eighth graders will continue to be expected to have mastery of:

- addition and subtraction of 2-, 3- and 4-digit whole numbers and decimals;
- multiplication and division of whole numbers and decimals by 10, 100 and 1000;
- multiplication and division of 2- and 3- digit whole numbers, money amounts and decimals by 1-digit numbers and decimals;
- addition and subtraction of fractions and mixed numbers with reasonable and appropriate denominators; and
- multiplication of whole numbers and fractions by fractions and mixed numbers.

Eighth graders will continue **not** to be expected to demonstrate pencil-and-paper mastery of:

- addition and subtraction of numbers greater than 10,000 or money amounts greater than $100;
- multiplication and division by 2-digit or larger factors or divisors;
- addition and subtraction of fractions with unlike denominators, **except** halves and thirds or when one denominator is a factor of the other; and
- division with fractions or mixed numbers.

In addition, students are not expected to demonstrate mastery of ratio, proportion and percent until Grade 8, when students will be expected to:

- solve problems involving ratios;
- solve problems involving proportions;
- find percents of whole numbers;
- find the percent a given number is of another number (**new for the third generation**); and
- solve problems involving percents.

Calculators: There is no change in the current policies and practices regarding use of calculators on the CMT. That is, calculators will not be permitted for any of the Grade 4 test. Calculators will be permitted for 2 of the 3 sessions on both the Grade 6 and the Grade 8 tests. On these tests, as in the past, calculators will not be available when students are tested on basic facts, computation, estimation and selected conceptual understanding items. Calculators will be available when students are tested on problems, measurement, geometry, statistics, probability and algebra.

The changes described in this section represent the Department's best information as of November 1999. However, since pilot testing is not complete, these changes are subject to minor adjustment prior to the fall of 2000.

Test Content and Blueprints

From CMT-2 to CMT–3 by the Numbers

Content: First and second generation: Roughly based on CT's 1981 Guide to Curriculum Development in Mathematics
Third generation: Closely based on CT's 1998 Mathematics Framework – 10 content standards broken down into 25 strands

Objectives and Items

CMT-2

Grade	4	6	8
# of sessions	2	3	3
# of objectives	30	36	40
# of items	116	142	158

Item Mix: Approximately 80 percent multiple-choice, 10% grid-in and 10% open-ended

CMT–3

Grade	4	6	8
# of Sessions	2	3	3
# of Reporting Strands	18	23	23
# of Items	96	117	122
Multiple-choice items	74 (77%)	70 (60%)	70 (57%)
Open-ended Items	22 (23%)	31 (26%)	33 (27%)
Grid-in Items	0 (0%)	16 (14%)	19 (16%)

Magnitude of Change from CMT-2 to CMT-3

Grade	4	6	8
Total # of skills & concepts	37	51	58
No change from second gen.	25 (68%)	27 (53%)	29 (50%)
Minor change	4 (11%)	10 (20%)	16 (28%)
New for third generation	8 (22%)	14 (27%)	13 (22%)

Mastery and Reporting

CMT-2: usually 3 out of 4 items for each objective

CMT-3: 4 to 8 items per strand, mastery defined as x out of y points depending on strand (each item worth one, two or three points depending on item type)

Calculators: No change in calculator policy (not allowed at Grade 4, a calculator of student choice allowed for 2 of 3 sessions at Grades 6 and 8).

Connecticut Mastery Test – Third Generation

Mathematics Content Standards and Strands for Grades 4, 6 and 8

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

Connecticut Mastery Test – Third Generation

Mathematics Grade 4 Test Blueprint

Content Standards and Strands	# of multiple-choice items	# of open-ended items
Number Sense		
1. Place Value	6	
2. Pictorial Representations of Numbers	4	2
3. Equivalent Fractions, Decimals and Percents		
4. Order, Magnitude and Rounding of Numbers	6	
Operations		
5. Models for Operations	4	2
6. Basic Facts	6	
7. Computation with Whole Numbers and Decimals	6	
8. Computation with Fractions		
9. Solve Word Problems	6	
Estimation and Approximation		
10. Numerical Estimation Strategies	4	2
11. Estimating Solutions to Problems	2	2
Ratio, Proportion and Percent		
12. Ratios and Proportions		
13. Computation with Percents		
Measurement		
14. Time	6	
15. Approximating Measures	6	
16. Customary and Metric Measures	3	3
Spatial Relationships and Geometry		
17. Geometric Shapes and Properties	3	3
18. Spatial Relationships		
Probability and Statistics		
19. Tables, Graphs and Charts	4	2
20. Statistics and Data Analysis		
21. Probability	4	
Patterns		
22. Patterns	2	2
Algebra and Functions		
23. Algebraic Concepts		
Discrete Mathematics		
24. Classification and Logical Reasoning	2	2
Integrated Understandings		
25. Mathematical Applications		2
TOTAL	74	22

Connecticut Mastery Test – Third Generation

Mathematics Grade 6 Test Blueprint

Content Standards and Strands	# of multiple choice items	# of open-ended items	# of grid-in items
Number Sense			
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	
Operations			
5. Models for Operations	4	2	
6. Basic Facts			6
7. Computation with Whole #'s and Decimals	2		4
8. Computation with Fractions	6		
9. Solve Word Problems		2	4
Estimation and Approximation			
10. Numerical Estimation Strategies	4	2	
11. Estimating Solutions to Problems	2	2	
Ratio, Proportion and Percent			
12. Ratios and Proportions			
13. Computation with Percents			
Measurement			
14. Time	4		
15. Approximating Measures	6		
16. Customary and Metric Measures	2	2	2
Spatial Relationships and Geometry			
17. Geometric Shapes and Properties	2	2	
18. Spatial Relationships	4	2	
Probability and Statistics			
19. Tables, Graphs and Charts	2	2	
20. Statistics and Data Analysis	2	2	
21. Probability	2	2	
Patterns			
22. Patterns	2	2	
Algebra and Functions			
23. Algebraic Concepts	4		
Discrete Mathematics			
24. Classification and Logical Reasoning	2	2	
Integrated Understandings			
25. Mathematical Applications		3	
TOTAL	70	31	16

