

## **PART II**

### **Preparing Students for the Mathematics CMT**

**General Instructional Strategies for Grades 1-7**

**Questions and Answers About Preparing Students for  
the CMT**

**CMT Mathematics Test-Taking Tips for Students**

**Programmatic Shifts that Raise Student Achievement**



## General Instructional Strategies for Grades 1-7

Here are three straightforward strategies for raising CMT math scores that Connecticut teachers are urged to adopt:

**1. Ongoing Review.** Almost no one masters something new after one or two lessons and one or two homework assignments. That's why one of the most effective strategies for fostering retention and mastery is **daily, cumulative review** at the beginning of every class. Some teachers call it warm-ups, others call it daily mini-math. Some days it's delivered orally, other days it's written on the board or shown on the overhead. But every day it's five to eight quick problems to keep skills sharp. Every day teachers present:

- a **fact** of the day (e.g.,  $7 \times 6$ );
- an **estimate** of the day (e.g., if one item costs 32¢ and another costs 29¢, about how much will it cost to buy both items?);
- a **measurement** 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?); and
- a **word problem** of the day and any other exercises or problems that reinforce weaker, newer, or needed skills and concepts.

**2. Permission to Omit.** An amazing amount of time and energy is still expended by you and by your students on increasingly obsolete skills. Teachers need to give each other permission to skip textbook pages that no longer serve a useful purpose. So give yourself and your colleagues permission to omit such things as:

- pencil and paper multiplication problems with two-digit or larger factors (3 digits by 1 digit should be enough);
- paper and pencil division problems with two-digit or larger divisors (4 digits by 1 digit should be enough); and
- computation with fractions with unreasonable denominators like sevenths or 11ths (halves, fourths, eighths; thirds and sixths; fifths and tenths should be enough).

**3. Asking "Why?"** Probably the best way to implement a thinking curriculum, to help focus on alternative approaches, and to create a language-rich classroom, is by regularly asking "**Why?**" or "**How do you know?**" or "**Can you explain what you did and why you did it?**" A student who can explain his or her answer usually has a stronger understanding of mathematics. Classrooms where students are regularly explaining how and why -- in groups and in whole-class discussions -- help other students learn mathematics. So monitor yourself or ask your students to monitor how often you ask "why" -- especially when students respond with correct, as well as incorrect, answers.

## **Questions and Answers About Preparing Students for the CMT**

### **1. Are curriculum and instruction effectively aligned with test content?**

- Curriculum modifications should have been made to ensure alignment with CMT objectives.
- Teachers should regularly use realistic problems and current issues to apply academic skills.
- Teachers should regularly present open-ended problems with a variety of appropriate solutions, and use student work to focus on thinking and reasoning skills.
- Teachers should regularly ask for oral and written explanations that focus on justifying answers and explaining reasoning.
- All professional observations and supervision should include discussion of these practices.

### **2. Is the testing environment conducive to students doing their best work?**

- Testing should be done in well-lighted classrooms.
- Teacher/proctors should be well prepared.
- All necessary materials should be present, having been checked the day before the testing.
- All students should have eaten breakfast.

### **3. Are students knowledgeable about the test and familiar with test formats?**

- Students should have completed and discussed practice test materials.
- Students should have practiced grid-in procedures and should be familiar with open-ended item formats.

### **4. Are teachers familiar with test specifications?**

- Teachers should have reviewed and discussed test objectives or specifications.
- Teachers should be familiar with the CMT handbook and sample items.
- Teachers should have seen released forms of the second generation CMT.

### **5. Have appropriate content reviews been conducted?**

- During September, 4<sup>th</sup>, 6<sup>th</sup> and 8<sup>th</sup> grade teachers should conduct an ongoing review of skills and concepts on which students will be tested on the CMT.

