

## Grade Four Math Curriculum Implementation Guide 2005 – 2006

The *Investigations in Number, Data, and Space* Curriculum is the core mathematics curriculum for grade four for Cambridge Public Schools. Several resources have been selected to complement the *Investigations* Curriculum and to help teachers and students meet all of the MA Framework Mathematics Learning Standards. We have carefully selected *Investigations* units and investigations within units that will help teachers and students best meet the expectations of the MA State Framework. Please note that the **Teacher Notes** and **Dialogue Boxes** within each *Investigations* unit are an important resource for teacher professional development in content and pedagogy.

### SUPPLEMENTS AND RESOURCES

We have selected several resources for use with the *Investigations* curriculum. The book *Groundworks* was selected as a supplement to provide students with experiences in patterns, relations, and algebra that are similar to problems they will encounter on MCAS. The *Math to Know* handbook and resource books were selected so teachers can easily provide supplemental practice or address some of the standards that are not introduced in *Investigations*. The **24 Games** are an additional resource to help students strengthen computational fluency and number sense. We suggest teachers use these resources in the following manner:

- Morning work (Do Now)
- 10 Minute Math
- Homework

Please note that where designated on the CPS pacing chart the MA Standard is only addressed through the work in *Math to Know* or *Groundworks*.

The **Ten Minute Math Activities** and **Games** are an integral part of the *Investigations* Curriculum. They are essential and should not be skipped. The **Ten-Minute Math Activities** and **Games** are where students deepen their understanding of concepts, make connections and develop automaticity and fluency with basic facts and computation skills.

### SIGNIFICANT CHANGES

The changes to the grade four pacing chart are the same as last year:

The unit, *Money, Miles and Large Numbers* is no longer on the grade four pacing chart. Instead teachers should incorporate work with addition and subtraction of larger numbers into the first unit, *Landmarks in the Thousands*.

*Seeing Solids and Silhouettes* has also been taken off the pacing chart because it does not directly address the grade four MA Framework Geometry standards. An important change in the grade four pacing chart is in the Geometry strand. In order to help our students better prepare for MCAS and meet the MA Framework Geometry standards we have put together investigations from several grade three and grade four *Investigations* geometry units. ***If you do not already have two or more sets of geometric solids you will need to purchase them or borrow them from a younger grade teacher.*** You may wish to use the investigations not included in the pacing chart as additional exploration and enrichment. We have been careful to build in “buffer” time that will allow teachers to assess and provide additional experiences according to their students’ needs and interests.

In order to provide easier access to the investigations from units you might not have, we have copied and included those in this packet. Enclosed, please find:

- ***Mathematical Thinking at Grade 4***, Investigation 4, Sessions 1 -4
- ***Exploring Solids and Boxes***, Grade 3, Investigation 1, Sessions 1 and 2 and Student Sheet # 6
- ***Flips, Turns, and Area***, Grade 3, Investigation 1, Sessions 2 and 3 (on paper and computer activities)
- Page 21 Distributive Property from ***Packages and Groups*** (It may not be in earlier editions of the unit)
- **Ten-Minute Math Activities** – *What is Likely?, Likely or Unlikely?, Exploring Data.*

All of the other work for grade four is in the following units:

*Landmarks in the Thousands* (The Number System)  
*Arrays and Shares* (Multiplication and Division)  
*Different Shapes, Equal Pieces* (Fraction and Area)  
*The Shape of the Data* (Statistics)  
*Changes Over Time* (Graphs)  
*Packages and Groups* (Multiplication and Division)  
*Sunken Ships and Grid Patterns* (2-D Geometry)  
*Three Out of Four Like Spaghetti* (Data and Fractions)

***The most significant change to the pacing chart for 2005- 2006 is:***

***Navigating Through Geometry (NCTM) – We have ordered this book for all grade four teachers. Please note additional work to be done from this book as reflected in the pacing chart. Books will be sent to you when they arrive. A workshop will be offered to all grade four teachers and specialists on October 20 to help familiarize you with the work in this book.***

Please let us know if you do not have access to any of the supplemental materials or units and we will help to locate them for you. We look forward to hearing from you this year. Let us know what went well and what you would like to see changed. We would also appreciate hearing from you about other supplemental resources you may find useful.

## 2005-2006 PACING CHART FOR GRADE 4

It is important to follow the pacing chart. The new quarterly exams will reflect what is happening at those times in the year listed on the pacing chart.