Connecticut Mastery Test – Third Generation

Mathematics Grade 8 Test Blueprint

Content Standards and Strands	# of multiple choice items	# of open-ended items	# of grid-in items
Number Sense			
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	
Operations			
5. Models for Operations	2	2	
6. Basic Facts			
7. Computation with Whole #'s and Decimals			6
8. Computation with Fractions	6		
9. Solve Word Problems	2	2	2
Estimation and Approximation			
10. Numerical Estimation Strategies	4	2	
11. Estimating Solutions to Problems	2	2	
Ratio, Proportion and Percent			
12. Ratios and Proportions	4		
13. Computation with Percents			4
Measurement			
14. Time			
15. Approximating Measures	6		
16. Customary and Metric Measures	3	2	3
Spatial Relationships and Geometry			
17. Geometric Shapes and Properties	4	2	
18. Spatial Relationships	3	3	
Probability and Statistics			
19. Tables, Graphs and Charts	2	2	
20. Statistics and Data Analysis	2	1	2
21. Probability	2	2	
Patterns			
22. Patterns	2	2	
Algebra and Functions			
23. Algebraic Concepts	4	2	2
Discrete Mathematics			
24. Classification and Logical Reasoning	2	2	
Integrated Understandings			
25. Mathematical Applications		3	
TOTAL	70	33	19

Connecticut Mastery Test – Third Generation

Grade 4 Mathematics Content

Content Standards and Strands	Concepts and Skills Assessed	Remarks
Number Sense		
1. Place Value	1a. Solve problems involving 1 and 10 more or less 1b. Identify alternative forms of expressing whole numbers using expanded notation 1c. Identify alternative forms of expressing whole numbers using regrouping 1d. Use place value concepts to interpret the meaning of numbers	No change No change No change New
2. Pictorial Representations of Numbers	2a. Relate pictorial representations using base ten blocks to whole numbers and vice versa 2b. Identify, label or shade fractional parts of regions and sets	New No change
3. Equivalent Fractions, Decimals and Percents	Not tested at Grade 4	
4. Order, Magnitude and Rounding of Numbers	4a. Order whole numbers 4b. Describe the magnitude of whole #'s 4c. Round whole numbers in a context 4d. Identify points representing whole numbers on a number line and vice versa	Minor chg. Minor chg. Minor chg. New
Operations		
5. Models for Operations	5a. Relate multiplication and division facts to rectangular arrays and pictures 5b. Identify or write the appropriate operation or number sentence to solve a story problem 5c. Write story problems from addition and subtraction number sentences	No change No change No change
6. Basic Facts	6a. Add and subtract facts to 18 6b. Multiply and divide by 2, 5 and 10	No change No change
7. Computation with Whole #'s and Decimals	7a. Add and subtract 1- and 2-digit numbers without regrouping 7b. Add 1- and 2-digit numbers with regrouping	No change No change
8. Computation with Fractions	Not tested at Grade 4	

(continued)

Grade 4 Mathematics Content, continued

9. Solve Word Problems	**9a. Solve simple story problems involving addition and subtraction** **9b. Solve simple story problems involving addition and subtraction with extraneous information**	**No change** **No change**
Estimation and Approximation		
10. Numerical Estimation Strategies	**10a. Identify the best expression to find an estimate** **10b. Determine a reasonable estimate and describe the strategy used to make the estimate**	**New** **New**
11. Estimating Solutions to Problems	**11a. Estimate a reasonable answer to a problem** **11b. Use estimation to make and defend decisions**	**No change** **New**
Ratio, Proportion and Percent		
12. Ratios and Proportions	**Not tested at Grade 4**	
13. Computation with Percents	**Not tested at Grade 4**	
Measurement		
14. Time	**14a. Tell time to the nearest hour, half-hour, and quarter-hour using analog and digital clocks** **14b. Solve problems involving time, elapsed time and calendars**	**No change** **No change**
15. Approximating Measures	**15. Estimate lengths and areas**	**No change**
16. Customary and Metric Measures	**16a. Measure or draw lengths to the nearest inch or centimeter** **16b. Identify an appropriate customary or metric measure for a given situation**	**No change** **No change**
Spatial Relationships and Geometry		
17. Geometric Shapes and Properties	**17a. Identify geometric shapes and figures including the number of angles and sides of polygons** **17b. Draw geometric shapes and figures**	**No change** **No change**
18. Spatial Relationships	**Not tested at Grade 4**	

(continued)

Grade 4 Mathematics Content, continued

Probability and Statistics		
19. Tables, Graphs and Charts	**19a. Identify correct information from graphs, tables and charts** **19b. Create bar graphs and pictographs from data in tables and charts**	**No change** **No change**
20. Statistics and Data Analysis	**Not tested at Grade 4**	
21. Probability	**21. Solve problems involving elementary notions of probability**	**No change**
Patterns		
22. Patterns	**22. Extend or complete patterns involving whole numbers and attributes and identify or state rules for given patterns**	**Minor chg.**
Algebra and Functions		
23. Algebraic Concepts	**Not tested at Grade 4**	
Discrete Mathematics		
24. Classification and Logical Reasoning	**24a. Identify objects that are the same or different by one attribute** **24b. Sort objects into two groups by a common attribute**	**No change** **New**
Integrated Understandings		
25. Mathematical Applications	**25. Solve extended numerical and statistical problems**	**New**