### **6. Are students given the message that the tests are important and need to be taken seriously?**

- Parents should be informed about the testing – perhaps using one of the CMT brochures – and reminded to tell their children that CMT scores are important.
- Teachers should set a clear and consistent tone for students that the CMTs are important indicators of how well students are performing academically.
- Schools should consider conducting special events before, during or just after CMT testing to better communicate the importance of this test.

## CMT Mathematics Test-Taking Tips for Students

### Before the Test

- Begin to get ready for the test by developing a positive attitude. Tell yourself, “I will do my best on this test.”
- Get a good night’s sleep the night before the test.
- Get up early enough to avoid hurrying to get ready for school.
- Eat a good breakfast.

### During the Test

- Stay calm.
- Listen carefully to the directions the teacher gives.
- Ask questions if you don’t understand what to do.
- Read the entire question and look at all the answer choices. Solve the problem and think of your own answer. For multiple-choice questions, look to see if one of the choices is similar to yours. Bubble in this choice on your answer sheet and move to the next question.
- Read each question carefully. Try to figure out what the question is really asking.
- If you are not sure of an answer to a multiple-choice question, try these tips:
  - a. get rid of some of the answers that you know are not correct and then choose among the rest;
  - b. read through all of the answers very carefully, and then go back to the question. Sometimes you can pick up clues just by thinking about the different answers you have been given;
  - c. if you get stuck on a question, skip it and come back later; and
  - d. guess... it is ok to guess on this test. Try to make your best guess after you have gotten rid of some of the answers.
- On grid-in items, write your answer in the spaces above the grid, check that you’ve correctly written the answer and be sure to fill in all of the bubbles underneath each number you wrote.
- On open-ended items, be sure to show all of your work and reread your explanations to be sure that they are clear.
- Pace yourself. If you come to a difficult question, it may be better to skip it and answer other questions. Then come back and really focus on the difficult questions one at a time.

### After the Test

- Before you turn your test in, check it over. Change an answer only if you have good reason. Generally it is better to stick with your first choice.
- Make sure you have marked an answer for every question, even if you had to guess.
- Make sure your answer booklet is clearly marked, and erase any stray marks.

## Programmatic Shifts that Raise Student Achievement

On September 6, 1995, several Connecticut educational leaders, representing an urban, suburban and rural school district, addressed the State Board of Education about their respective records of consistently high Mastery Test scores.

Ten recurring themes summarize what is occurring in their districts:

1. **A clear mission** to empower all students and a **nonnegotiable commitment** to high levels of performance and student achievement permeate all of the educational activities within the district.
2. **High expectations** are set by the board of education, central office administrators, principals and teachers, communicated clearly to students and parents, and closely monitored on a regular basis. These expectations are tangibly evident in everyday interactions at all levels.
3. The **alignment of curriculum, instruction and assessment** is an ongoing process to ensure that what is taught, how it is taught, and how well it is learned are interwoven components of the educational program in every discipline.
4. **Professional development** is a continuous, priority activity. Neither an add-on nor another burden, high-quality opportunities for professional growth and interaction are tailored to meet specific and clearly identified needs. Professional development is carried out most often at the classroom level, but information and training is spread quickly and evenly throughout the district.
5. **Principals** are expected and empowered to be the instructional leaders of their schools. They are site-based managers who are given the flexibility to take risks and held accountable for high levels of student performance. They are allowed to fail and try again, but there is no tolerance for excuses.
6. **Support for students and teachers** is provided in many systemic ways. For example, resource teachers are available to work closely with teachers and students, Saturday Academies are run, flexible scheduling is adopted to better meet individual student needs, and thinking skills are embedded into the curriculum for all students – not just gifted students.
7. **Parents** are seen as indispensable partners for attaining high levels of student achievement. They are kept informed and welcomed to participate in school activities. Their opinions are genuinely solicited.
8. **Teaching to the test** is not viewed as cheating or unprofessional. Instead, the guiding belief is that when the tests are good and measure what we want students to know and be able to do, then teaching in ways that best prepare students to show their best on such

tests is good practice and makes sense. As one of the educators noted, "The CMT isn't a tool of domination, we see it is as tool of empowerment." However, using actual, live test items as part of instruction or preparation is viewed as cheating and unethical, and is strictly prohibited.

