

**INSTRUCTIONAL IMPROVEMENT PLAN 2006-2007  
CURRICULUM AREA: Mathematics 7-12**

**GOAL:** By the year 2007, 90% of students will achieve 3 or 4 on the NCLB State Math Assessments for grades 7/8 and 95% of students will achieve a 65% or higher on the Math A Regents Exam.

**OBJECTIVE:** In the 2006-07 school year, 90% of students will receive a 3 or 4 on the NCLB State Math Assessments for grades 7/8 and 95%\* of students will receive a 65% or higher on the Math A Regents Exam. \*(achieved in 2005 and 2006)

**TARGETED STUDENT AUDIENCE:** Students in grades 7-12.

**NEEDS ASSESSMENT:** Students enter 7<sup>th</sup> grade lacking procedural knowledge and with low conceptual understanding of math, under-developed problem solving skills in math, poor vocabulary skills and low reading comprehension. (McRel differentiates Mathematics from the other core subject areas in terms of time needed to teach procedures and content. Whereas Science and Social Studies are heavy on content and English is heavy on process, only Math is approximately 50-50 for each.) These causes were discovered through analyses of student work on Intermediate Math Assessments and Math A and Math B Regents exams. See appendix A.

STRATEGIES/ ACTIVITIES	TIME	PARTICIPANTS	LEAD PERSON	BUDGET	RESULTS OF STRATEGY ACTIVITIES	✓ If professional development or indicate request
<p>1. Math teachers will increase the amount of time for practice of math procedures in the classroom.</p> <ul style="list-style-type: none"> <li>• Implement warm-ups – Teacher-generated Mathercise journals.</li> <li>• Use guided practice –Prentice Hall Guided Problem Solving Masters for gr. 7/8 and McRel’s Graphic Organizer for 5</li> </ul>	<p>3-5 mins. per class</p> <p>When introducing a new topic</p>	<p>A. Bridy A. Courtwright D. Harris J. Lewis D. Gallagher M. Strong P. Winans P. Wangerman</p>	<p>A. Bridy</p>	<p>0</p> <p>0</p>	<ul style="list-style-type: none"> <li>• Students will review previously learned procedures and become more proficient with new ones.</li> <li>• Students will learn proper mathematical procedures and will show complete work.</li> </ul>	<p>✓</p>

<p><b>Step Problem Solving</b></p> <ul style="list-style-type: none"> <li>• <b>Use cooperative learning activities such as those in Kagan’s “Cooperative Learning &amp; Mathematics: High School Activities”</b></li> <li>• <b>Progress days will be used to focus on technology, including but not limited to websites and graphing calculators.</b></li> </ul>	<p><b>Once every 2 weeks</b></p> <p><b>Once every 8 days</b></p>			<p><b>0</b></p> <p><b>0</b></p>	<ul style="list-style-type: none"> <li>• <b>Students will improve their math techniques while modeling their skills for others.</b></li> <li>• <b>Students will become adept at using technology. It will become a permanent part of their mathematical toolkit.</b></li> </ul>	
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<p><b>2. Math teachers will increase the amount of time dedicated to vocabulary development , reading comprehension, math facts retention, and symbol recognition and usage.</b></p> <ul style="list-style-type: none"> <li>• <b>Develop math vocabulary lists.</b></li> <li>• <b>Develop facts/formula sheets for Math</b></li> <li>• <b>On Progress Days, students will be quizzed on vocabulary, new and old.</b></li> <li>• <b>Write vocabulary idea web cards (Frayer model and concept circles)</b></li> </ul>	<p>Per grade level</p> <p>Per grade level</p> <p>Once every 8 days</p> <p>Per unit</p>	<p><b>Math (7-12) department</b></p>	<p><b>A. Bridy</b></p>	<p><b>0</b></p> <p><b>0</b></p> <p><b>0</b></p> <p><b>0</b></p>	<ul style="list-style-type: none"> <li>• <b>Students will become more familiar with mathematical vocabulary.</b></li> <li>• <b>Students will retain mathematical facts/formulas.</b></li> <li>• <b>Students will improve understanding and usage of mathematical terms and symbols.</b></li> <li>• <b>Students' prior knowledge of vocabulary will be activated and new words will be acquired.</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>In-house development of grade level vocabulary lists.</b></li> <li>• <b>In-house development of the facts/formula sheets</b></li> <li>• <b>In-house development of vocabulary quizzes</b></li> </ul>
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<ul style="list-style-type: none"><li>• <b>Present a consistent method of studying for math tests. (Students will be required to maintain a binder organizing math materials.)</b></li></ul>	<p><b>Display in each math room and distribute a copy to all students of math.</b></p>			<p><b>0</b></p>	<ul style="list-style-type: none"><li>• <b>Students will be better prepared for math tests and will have better organizational skills which will lead to better performance.</b></li></ul>	<ul style="list-style-type: none"><li>• <b>In-house development through collaboration with computer lab and library personnel</b></li></ul>
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<p><b>3. Within the realm of the Community of Caring, the math department will work with other school personnel to develop a program to help students and their parents to understand the uniqueness of math instruction.</b></p> <ul style="list-style-type: none"> <li>• Present to the Jr. High Parents Group an overview of the math curriculum and the math dept. policies.</li> <li>• The Math Dept. Homework Policy will be distributed to all 7-12 math students.</li> </ul>	<p>November meeting</p> <p>As Soon As Possible in Sept.</p>	<p>Junior High parents</p> <p>7-12 graders and all math teachers (7-12)</p>	<p>A. Bridy</p>	<p>0</p> <p>0</p>	<ul style="list-style-type: none"> <li>• Students, their parents, and all school personnel will develop a sense of community as members of LaFayette High School</li> <li>• Students will develop greater ownership of their learning and their math skills will improve</li> </ul>	<p>✓</p>
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**MILESTONES:** During the 2006-07 school year, 80% of grade 7-12 students will receive 85% or higher on unit test questions.