Summary: **18 Reporting Strands**
96 Items
74 multiple-choice
22 open-ended

37 Concepts and Skills
25 No change from second generation
4 Minor changes
8 New for third generation

Connecticut Mastery Test – Third Generation

Grade 6 Mathematics Content

Content Standards and Strands	Concepts and Skills Assessed	Remarks
Number Sense		
1. Place Value	1a. Solve problems involving 100 and 1000 more or less	New
	1b. Identify alternative forms of expressing whole numbers < 10,000 using expanded notation	No change
	1c. Identify alternative forms of expressing whole numbers < 10,000 using regrouping	No change
	1d. Use place value concepts to interpret the meaning of numbers	New
2. Pictorial Representations of Numbers	2a. Relate decimals (0.01 – 2.99) to pictorial representations and vice versa	No change
	2b. Relate fractions and mixed numbers to pictures and vice versa	No change
	2c. Construct pictorial representations of fractions, mixed numbers and decimals	New
3. Equivalent Fractions, Decimals and Percents	3a. Rename equivalent fractions	No change
	3b. Rename equivalent mixed numbers and improper fractions	No change
4. Order, Magnitude and Rounding of Numbers	4a. Order whole numbers less than 100,000	Minor chg.
	4b. Order fractions, mixed numbers and decimals	New
	4c. Describe the magnitude of whole numbers less than 100,000	Minor chg.
	4d. Describe the magnitude of fractions, mixed numbers and decimals	Minor chg.
	4e. Round whole numbers in a context	Minor chg.
	4f. Round decimals in a context	New
	4g. Locate points on number lines and scales	No change
Operations		
5. Models for Operations	5a. Identify the appropriate operation or number sentence to solve a story problem	No change
	5b. Write story problems from multiplication and division number sentences	New

(continued)

Grade 6 Mathematics Content, continued

6. Basic Facts	6. Multiply and divide facts	No change
7. Computation with Whole #'s and Decimals	7a. Add and subtract 2-, 3- and 4- digit whole numbers and money amounts less than $100. 7b. Multiply and divide multiples of 10 and 100 by 10 and 100 7c. Multiply and divide 2- and 3-digit whole numbers and money amounts less than $10 by 1-digit numbers	No change No change No change
8. Computation with Fractions	8. Add and subtract fractions and mixed numbers with like denominators	No change
9. Solve Word Problems	9a. Solve 1-step problems involving whole numbers and money amounts 9b. Solve 2-step problems involving whole numbers and money amounts 9c. Solve 2-step problems and explain how the solution was determined	No change No change New
Estimation and Approximation		
10. Numerical Estimation Strategies	10a. Identify the best expression to find an estimate 10b. Identify whether and why a particular strategy will result in an overestimate or an underestimate 10c. Determine a reasonable estimate and describe the strategy used to make the estimate	Minor chg. New New
11. Estimating Solutions to Problems	11a. Estimate a reasonable answer to a problem 11b. Use estimation to make and defend decisions	No change New
Ratio, Proportion and Percent		
12. Ratios and Proportions	Not tested at Grade 6	
13. Computation with Percents	Not tested at Grade 6	
Measurement		
14. Time	14a. Solve problems involving elapsed time 14b. Solve problems involving the conversion of measures of time	No change No change

(continued)

Grade 6 Mathematics Content, continued

15. Approximating Measures	15. Estimate lengths and areas	No change
16. Customary and Metric Measures	16a. Solve problems involving the conversion of measures of length 16b. Measure lengths to the metric or customary unit specified 16c. Measure/determine perimeter and area 16d. Identify appropriate customary or metric units of measure (length, capacity, mass) for a given situation	No change New No change No change
Spatial Relationships and Geometry		
17. Geometric Shapes and Properties	17a. Identify and draw geometric shapes and figures 17b. Describe and classify geometric shapes and figures	No change No change
18. Spatial Relationships	18a. Identify or draw lines of symmetry 18b. Identify congruent figures 18c. Locate points on grids	No change New No change
Probability and Statistics		
19. Tables, Graphs and Charts	19a. Identify correct information from graphs, tables and charts 19b. Create bar graphs and pictographs from data in tables and charts	Minor chg. No change
20. Statistics and Data Analysis	20. Draw and justify reasonable conclusions from graphs, tables and charts	Minor chg.
21. Probability	21. Solve problems involving elementary notions of probability and fairness, including justifying answers	Minor chg.
Patterns		
22. Patterns	22. Extend or complete patterns involving numbers and attributes, and identify or state rules for given patterns	Minor chg.
Algebra and Functions		
23. Algebraic Concepts	23. Solve simple 1-step algebraic equations	New
Discrete Mathematics		
24. Classification and Logical Reasoning	24. Solve problems involving the organization of data	Minor chg.

(continued)

Grade 6 Mathematics Content, continued

Integrated Understandings		
25. Mathematical Applications	25. Solve extended numerical, spatial and statistical problems	New

Summary: 23 Reporting Strands
117 items
70 multiple-choice
31 open-ended
16 grid

51 Concepts and Skills
27 No change from second generation
10 Minor changes
14 New for third generation

Connecticut Mastery Test – Third Generation

Grade 8 Mathematics Content

Content Standards and Strands	Concepts and Skills Assessed	Remarks
Number Sense		
1. Place Value	1a. Solve problems involving 0.1 and 0.01 more or less 1b. Identify alternative forms of expressing numbers using expanded notation 1c. Identify alternative forms of expressing numbers using scientific notation	New New New
2. Pictorial Representations of Numbers	2a. Relate fractions, decimals and percents to their pictorial presentations and vice versa 2b. Construct pictorial representations of fractions, decimals and percents	No change New
3. Equivalent Fractions, Decimals and Percents	3a. Rename fractions and mixed numbers as equivalent decimals and vice versa 3b. Rename fractions and decimals as equivalent percents and vice versa	No change No change
4. Order, Magnitude and Rounding of Numbers	4a. Order whole numbers and decimals 4b. Order fractions and mixed numbers 4c. Describe the magnitude of whole numbers and decimals 4d. Describe the magnitude of fractions and mixed numbers 4e. Round whole numbers, fractions and decimals in a context 4f. Locate points on number lines and scales, including fractions, decimals and integers	Minor chg. Minor chg. Minor chg. Minor chg. Minor chg. No change
Operations		
5. Models for Operations	5a. Identify the appropriate operation or number sentence to solve a story problem 5b. Write story problems from equations, involving fractions, decimals and unknowns	No change New
6. Basic Facts	Not tested at Grade 8	