9. **Close and regular monitoring** of student progress, and teacher and administrator performance takes place. This ongoing self-evaluation results in a cycle of continuous adjustment and improvement, as no one is ever fully satisfied with the current level of accomplishment.

10. A "**culture of success**" pervades each school and each classroom. The entire school community takes pride in and celebrates student achievement. Teachers are expected to ensure daily successful experiences for every child so that self-esteem grows from concrete academic accomplishments.

The bottom line in these three school districts, and in other consistently high-achieving districts across Connecticut, is that there are **no secret formulas or quick fixes, nor are excuses tolerated**. Instead, one finds a great deal of **focused commitment, targeted support, high expectations and hard work** by the professionals in each of these districts.

On February 3, 1999, a second set of district personnel addressed the State Board of Education regarding initiatives that have contributed to increases in CMT scores. Among the specific activities they credited with helping improve achievement were:

1. the creation and effective use of a professional training center to carry out the great majority of professional development for reading, writing and mathematics instruction;
2. building-level, subject-area (reading and mathematics) resource teachers who are available to work with students and teachers;
3. a periodically updated core curriculum whose classroom-level implementation is monitored closely;
4. a regular schedule for updating textbooks;
5. regular opportunities – formal and informal – for professional sharing among staff members both within schools and across district;
6. sharing data, informally and anonymously, with teachers comparing their results with those of their peers;
7. regular use and analysis of CMT off-year assessments – including teacher scoring – so that all teachers are involved in improvement efforts;
8. mandatory summer school and/or Saturday academies for students achieving below expectations;
9. a strong assistant administrator who provides leadership by overseeing and monitoring all of the above; and
10. targeted, focused and wise use of additional State funds, especially priority district funds and reading grants.



## **PART III**

### **Miscellaneous Resources**

**Key Mathematics Vocabulary Expected for the CMT**

**Test Blueprints for Off-Level Grades 3, 5 and 7 CMT**

**Discipline-Based Professional Teaching Standards for  
Teachers of Mathematics**



# Key Mathematics Vocabulary Expected for the CMT

## Grade 4

Add	Hour	Quarter
Angle	Inch	Reasonable
Bar graph	Least	Rectangle
Centimeter	Less	Segment
Change (as in money)	Less than	Set
Circle	Line segment	Shaded
Closest	Meter	Shape
Day	Minute	Shortest
Days of the Week	More	Side
Dime	More than	Size
Divide	Most	Sort
Estimate	Multiply	Spinner
Fewer	Nearest	Square
Figure (as in geometric figure)	Nickel	Story problem
First	Number	Subtract
Foot	Number fact	Table
Fraction	Number line	Tallest
Fractional part	Number sentence	Tens
Graph	Ones	Triangle
Greatest	Parallelogram	Unshaded
Grid	Pattern	
	Pictograph	

## Key Mathematics Vocabulary Expected for the CMT

### Grade 6

Add	Highest	Pound
Angle	Hour	Quadrilateral
Area	Hundreds	Quarter
Bar graph	Inch	Reasonable
Centimeter	Kilometer	Rectangle
Change (as in money)	Least	Round(ed)
Chart	Length	Set
Circle	Less	Shaded
Closest	Less than	Shape
Common attribute	Line of symmetry	Short
Congruent	Line segment	Shortest
Data	Longer	Side
Day	Longest	Spinner
Decimal	Measure	Square
Dime	Meter	Square centimeter
Divide	Mile	Square inch
Equal	Minute	Square unit
Equation	Mixed number	Square yard
Equilateral	Month	Story problem
Equivalent	More	Subtract
Estimate	More than	Symmetry
Expression	Multiple	Table
Farthest	Multiply	Tens
Fewer	Nearest	Thousands
Figure (as in geometric figure)	Nickel	Trapezoid
Foot	Number	Triangle
Fraction	Number line	Unreasonable
Fractional Part	Number sentence	Unshaded
Gallon	Ones	Value
Geoboard	Parallelogram	Venn diagram
Graph	Pattern	Week
Greatest	Penny	Weight
Grid	Pentagon	Yard
Hexagon	Perimeter	Year
	Pictograph	