Unit	Alignment with Math Frameworks	Number of Weeks	Supplements	Quarterly Information
<p><b>Landmarks in the Thousands (The Number System)</b> Investigations 1 – 4</p>	<p><b>Number Sense and Operation</b> (4.N.1, 4.N.2, 4.N.7, 4.N.9, 4.N.10, 4N.12, 4.N.17)</p>	<p>Sept 6 – Oct 14 (6 Weeks)</p>	<p><i>Use Math To Know Teacher's Resource Book</i> For practice with:</p> <ul style="list-style-type: none"> <li>• Pre-assessment Student Self-Assessment Rubric page 9</li> <li>• place value, reading and writing large numbers pages 10 – 13 (4.N.1, 4.N.2)</li> <li>• basic operations, properties and relationships pages 24 – 30 (4.N.9, 4.N.10, 4.N.12, 4.N.14)</li> <li>• Estimation and rounding pages 71 and 77 (4.N.16, 4.N.17)</li> <li>• Computing with whole numbers (4.N.12)</li> </ul> <p>The <i>Math to Know Handbook</i> may be used as a teaching reference for teachers and students.</p>	
<p><b>1. Mathematical Thinking at Grade 4.</b> Investigation 4, Sessions 1- 4 (Making Geometric Patterns) (See handout enclosed) <b>2. Flips, Turns, and Area</b> (grade 3), Investigation 1, Sessions 2 and 3 (Slides, Flips and Turns) (See handout enclosed) <b>3. Sunken Ships and Grid Patterns.</b> Investigation 1 (Locating Houses and Ships on a Grid), Session 1-6 <i>NOTE CHANGE</i> <b>4. Exploring Solids and Boxes</b> (grade 3), Investigation 1, Sessions 1 and 2 (Sorting and Describing Solids) (See handout enclosed, including student sheet #6)</p>	<p><b>Geometry</b> (4.G.7, 4.G.8)</p> <p><b>Patterns, Relations, and Algebra</b> (4.P.1, 4.P.4)</p> <p><b>Geometry</b> (4.G.1 and 4.G.2)</p> <p><b>Geometry</b> (4.G.7)</p> <p><b>Geometry</b> (4.G.6)</p>	<p>Oct 17 – Dec 9 (8 - 9 Weeks)</p>	<p><i>Use Navigating through Geometry in Grades 3 -5 to supplement the four Investigations in column one. Do:</i></p> <ol style="list-style-type: none"> <li>1. With Mathematical Thinking at Grade 4 do <i>Patchwork Symmetry</i> pg. 49-51 and <i>Learn the Secret Code</i> pg. 52-54 (4.G.7, 4.G.8)</li> <li>2. With Flips, Turns, and Area do <i>Tetrominoes Cover Up</i> pg. 61-63, <i>Motion Comotion</i> pg. 64 -67, and <i>Puzzles with Pizzas</i> pg. 77-79 (4.G.7, 4.G.9)</li> <li>3. With Sunken Ships and Grid Patterns <i>optional -X's and O's</i> pg. 40 -43 and <i>do Can They Be The Same</i> pg. 44-46 (4.G.3, 4.G.5, 4.G.6)</li> </ol> <p>With Exploring Solids and Boxes do <i>Build What I've Created</i> (Use as an introduction or a pre-assessment) pg. 11-14, <i>Thinking about Triangles</i> pg. 15-21 (be sure to extend questions to squares and rectangles), <i>Roping in Quadrilaterals</i> pg. 22-25, <i>Building Solids</i> pg. 26 -30, and <i>optional - Searching for the Perfect Solids</i> pg 31 -34 (a nice extension activity). (4.G.1, 4.G.2, 4.G.3, 4.G.4, 4.G.5, 4.G.7) Use Math To Know Teacher's Resource Book For additional practice with:</p> <ul style="list-style-type: none"> <li>• Plane figures page 170 – 171 (4.G.4)</li> <li>• Point, lines, angles page 166 – 168 (4.G.5)</li> <li>• Congruence and similarity page 181 (4.G.3)</li> </ul> <p>The Math to Know Handbook may be used as a teaching reference for teachers and</p>	<p>First Quarter Assessment – <b>Oct. 31 - Nov. 10</b> Assessment will include <i>Landmarks in the Thousands</i> (Inv 1-4),</p>