(continued)

Grade 8 Mathematics Content, continued

7. Computation with Whole #'s and Decimals	**7a. Add and subtract 2-, 3- and 4- digit whole numbers and decimals** **7b. Multiply and divide whole numbers and decimals by 10, 100 and 1000** **7c. Multiply and divide 2- and 3-digit whole numbers, money amounts and decimals by 1-digit numbers and decimals**	**No change** **No change** **No change**
8. Computation with Fractions	**8a. Add and subtract fractions and mixed numbers with reasonable and appropriate denominators** **8b. Multiply whole numbers and fractions by fractions and mixed numbers**	**No change** **No change**
9. Solve Word Problems	**9a. Solve 1-step problems involving whole numbers, decimals and money amounts** **9b. Solve 1-step problems involving fractions and mixed numbers** **9c. Solve multi-step problems involving whole numbers, decimals, fractions and mixed numbers, including averaging** **9d. Solve multi-step problems involving whole numbers, decimals, fractions and mixed numbers with extraneous information** **9e. Solve multi-step problems and explain how the solution was determined**	**No change** **No change** **Minor chg.** **Minor chg.** **New**
Estimation and Approximation		
10. Numerical Estimation Strategies	**10a. Identify the best expression to find an estimate** **10b. Identify whether and why a particular strategy will result in an overestimate or an underestimate** **10c. Determine a reasonable estimate and describe the strategy used to make the estimate**	**Minor chg.** **New** **New**

(continued)

Grade 8 Mathematics Content, continued

11. Estimating Solutions to Problems	11a. Estimate a reasonable answer to a problem 11b. Use estimation to make and defend decisions	No change New
Ratio, Proportion and Percent		
12. Ratios and Proportions	12a. Solve problems involving ratios 12b. Solve problems involving proportions	No change No change
13. Computation with Percents	13a. Find percents of whole numbers or the percent a given number is of another number 13b. Solve problems involving percents	Minor chg. No change
Measurement		
14. Time	Not tested at Grade 8	
15. Approximating Measures	15. Estimate lengths, areas and angle measures	Minor chg.
16. Customary and Metric Measures	16a. Solve problems involving the conversion of units of measure, including time 16b. Measure/determine perimeter, area and volume 16c. Identify appropriate customary or metric units of measure (length, capacity, mass) for a given situation	No change No change No change
Spatial Relationships and Geometry		
17. Geometric Shapes and Properties	17a. Identify and draw geometric shapes and figures 17b. Describe and classify geometric shapes and figures	No change No change
18. Spatial Relationships	18a. Identify or draw geometric transformations 18b. Identify, draw and describe lines of symmetry 18c. Relate 2-dimensional and 3-dimensional representations 18d. Identify and describe congruent and similar figures 18e. Locate and draw points on grids	No change No change New New No change

(continued)

Grade 8 Mathematics Content, continued

Probability and Statistics		
19. Tables, Graphs and Charts	**19a. Identify correct information from graphs, tables and charts** **19b. Create bar graphs, line graphs and stem and leaf plots from data in tables and charts**	**Minor chg.** **Minor chg.**
20. Statistics and Data Analysis	**20a. Draw and justify reasonable conclusions from graphs, tables and charts** **20b. Solve problems involving means and medians of sets of data**	**Minor chg.** **No change**
21. Probability	**21a. Solve problems involving elementary notions of probability and fairness, including justifying answers** **21b. Solve problems involving expected outcomes or predictions**	**Minor chg.** **New**
Patterns		
22. Patterns	**22. Extend or complete patterns involving numbers and attributes, and identify or state rules for given patterns**	**Minor chg.**
Algebra and Functions		
23. Algebraic Concepts	**23a. Solve simple 1-step equations** **23b. Use order of operations** **23c. Evaluate expressions and use formulas** **23d. Represent situations with algebraic expressions**	**No change** **No change** **No change** **No change**
Discrete Mathematics		
24. Classification and Logical Reasoning	**24. Solve problems involving the organization of data**	**Minor chg.**
Integrated Understandings		
25. Mathematical Applications	**24. Solve extended numerical, spatial and statistical problems**	**New**

Summary: **23 Reporting Strands**
122 items
70 multiple-choice
33 open-ended
19 grid

58 Concepts and Skills
29 No change from second generation
16 Minor changes
13 New for third generation

Sample Items

Grade 4

1	**Place Value**
A	Solve problems involving 1 or 10 more or less

There were 85 people in line for a movie. Later 10 MORE people joined the line. How many people were waiting in line then?

75
84
86
95*

1	**Place Value**
B	Identify alternative forms of expressing whole numbers using expanded notation

Which means the same as 385?

300 + 80 + 5*
30 + 800 + 5
300 + 80 + 50
3 + 8 + 5

1	**Place Value**
C	Identify alternative forms of expressing whole numbers using regrouping

Which means the same as 2 tens and 18 ones?

28
38*
218
2018

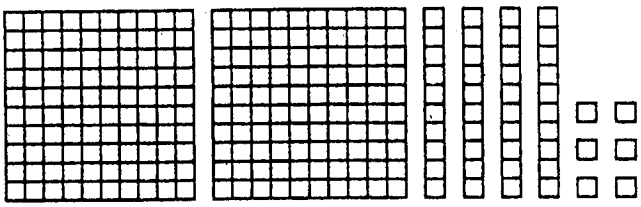
1	**Place Value**
D	Use place value concepts to interpret the meaning of numbers

In which number does the 3 have the GREATEST value?