## Key Mathematics Vocabulary Expected for the CMT Grade 8

Add	Line graph	Right angle
Angle	Line plot	Right triangle
Area	Line of symmetry	Rotation
Bar graph	Line segment	Round(ed)
Centimeter	Liter	Scale
Chance	Lowest	Scientific notation
Change (as in money)	Mean	Second
Chart	Measure	Set
Circle	Measurement	Shape
Closest	Median	Shortest
Combinations	Meter	Similar
Cone	Mile	Sphere
Congruent	Milliliter	Spinner
Cube	Millimeter	Square
Cup	Minute	Square centimeter
Cylinder	Mixed number	Square foot
Day	More	Square inch
Decimal	More than	Square meter
Degree	Multiple	Square unit
Diameter	Multiply	Square yard
Divide	Number	Stem-and-Leaf plot
Dozen	Number line	Story problem
Equation	Number sentence	Subtract
Equilateral	Octagon	Symmetry
Equivalent	Ordered pair	Table
Estimate	Ounce	Temperature
Expression	Parallel	Tenth
Figure (as in geometric figure)	Parallelogram	Thermometer
Foot	Pattern	Three-dimensional
Fraction	Pentagon	Ton
Fractional part	Percent	Trapezoid
Gallon	Perimeter	Triangle
Graph	Point	Two-dimensional
Greatest	Pound	Unreasonable
Grid	Probability	Venn diagram
Hexagon	Product	Volume
Highest	Pyramid	Yard
Hour	Quadrilateral	
Hundredth	Quart	
Inch	Quotient	
Isosceles	Radius	
Kilometer	Range	
Least	Ratio	
Length	Reasonable	
Less	Rectangle	
Less than	Rectangular prism	
	Reflection	



**Test Blueprints for  
Off-Level  
Grades 3, 5 and 7 CMT**



## Connecticut Mastery Test – Third Generation

### Grade 3 Off-level Test Mathematics Content

Content Standards and Strands	Concepts and Skills Assessed
<b>Number Sense</b>	
<b>1. Place Value</b>	<p><b>1a. Identify alternative forms of expressing whole numbers (less than 100) using expanded notation</b></p> <p><b>1b. Identify alternative forms of expressing whole numbers (less than 100) by regrouping using pictures of bean sticks or base ten materials</b></p> <p><b>1c. Use place value concepts to interpret the meaning of numbers</b></p>
<b>2. Pictorial Representations of Numbers</b>	<p><b>2a. Identify numbers (less than 100) from pictures of bean sticks or base ten materials, and vice versa</b></p> <p><b>2b. Match unit fractions with pictorial representations of unit fractions (<math>\frac{1}{2}</math>, <math>\frac{1}{3}</math>, <math>\frac{1}{4}</math>, <math>\frac{1}{6}</math>)</b></p>
<b>3. Equivalent Fractions, Decimals and Percents</b>	Not tested at Grade 3
<b>4. Order, Magnitude and Rounding of Numbers</b>	<p><b>4a. Identify a number larger or smaller than a given set of numbers less than 100</b></p> <p><b>4b. Order whole numbers less than 100</b></p> <p><b>4c. Solve problems involving one or two more or less than a given number</b></p> <p><b>4d. Round whole numbers less than 100 in a context</b></p> <p><b>4e. Identify points representing whole numbers on a number line and vice versa</b></p>
<b>Operations</b>	
<b>5. Models for Operations</b>	<p><b>5a. Match addition or subtraction number fact sentences with pictures</b></p> <p><b>5b. Identify or write the appropriate operation or number sentence to solve a story problem</b></p> <p><b>5c. Write a story problem that matches a given addition or subtraction number sentence</b></p>
<b>6. Basic Facts</b>	<p><b>6a. Use objects to find addition facts to 18</b></p> <p><b>6b. Use objects to find subtraction facts to 18</b></p>
<b>7. Computation with Whole #'s and Decimals</b>	<b>7. Use bean sticks or other base ten materials to add one- and two-digit numbers with and without regrouping</b>
<b>8. Computation with Fractions</b>	Not tested at Grade 3