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<p><b><u>Arrays and Shares</u></b> (Multiplication and Division)  <b>Investigation 1, Session 3 ONLY</b> (Skip Counting and Multiplying)  <b>Investigation 2, (Arrays), Sessions 1 - 8</b>  <b>Investigation 3, Sessions 1 – 5 (Multiplication and Division with Two-digit Numbers)</b></p> <p><b><u>Packages and Groups</u></b> (Multiplication and Division)  <b>Investigation 1, Sessions 1,2, 4 and 5 (Making a Multiplication Table and Multiples of Larger Numbers) DO NOT DO SESSION 3.</b>  <b>Investigation 2, Sessions 1 – 3 (Double-digit Multiplication)</b>  <b>Investigation 3, Sessions 1 – 10 (Multiplication and Division Choices)</b>  <i>Essential to read and use Page 21, Distributive Property in Multiplication – Using Arrays to Solve 1-digit x 2-digit problems.</i>  <i>(See handout enclosed)</i></p>	<p><b>Number Sense and Operations</b>                      (4.N.7, 4.N.8, 4.N.9, 4.N.10, 4.N.11, 4.N.12, 4.N.13, 4.N.17)</p>	<p>Dec 12 – Feb 3                      (6 - 7 Weeks)</p>	<p><b>Use Math To Know Teacher’s Resource Book for <i>additional</i> practice with: Multiplication and division Pages 32 – 43.</b></p> <p>The <b>Math to Know Handbook</b> may be used as a teaching reference for teachers and students for explicit instruction in the use of conventional algorithms for addition, subtraction, multiplication and division pages 144 – 207. (4.N.14 and 4.N.15).</p>	<p>Second Quarter Assessment  <b>Jan 17 - 31</b> Assessment will include <u>Mathematical Thinking at Grade 4</u> (Inv.4), <u>Flips, Turns, and Area</u> (Inv. 1: sessions 2 and 3), <u>Sunken Ships and Grid Patterns</u> (Inv. 1), Work from <u>Navigating Through Geometry Grades 3-5</u>, and <u>Arrays &amp; Shares</u> (Inv. 1-3) and <u>Packages a&amp; Groups</u> (Inv. 1 - 3)</p>
<p><b><u>Different Shapes, Equal Pieces</u></b> (Fractions and Area)  <b>Investigations 1 – 3</b></p> <p><b><u>Three Out of Four Like Spaghetti</u></b> (Data and Fractions)  <b>Investigation 1, Sessions 1 –4 (Using Fractions to Describe Data)</b></p> <p><b>The measurement unit, <u>Money, Miles and Large Numbers</u>, is not included in this pacing chart. See supplement column for measurement resources.</b></p>	<p><b>Number Sense and Operation</b>                      (4.N.3, 4.N.4, 4.N.5, 4.N.6, 4.N.18)  <b>Geometry (4.G.9)</b></p> <p><b>Number Sense and Operations</b>                      (4.N.3, 4.N.4, and 4.N.5)</p>	<p>Feb 6 – March 31                      (5 – 6 Weeks)</p>	<p><b>In addition to Different Shapes, Equal Pieces and Three Out of Four Like Spaghetti use Math to Know Teacher’s Resource Book, pages 18 - 20 and Math to Know Handbook, pages 22 –30 for work with decimals.</b> (4.N.4, 4.N.5, 4.N.6)</p> <p>Although grade four students will encounter investigations that address measurement throughout several units, we suggest using <b>Math to Know Teacher’s Resource Book pages 188 – 210</b> and <b>Math to Know Handbook pages 333 – 363</b> to teach and practice measurement concepts and skills. (4.M.1 - 4. M.5)</p>	

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<p><b>The Shape of the Data</b> (Statistics) Investigation 1, Sessions 1 and 2 (Introduction to Data Analysis)</p> <p><b>Changes Over Time</b> (Graphs) Investigation 1, Sessions 1 – 6 (Graphing Population Changes) <b>DO NOT DO INVESTIGATION 2</b> Investigation 3, Sessions 1 –7 (Telling Stories From Line Graphs)</p> <p>Do the following Ten-Minute Math Activities throughout this period: <i>Exploring Data</i> (Packages and Groups) <i>What Is Likely?</i> (Landmarks in the Thousands and Three Out of Four Like Spaghetti) <i>Likely or Unlikely?</i> (Money, Miles and Large Numbers). (See handout enclosed)</p>	<p style="text-align: center;"><b>Data Analysis, Statistics and Probability</b> (4.D.1 and 4.D.3)</p> <p style="text-align: center;"><b>Data Analysis, Statistics and Probability</b> (4.D.1, 4.D.2 and 4.D.3)</p> <p style="text-align: center;"><b>Patterns, Relations, and Algebra</b> (4.P.2 and 4.P.3)</p> <p style="text-align: center;"><b>Data Analysis, Statistics and Probability</b> (4.D.1, 4.D.2, 4.D.3, 4.D.4 and 4.D.6)</p>	<p>April 3 – May 31 (5 – 6 Weeks)</p>	<p><b>Use Math To Know Teacher’s Resource Book</b> For practice with:</p> <ul style="list-style-type: none"> <li>• Different types of Graphs page 161 (4.D.2)</li> <li>• Combinations (4.D.5)</li> <li>• Function Machines pages 142 - 144</li> </ul> <p>Statistics and Probability page 150 - 165 Also, see <b>Math To Know Handbook</b> page 298 – 299, Counting Possible Outcomes (4.D.5).</p> <p>In <i>addition</i> to Changes Over Time, use <b>Groundworks</b> for practice with Patterns, Relations, and Algebra (4.P.1, 4.P.2, 4.P.3, 4.P.5, and 4.P.6). May be used as additional Ten-Minute Math activities, morning work or homework.</p>	<p>Third Quarter Assessment <b>Mar 27-Apr 7</b> Assessment will include <i>Different Shapes, Equal Pieces</i> (Inv 1-3), <i>Three out of Four Like Spaghetti</i> (Inv 1-4), and the Measurement Supplements</p> <p style="text-align: center;"><b>MCAS</b> <b>May</b></p>