435
345*
543
39

2	**Pictorial Representations of Numbers**
A	Relate pictorial representations using base ten blocks to whole numbers and vice versa

What number is shown by the blocks in this picture?



642
426
264
246*

2	**Pictorial Representations of Numbers**
B	Identify, label or shade fractional parts of regions and sets

Shade in 1/8 of the set.

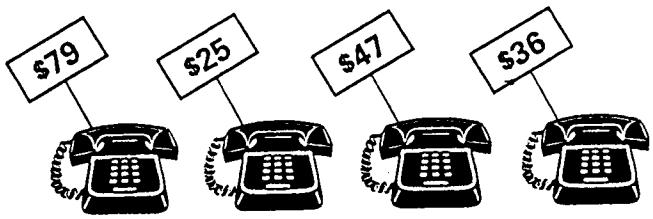
4	**Order, Magnitude and Rounding of Numbers**
A	Order whole numbers

Which list shows the numbers in order from LEAST to GREATEST?

53, 63, 54, 62
54, 53, 62, 63
53, 54, 62, 63*
53, 63, 54, 62

4	**Order, Magnitude and Rounding of Numbers**
B	Describe the magnitude of whole numbers

Mark wants to buy a new telephone for his office. He does not want to spend more than $55. Which phone costs MORE than he wants to spend?

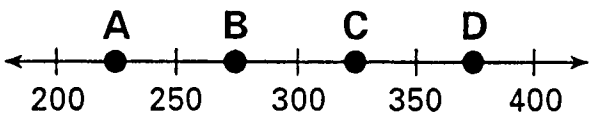


4	**Order, Magnitude and Rounding of Numbers**
C	Round whole numbers in context

Beth read 18 books last summer. This number is CLOSEST to

10
15
20*
25

4	**Order, Magnitude and Rounding of Numbers**
D	Identify points representing whole numbers on a number line and vice versa



The number 385 would be CLOSEST to which point marked on the number line?

A
B
C
D *

5 Models for Operations
A Relate multiplication and division facts to rectangular arrays and pictures

Which number fact goes with this picture?

☺	☺	☺
☺	☺	☺
☺	☺	☺
☺	☺	☺
☺	☺	☺

5 + 3 =
5 ÷ 3 =
5 x 3 =*
5 – 3 =

5 Models for Operations
B Identify the appropriate operation or number sentence to solve a story problem

Martha had 6 plants in her front yard and 4 plants in her backyard. Which number sentence could be used to find out how many plants Martha had all together?

6 x 4 = □
6 – 4 = □
6 + 4 = □*
6 ÷ 4 = □

5 Models for Operations
C Write story problems from addition and subtraction number sentences

Write a story problem that can be solved using the number sentence 8 + 4 = □

6 Basic Facts
A Add and subtract facts to 18

6 + 9 =

19
17
16
15*

6	**Basic Facts**
B	Multiply and divide by 2, 5 or 10

2 x 4 =

2
6
8*
42

7	**Computation with Whole Numbers and Decimals**
A	Add and subtract 1- and 2-digit whole numbers without regrouping

28 + 61 =

47
49
87
89*

7	**Computation with Whole Numbers and Decimals**
B	Add 1- and 2-digit whole numbers with regrouping

53 + 27 =

70
80*
81
710

9	**Solve Word Problems**
A	Solve simple story problems involving addition or subtraction

There are 16 girls and 24 boys in the school chorus. How many children are in the chorus all together?

30
40*
50
60

9	**Solve Simple Word Problems**
B	Solve simple problems involving addition or subtraction *with extraneous information*

Linda had 5 apples, 3 oranges and 6 peaches. Each piece of fruit cost 9¢.
How many pieces of fruit did Linda have?

5
14*
15
23

10	**Numerical Estimation Strategies**
A	Identify the best expression to find an estimate

Joe needs to subtract 319 from 799. Which of the following would be BEST for Joe to use to ESTIMATE the difference?

700 – 300
700 – 400
800 – 300 *
800 – 400

10	**Numerical Estimation Strategies**
B	Determine a reasonable estimate and describe the strategy used to determine the estimate

Kelly wants to ESTIMATE the total height of two basketball players. One player is 72 inches tall and the other is 69 inches tall.
What would be a GOOD ESTIMATE?
Explain how you made your estimate.

11	**Estimating Solutions to Problems**
A	Estimate a reasonable answer to a problem

Kelly bought a hat for $27 and a sweater for $32. ABOUT how much did she spend on the 2 items all together?

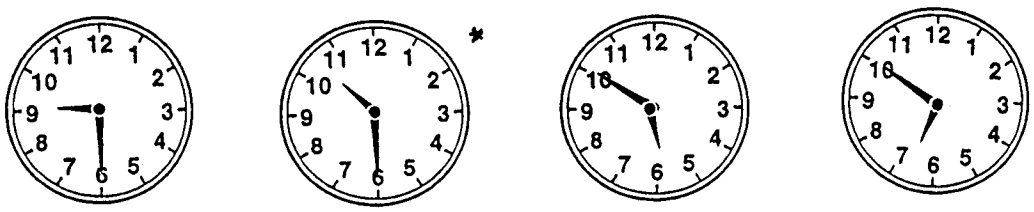
A little less than $60*
A little more than $50
A little less than $50
A little more than $60

11 Estimating Solutions to Problems
B Use estimation to make and defend decisions

A book costs $4.89, a bookmark costs $1.75 and a magazine costs $1.99. Fred has $10. Explain how you could use ESTIMATION to decide if Fred has enough money to buy all three items.

14 Time
A Tell time to the nearest hour, half-hour and quarter-hour using analog and digital clocks

Recess begins at 10:30. Which clock shows that time?