<b>9. Solve Word Problems</b>	<b>9. Solve simple story problems involving addition and subtraction facts using counters or other objects</b>
<b>Estimation and Approximation</b>	
<b>10. Numerical Estimation Strategies</b>	<b>Not tested at Grade 3</b>
<b>11. Estimating Solutions to Problems</b>	<b>11. Estimate a reasonable answer to a problem</b>
<b>Ratio, Proportion and Percent</b>	
<b>12. Ratios and Proportions</b>	<b>Not tested at Grade 3</b>
<b>13. Computation with Percents</b>	<b>Not tested at Grade 3</b>
<b>Measurement</b>	
<b>14a. Time</b>	<b>14a. Tell time to the nearest hour and half hour using analog and digital clocks</b>
<b>14b. Money</b>	<b>14b. Determine the value of a set of coins less than \$1.00 (pennies, nickels and dimes)</b>
<b>15. Approximating Measures</b>	<b>15. Estimate lengths using nonstandard units</b>
<b>16. Customary and Metric Measures</b>	<b>16a. Measure lengths using nonstandard units 16b. Identify an appropriate customary or metric unit (inch, foot, meter, centimeter) for a given situation</b>
<b>Spatial Relationships and Geometry</b>	
<b>17. Geometric Shapes and Properties</b>	<b>17. Identify and draw simple geometric figures (circle, square, triangle, rectangle)</b>
<b>18. Spatial Relationships</b>	<b>Not tested at Grade 3</b>
<b>Probability and Statistics</b>	
<b>19. Tables, Graphs and Charts</b>	<b>19a. Identify correct information from tables, graphs and charts 19b. Create simple bar graphs and pictographs from data in tables and charts</b>
<b>20. Statistics and Data Analysis</b>	<b>Not tested at Grade 3</b>

<b>21. Probability</b>	<b>Not tested at Grade 3</b>
<b>Patterns</b>	
<b>22. Patterns</b>	<b>22. Extend or complete patterns involving whole numbers and attributes and identify or state rules for given patterns</b>
<b>Algebra and Functions</b>	
<b>23. Algebraic Concepts</b>	<b>Not tested at Grade 3</b>
<b>Discrete Mathematics</b>	
<b>24. Classification and Logical Reasoning</b>	<b>24a. Identify objects that are the same or different by one attribute 24b. Sort objects into two groups by a common attribute</b>
<b>Integrated Understandings</b>	
<b>25. Mathematical Applications</b>	<b>25. Solve extended numerical and statistical problems</b>

**NOTE: All students will have a supply of 20 counters and 10 paper clips available to them. In addition, students will have a set of bean sticks or other base ten materials available.**



## Connecticut Mastery Test – Third Generation

### Grade 5 Off-level Test Mathematics Content

Content Standards and Strands	Concepts and Skills Assessed
<b>Number Sense</b>	
<b>1. Place Value</b>	<p>1a. Solve problems involving 10 and 100 more or less</p> <p>1b. Identify alternative forms of expressing whole numbers &lt;1,000 using expanded notation</p> <p>1c. Identify alternative forms of expressing whole numbers &lt;1,000 using regrouping</p> <p>1d. Use place value concepts to interpret the meaning of numbers</p>
<b>2. Pictorial Representations of Numbers</b>	<p>2a. Construct pictorial representations of fractions, decimals (tenths) and mixed numbers</p> <p>2b. Relate fractions and mixed numbers to pictorial representations, and vice versa</p> <p>2c. Relate decimals (0.1–2.9) to pictorial representations, and vice versa</p>
<b>3. Equivalent Fractions, Decimals and Percents</b>	<p>3. Relate equivalent fractions (using pictorial representations)</p>
<b>4. Order, Magnitude and Rounding of Numbers</b>	<p>4a. Order whole numbers less than 10,000</p> <p>4b. Describe the magnitude of whole #'s, fractions, mixed numbers and decimals (tenths)</p> <p>4c. Round whole numbers in a context</p> <p>4d. Identify points representing whole numbers, fractions and decimals on a number line</p>
<b>Operations</b>	
<b>5. Models for Operations</b>	<p>5a. Identify or write the appropriate operation or number sentence to solve a story problem</p> <p>5b. Write a story problem that matches a given addition, subtraction or multiplication number sentence</p>
<b>6. Basic Facts</b>	<p>6a. Find multiplication facts where one factor is 2, 3, 4, 5 or 10</p> <p>6b. Find division facts where one factor is 2, 3, 4, 5 or 10</p> <p>6c. Identify members of multiplication and division fact families from arrays</p>
<b>7. Computation with Whole #'s and Decimals</b>	<p>7a. Add and subtract 2- and 3-digit whole numbers and money amounts less than \$10.00</p>

<b>8. Computation with Fractions</b>	<b>Not tested at Grade 5</b>
<b>9. Solve Word Problems</b>	<b>9a. Solve one-step problems involving whole numbers and money amounts (all four operations)</b> <b>9b. Solve simple story problems involving addition and subtraction with extraneous information</b> <b>9c. Solve one-step problems and explain how the solution was determined</b>
<b>Estimation and Approximation</b>	
<b>10. Numerical Estimation Strategies</b>	<b>10a. Identify the best expression to find an estimate</b> <b>10b. Determine a reasonable estimate and describe the strategy used to make the estimate</b>
<b>11. Estimating Solutions to Problems</b>	<b>11a. Estimate a reasonable answer to a problem, including estimating change from \$1, \$5, \$10</b> <b>11b. Use estimation to make and defend decisions</b>
<b>Ratio, Proportion and Percent</b>	
<b>12. Ratios and Proportions</b>	<b>Not tested at Grade 5</b>
<b>13. Computation with Percents</b>	<b>Not tested at Grade 5</b>
<b>Measurement</b>	
<b>14. Time</b>	<b>14. Solve problems involving time and elapsed time</b>
<b>15. Approximating Measures</b>	<b>15. Estimate lengths and areas</b>
<b>16. Customary and Metric Measures</b>	<b>16a. Measure or draw lengths to the nearest inch, half-inch, or centimeter</b> <b>16b. Identify an appropriate customary or metric measure for a given situation</b>
<b>Spatial Relationships and Geometry</b>	
<b>17. Geometric Shapes and Properties</b>	<b>17a. Identify and draw geometric shapes and figures</b> <b>17b. Describe geometric shapes and figures</b>
<b>18. Spatial Relationships</b>	<b>Not tested at Grade 5</b>

<b>Probability and Statistics</b>	
<b>19. Tables, Graphs and Charts</b>	<b>19a. Identify correct information from tables, graphs and charts</b> <b>19b. Create bar graphs and pictographs from data in tables and charts</b>
<b>20. Statistics and Data Analysis</b>	<b>20. Draw and justify reasonable conclusions from tables, graphs and charts</b>
<b>21. Probability</b>	<b>21. Solve problems involving elementary notions of probability</b>
<b>Patterns</b>	
<b>22. Patterns</b>	<b>22. Extend or complete patterns involving whole numbers and attributes and identify or state rules for given patterns</b>
<b>Algebra and Functions</b>	
<b>23. Algebraic Concepts</b>	<b>Not tested at Grade 5</b>
<b>Discrete Mathematics</b>	
<b>24. Classification and Logical Reasoning</b>	<b>24. Solve problems involving the organization of data, including sorting objects by common attributes</b>
<b>Integrated Understandings</b>	
<b>25. Mathematical Applications</b>	<b>25. Solve extended numerical, spatial and statistical problems</b>