14 Time
B Solve problems involving time, elapsed time and calendars

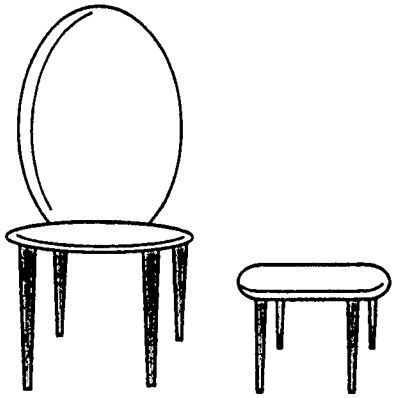
November

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	

Colette got her allowance on the third day of this month. What day was that?

Monday
Wednesday
Saturday*
Sunday

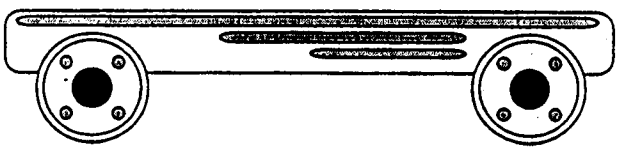
15	**Approximating Measures**
A	Estimate lengths and areas



ABOUT how many footstools would be the same height as the chair?

2
3*
4
5

16	**Customary and Metric Measures**
A	Measure or draw lengths to the nearest inch or centimeter



Use your ruler to measure the length of the wagon in this picture to the NEAREST centimeter.

5 centimeters
8 centimeters*
12 centimeters
15 centimeters

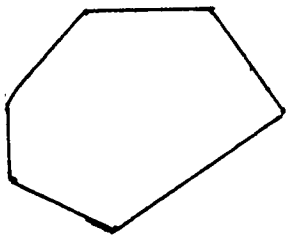
16 Customary and Metric Measures
B Identify appropriate customary or metric units of measure for a given situation

ABOUT how long is a new pencil?

7 inches*
7 feet
7 yards
7 miles

17 Geometric Shapes and Properties
A Identify geometric shapes and figures including number of angles and sides of polygons

How many angles does this shape have?



4
5
6*
7

17 Geometric Shapes and Properties
B Draw geometric shapes and figures

Draw a shape with 4 sides.

19 Tables, Graphs and Charts
A Identify correct information from tables, graphs and charts

The table shows books that some students in Mr. Johnson's class read.

Book	Number of Students
Old Yeller	8
Tales of a Fourth-Grade Nothing	12
Indian in the Cupboard	5
Sign of the Beaver	14

How many of Mr. Johnson's students read *Old Yeller*?

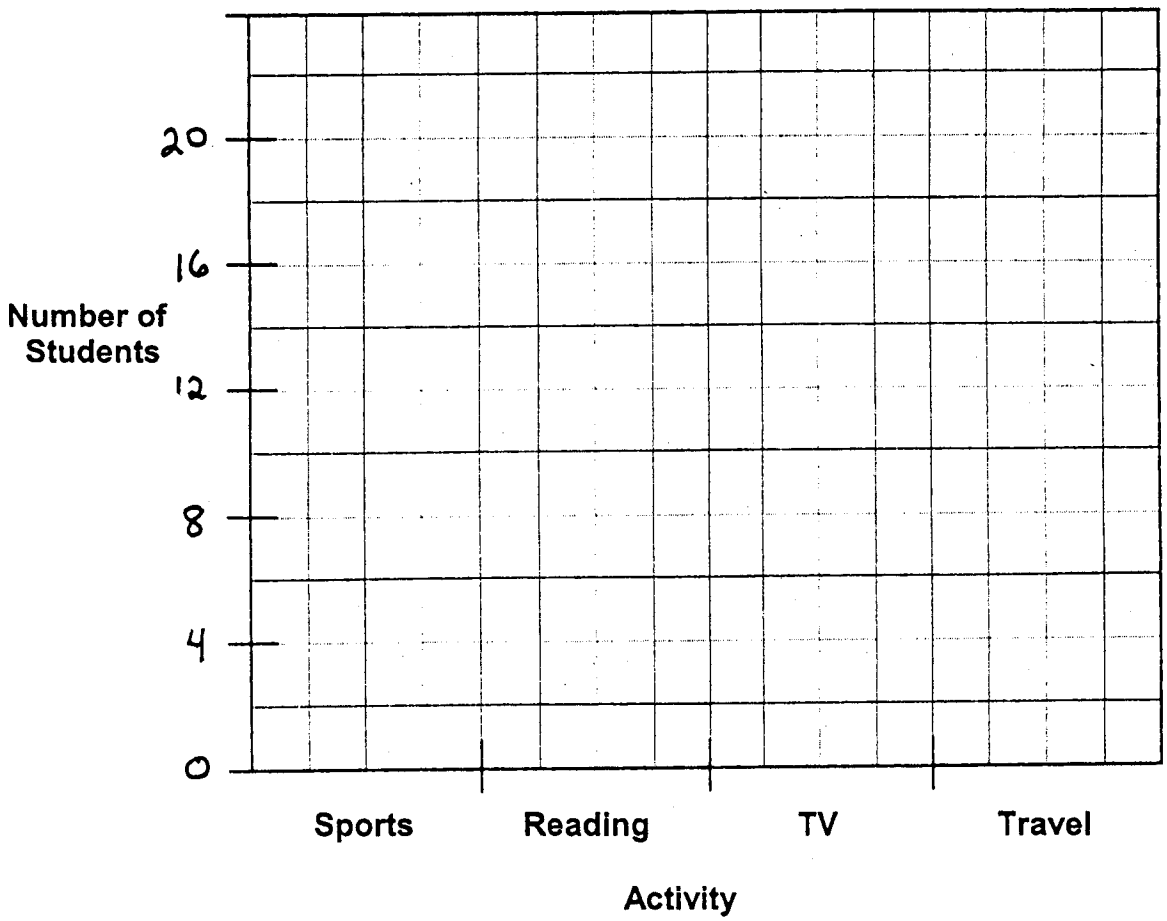
5
8*
12
14

19	**Tables, Graphs and Charts**
B	Create bar graphs and pictographs from data in tables and charts