## Connecticut Mastery Test – Third Generation

### Grade 7 Off-level Test Mathematics Content

Content Standards and Strands	Concepts and Skills Assessed
<b>Number Sense</b>	
<b>1. Place Value</b>	<p>1a. Solve problems involving 100, 1,000, 10,000 more or less and 0.1 more or less than a given number</p> <p>1b. Identify alternative forms of expressing whole numbers &lt;100,000 using expanded notation and regrouping</p>
<b>2. Pictorial Representations of Numbers</b>	<p>2a. Construct pictorial representations of fractions, decimals (tenths and hundredths) and mixed numbers</p> <p>2b. Relate fractions, mixed numbers, decimals and percents to their pictorial representations and vice versa</p>
<b>3. Equivalent Fractions, Decimals and Percents</b>	<p>3a. Rename equivalent fractions and mixed numbers</p> <p>3b. Rename fractions and mixed numbers as equivalent decimals, and vice versa</p>
<b>4. Order, Magnitude and Rounding of Numbers</b>	<p>4a. Order whole numbers and decimals (tenths and hundredths)</p> <p>4b. Order fractions and mixed numbers</p> <p>4c. Describe the magnitude of whole numbers and decimals (tenths and hundredths)</p> <p>4d. Describe the magnitude of fractions and mixed numbers</p> <p>4e. Round whole numbers, fractions and decimals in a context</p> <p>4f. Locate points on number lines and scales, including fractions, decimals and integers</p>
<b>Operations</b>	
<b>5. Models for Operations</b>	<p>5a. Identify or write the appropriate operation or number sentence to solve a story problem</p> <p>5b. Write story problems from equations involving fractions and decimals</p>
<b>6. Basic Facts</b>	Not tested at grade 7
<b>7. Computation with Whole #'s and Decimals</b>	<p>7a. Add and subtract 2-, 3- and 4- digit whole numbers and decimals</p> <p>7b. Multiply and divide whole numbers and decimals by 10, 100 and 1,000</p> <p>7c. Multiply and divide 2- and 3-digit whole numbers and money amounts by 1-digit numbers and decimals</p> <p>7d. Identify the correct placement of the decimal point in multiplication and division of decimals by one digit numbers</p>

<b>8. Computation with Fractions</b>	<p>8a. Add and subtract fractions and mixed numbers with reasonable and appropriate denominators</p> <p>8b. Multiply whole numbers and fractions by fractions and mixed numbers</p>
<b>9. Solve Word Problems</b>	<p>9a. Solve 1-step problems involving whole numbers, fractions, decimals and money amounts</p> <p>9b. Solve two-step problems involving whole numbers, decimals, fractions and mixed numbers, including averaging</p> <p>9c. Solve two-step problems involving whole numbers, decimals, fractions and mixed numbers with extraneous information</p> <p>9d. Solve two-step problems and explain how the solution was determined</p>
<b>Estimation and Approximation</b>	
<b>10. Numerical Estimation Strategies</b>	<p>10a. Identify the best expression to find an estimate</p> <p>10b. Identify whether and why a particular strategy will result in an overestimate or an underestimate</p> <p>10c. Determine a reasonable estimate and describe the strategy used to make the estimate</p>
<b>11. Estimating Solutions to Problems</b>	<p>11a. Estimate a reasonable answer to a problem, including estimating change</p> <p>11b. Use estimation to make and defend decisions</p>
<b>Ratio, Proportion and Percent</b>	
<b>12. Ratios and Proportions</b>	<b>12. Solve problems involving ratios</b>
<b>13. Computation with Percents</b>	<b>Not tested at Grade 7</b>
<b>Measurement</b>	
<b>14. Time</b>	<b>Not tested at Grade 7</b>
<b>15. Approximating Measures</b>	<b>15. Estimate lengths, areas and angle measures</b>
<b>16. Customary and Metric Measures</b>	<p>16a. Solve problems involving the conversion of units of measure, including time</p> <p>16b. Measure or determine perimeter, area and volume</p> <p>16c. Identify appropriate customary or metric measures or units (length, area, volume, capacity, mass) for a given situation</p>