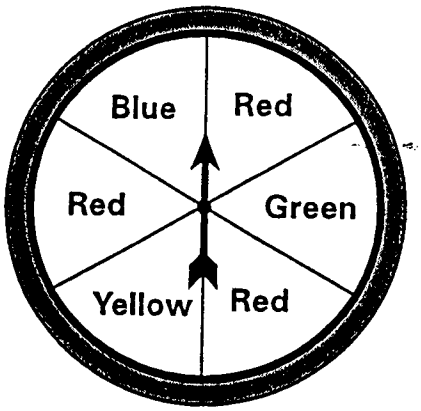
The table shows things students did over a weekend.

Activity	Number of Students
Sports	15
Reading	13
T.V.	5
Travel	4

Complete the BAR graph to show the same information.



21	**Probability**
A	Solve problems involving elementary notions of probability



If Robin spins this spinner once, on which color is the arrow MOST likely to land?

Red*
Blue
Green
Yellow

22	**Patterns**
	Extend or complete patterns involving whole numbers and attributes or identify or state rules for given patterns

These numbers follow a pattern.

5, 9, 13, 17, _____, 25

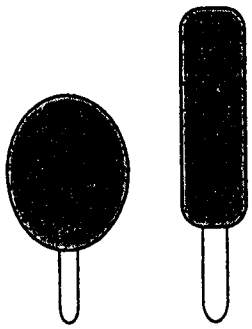
Which number is missing from the pattern?

Write the number. _____

Then write a sentence that explains why you think that is the missing number.

24 Classification and Logical Reasoning
A Identify objects that are the same or different by one attribute

Marie bought these lollipops at the fair.



How are the lollipops the SAME?

Size
Shape
Color*
Color and shape

24 Classification and Logical Reasoning
B Sort objects into 2 groups by common attribute

Sort 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 from each figure onto the chart. Then explain how you decided to group the figures.

25	**Mathematical Applications**
A	Numerical

Aida has three kinds of plants. These are the plants she has:

Flowers $2.00 | Small bush $4.00 | Small tree $5.00

She wants to make a garden with the plants. The garden can hold only 10 plants and will need all three types. The garden can cost no more than $25.

Use the space below to show one way Aida could make her garden. Show how many of each plant she should buy and show the total cost.

Show how you got your answer.

25	**Mathematical Applications**
B	Statistical

Jenny is selling muffins at a stand. She sells the muffins in packs of 2 and 4. This chart shows how she planned to sell each of them:

Muffins	**Cost**
2-pack	$1.50
4-pack	$2.50

Jenny sorted the 60 muffins into the two types of packs. When she was done, she found that she had the same number of 2-packs as 4-packs. Use the space below to show the number and types of muffin packs Jenny sold at the stand.

Show how you got your answer.

Grade 6

1	**Place Value**
A	Solve problems involving 100 and 1000 more or less

On Monday 285 concert tickets were sold. By Tuesday 100 more tickets were sold. How many tickets were sold all together?

275
287
385*
395

1	**Place Value**
B	Identify alternative forms of expressing whole numbers less than 10,000 using expanded notation

Which means the same as 3815?

3000 + 800 + 10 + 5*
3000 + 800 + 10 + 50
3000 + 80 + 100 + 5
300 + 80 + 100 + 5

1	**Place Value**
C	Identify alternative forms of expressing whole numbers less than 10,000 using regrouping

Which means the same as 7500?

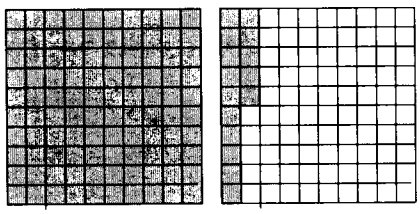
75 hundreds*
75 tens
75 thousands
75 ones

1	**Place Value**
D	Use place value concepts to interpret the meaning of numbers

In which number does the 3 have the greatest value?

4351
3451*
5431
391

2 Pictorial Representations of Numbers
A Relate decimals (0.01-2.99) to pictorial representations and vice versa



Each = 0.01

The shaded part of this picture shows what decimal number?

1.35
1.25
1.15*
1.05

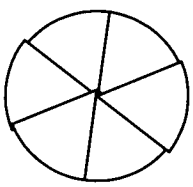
2 Pictorial Representations of Numbers
B Relate fractions and mixed numbers to pictures and vice versa

The shaded part of this picture shows which fraction?

3/8
3/4
3/5
3/6*

2 Pictorial Representations of Numbers
C Construct pictorial representations of fractions, mixed numbers and decimals

Shade in 1/6 of this shape.



3 Equivalent Fractions, Decimals and Percents
A Rename equivalent fractions

Wally eats breakfast 1/3 of the mornings he goes to school. Which is another way to describe this?

Wally eats breakfast 12 out of 20 school mornings.
Wally eats breakfast 8 out of 16 school mornings.
Wally eats breakfast 6 out of 8 school mornings.
Wally eats breakfast 5 out of 15 school mornings. *

3 Equivalent Fractions, Decimals and Percents
B Relate equivalent mixed numbers and improper fractions

Which fraction is equivalent to 2 3/5?

10/5
12/5
13/5*
23/5

4 Order, Magnitude and Rounding of Numbers
A Order whole numbers less than 100,000

Ron is studying the Great Lakes in geography class. He made this chart to show the maximum depth of each of the lakes.

Lake	Depth feet
Erie	116
Huron	850
Michigan	923
Ontario	393
Superior	1,330

Which shows the depth of the lakes arranged from GREATEST to LEAST?

Erie, Huron, Michigan, Ontario, Superior
Superior, Ontario, Michigan, Huron, Erie
Erie, Ontario, Huron, Michigan, Superior
Superior, Michigan, Huron, Ontario, Erie *

4	**Order, Magnitude and Rounding of Numbers**
B	Order fractions, mixed numbers and decimals

The chart shows the heights of some of Bill's friends.

Friend	Height Feet
Mac	$4\frac{1}{4}$
Sam	$4\frac{3}{4}$
Ted	$3\frac{7}{8}$
Johnny	$4\frac{1}{2}$

Which of Bill's friends is the TALLEST?

Mac
Sam *
Ted
Johnny

4	**Order, Magnitude and Rounding of Numbers**
C	Describe the magnitude of whole numbers less than 100,000

Amanda collected between 4600 and 5800 pounds of newspaper for recycling. Which could be the amount collected?

5120*
3960
4410
5970

4	**Order, Magnitude and Rounding of Numbers**
D	Describe the magnitude of fractions, mixed numbers and decimals

Karen bought between 4 1/2 and 7 1/2 pounds of meat for the barbecue. Which could be the amount bought?

4 1/4 pounds
5 1/4 pounds*
7 3/4 pounds
3 3/4 pounds

4	**Order, Magnitude and Rounding of Numbers**
E	Round whole numbers in a context

There were 6852 people at the game. This number is ABOUT

5000
6000
7000*
8000

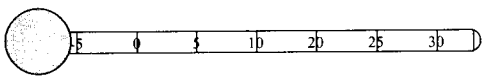
4	**Order, Magnitude and Rounding of Numbers**
F	Round decimals in a context

Ann bought 2.1 pounds of pet food. This amount rounded to the NEAREST whole number is

1 pound
2 pounds*
3 pounds
4 pounds

4	**Order, Magnitude and Rounding of Numbers**
G	Locate points on number lines and scales

The average July temperature in Connecticut is 21 degrees Celsius. Mark this temperature on the thermometer with a heavy line.



5	**Models for Operations**
A	Identify the appropriate operation or number sentence to solve a story problem

During inventory of a hardware store, Jason counted 16 boxes of bolts. Each box contained 48 bolts. Which number sentence could be used to find out how many bolts were in all of the boxes?

Add 48 and 16
Subtract 16 from 48
Multiply 48 by 16*
Divide 48 by 16

5	**Models for Operations**
B	Write story problems from multiplication and division number sentences

Write a story problem that can be solved using the number sentence
8 x 4 = ☐.

6	**Basic Facts**
A	Multiply and divide facts

Solve this problem.

8 x 7 =

7	**Computation with Whole Numbers and Decimals**
A	Add and subtract 2-, 3- and 4-digit whole numbers and money amounts less than $100

Solve this problem.

$69.39 – $2.84

7	**Computation with Whole Numbers and Decimals**
B	Multiply and divide multiples of 10 and 100 by 10 and 100

$10.00 x 40

$4000.00
$400.00*
$40.00
$4.00

7	**Computation with Whole Numbers and Decimals**
C	Multiply and divide 2- and 3-digit whole numbers and money amounts less than $10 by 1-digit numbers

Solve this problem.

345 x 4 =

8	**Computation with Fractions**
A	Add and subtract fractions and mixed numbers with like denominators

1/4 + 2/4 =

3/8
3/6
3/5
3/4*

9	**Solve Simple Word Problems**
A	Solve 1-step problems involving whole numbers and money amounts

Solve this problem.

A package of 15 computer disks cost $47.25. Each disk cost the same amount. How much did each disk cost?

9	**Solve Simple Word Problems**
B	Solve 2-step problems involving whole numbers and money amounts

Solve this problem.

Rob's baseball card collection was organized in 3 boxes with 175 cards in each box. He hopes to have 4 times as many cards as he has now after his visit to the Baseball Card Collectors' Convention. How many cards does Joe hope to have after the convention?

9	**Solve Simple Word Problems**
C	Solve 2-step problems and explain how the solution was determined

Jenn bought 3 tops that each cost $12.95. She gave the clerk a $50 bill. If there is no tax on the tops, how much change should Jenn receive?

Explain how you arrived at your answer.

10	**Numerical Estimation Strategies**
A	Identify the best expression to find an estimate

Ellen needs to subtract 31,919 from 79,899. Which of the following would be BEST for Ellen to use to ESTIMATE the difference?

80,000 – 30,000 *
80,000 – 40,000
70,000 – 30,000
70,000 – 40,000

10	**Numerical Estimation Strategies**
B	Identify whether and why a particular strategy will result in an overestimate or an underestimate

To ESTIMATE the product of 521 and 613, John multiplied 500 x 600. Will John's estimate be MORE or LESS than the actual sum?

More, because he rounded both numbers up.
More, because he rounded both numbers down.
Less, because he rounded both numbers up.
Less, because he rounded both numbers down.*

10	**Numerical Estimation Strategies**
C	Determine a reasonable estimate and describe the strategy used to make the estimate

Karen wants to ESTIMATE the number of ounces in 8 cases of soda. Each can contains 12 ounces and there are 24 cans in a case.

What would be a GOOD ESTIMATE?

Explain how you made your estimate.

11	**Estimating Solutions to Problems**
A	Estimate a reasonable answer to a problem

Ben rode on the bus 37 1/4 miles the first week of school and 29 7/8 miles the second week. ABOUT how many miles did he ride on the bus during the two weeks?

Fewer than 60
A little more than 60
A little less than 70*
More than 70

11	**Estimating Solutions to Problems**
B	Use estimation to make and defend decisions

Becky earned $23,994 the first year after she graduated from college. Her second year she earned $24,993. To pay back her loans, she needed to earn more than $50,000 her first two years after college.

Explain how you could use ESTIMATION to decide if Becky earned over $50,000 her first two years after college.