<b>Spatial Relationships and Geometry</b>	
<b>17. Geometric Shapes and Properties</b>	17a. Identify and draw geometric shapes and figures 17b. Describe and classify geometric shapes and figures
<b>18. Spatial Relationships</b>	18a. Identify and draw lines of symmetry 18b. Identify geometric transformations 18c. Identify congruent and similar figures 18d. Locate and draw points on grids
<b>Probability and Statistics</b>	
<b>19. Tables, Graphs and Charts</b>	19a. Identify correct information from tables, graphs and charts 19b. Create bar graphs and line graphs from data in tables and charts
<b>20. Statistics and Data Analysis</b>	20a. Draw and justify reasonable conclusions from tables, graphs and charts 20b. Solve problems involving means and medians of sets of data
<b>21. Probability</b>	21. Solve problems involving elementary notions of probability and fairness, including justifying answers
<b>Patterns</b>	
<b>22. Patterns</b>	22. Extend or complete patterns involving whole numbers and attributes, and identify or state rules for given patterns
<b>Algebra and Functions</b>	
<b>23. Algebraic Concepts</b>	23a. Solve simple 1-step algebraic equations 23b. Evaluate expressions and use formulas
<b>Discrete Mathematics</b>	
<b>24. Classification and Logical Reasoning</b>	24. Solve problems involving the organization of data, including sorting objects by common attributes
<b>Integrated Understandings</b>	
<b>25. Mathematical Applications</b>	25. Solve extended numerical, spatial and statistical problems



# **Discipline-Based Professional Teaching Standards For Teachers Of Mathematics**

## **I. Mathematical Content**

Teachers responsible for mathematics instruction at all levels understand the key concepts and procedures of mathematics, including ideas from number systems and number theory, geometry and measurement, statistics and probability, algebra and functions, discrete mathematics and concepts of calculus, and have a broad understanding of the K-12 mathematics curriculum.

## **II. Mathematical Tasks**

Teachers of mathematics pose tasks that provide the stimulus for students to think about mathematical concepts and procedures, their connections with other mathematical ideas, and their applications to real-world contexts. These tasks encourage students to reason about mathematical ideas, and to formulate, grapple with and solve problems.

## **III. Mathematical Discourse**

Teachers of mathematics orchestrate discourse that is founded on mathematical ways of knowing and ways of communicating. This discourse fosters the development of critical mathematics processes – problem solving, reasoning, communication and making mathematical connections – and influences students' dispositions toward doing mathematics.

## **IV. Learning Environment**

Teachers of mathematics are responsible for creating an intellectual environment in which mathematical thinking is the norm. Teachers create an environment that supports and encourages mathematical reasoning and encourages students to make conjectures, experiment with alternative approaches to solving problems, and construct and respond to the mathematics arguments of others.

## **V. Analysis of Learning and Teaching**

Teachers of mathematics use a variety of strategies to continuously monitor students' capacity and inclination to analyze situations, frame and solve problems, and make sense of mathematical concepts and procedures. Teachers use such information about students to assess not just how students are doing, but also to appraise how well the mathematical tasks, discourse and environment are working together to foster students mathematical power and what changes need to be made in response.