**EVALUATIONS:** During the 2006-07 school year, 80% of grade 7-12 students will receive 85% or higher on midterms and final exams.

# **APPENDIX A**

This appendix contains the data analyses done by individual teachers in reference to the state assessments for Math 7, Math 8, Math A and Math B. This information was shared with the math department and discussed in order to create the Instructional Improvement Plan for Math 7-12 for 2006-07.

## **Explanatory notes for the data analysis**

Each of the four state math tests was analyzed. Spreadsheets for Math 7, Math A and Math B were created.

For the multiple choice questions (MC), the numbers 1,2,3,4 refer to the choices available to answer each question. For the open ended responses (OE), the numbers 0,1,2,3,4,5,6 refer to the number of points the student received for that particular question with the total number of points available listed after the abbreviation OE.

In the columns with the possible choices, the number of students who selected that choice is listed and in **bold** for the correct choice. In the columns with the number of points, the number of students who received that amount of points is listed.

For Math 7 and 8, a list of patterns of student errors was generated.

The new curriculum is in force for Math 7 and 8, so both the multiple choice questions and the open ended response questions were categorized and analyzed according to the content and the process strands. Math A and Math B follow the older “core curriculum” and these tests were looked at through the Key Idea structure.

## NYS Math7 Assessment: March 2006

Q #	% correct	Strand #	Q Type	1	2	3	4
1	87	1	Mc	5	1	2	<b>54</b>
2	94	3	Mc	<b>58</b>	1	3	0
3	76	1	Mc	2	10	<b>47</b>	3
4	47	1	Mc	26	6	1	<b>29</b>
5	85	5	Mc	1	4	<b>53</b>	3
6	77	4	Mc	0	5	9	<b>48</b>
7	95	5	Mc	0	2	<b>59</b>	1
8	74	2	Mc	7	0	<b>46</b>	8
9	73	1	Mc	4	<b>45</b>	2	10
10	69	1	Mc	5	12	<b>43</b>	2
11	77	2	Mc	6	<b>48</b>	2	6
12	90	5	Mc	1	2	3	<b>56</b>
13	56	1	Mc	4	<b>35</b>	7	16
14	50	2	Mc	<b>31</b>	18	10	2
15	69	1	Mc	10	<b>43</b>	4	4
16	56	4	Mc	10	4	13	<b>35</b>
17	90	3	Mc	5	<b>56</b>	0	1
18	74	1	Mc	1	1	14	<b>46</b>
19	39	3	Mc	15	<b>24</b>	18	5
20	81	4	Mc	2	3	5	<b>50</b>
21	98	5	Mc	0	<b>61</b>	0	1
22	66	1	Mc	2	18	<b>41</b>	1
23	74	2	Mc	<b>46</b>	5	8	2
24	39	4	Mc	6	22	<b>24</b>	9
25	48	5	Mc	9	16	7	<b>30</b>
26	92	5	Mc	0	5	<b>57</b>	0
27	92	3	Mc	3	<b>57</b>	2	0
28	71	1	Mc	13	0	<b>44</b>	5
29	44	3	Mc	22	<b>27</b>	6	7
30	58	5	Mc	3	<b>36</b>	13	10

Test Analysis of Part 2

Q31: **Strand #5: Statistics and Probability**

**7.S.6** Read and interpret data represented graphically

**Possible errors:**

- misunderstanding of the question
- inadequate explanation
- choice of graph not necessarily the *best* choice

Q32: **Strand #3: Geometry**

**7.G.2** Calculate the **volume** of prisms and **cylinders**, using a given formula and a calculator

**Possible errors:**

- calculated surface area instead of volume
- error in rounding
- failure to use formula sheet to determine formula
- failure to show adequate work

Q33: **Strand #2: Algebra**

**7.A.4** Solve multi-step equations by combining like terms, using the distributive property, or moving variables to one side of the equation

**Possible errors**

**(in part a):**

- computation error
- inadequate work shown
- set up equation incorrectly

**(in part b):**

- confusion as to the definition of "difference"

- inadequate work shown
- failure to determine "amount of money raised" per team

Q34: **Strand #4: Measurement**

**7.M.8** Draw central angles in a given circle using a protractor  
(Circle graphs)

**7.M.9** Determine the tool and **technique** to measure with an appropriate level of precision

and

**Strand #5: Statistics and Probability**

**7.S.2** Display data in a circle graph

**Possible errors:**

- Poor directions- students were graded on work that was not explicitly asked for
- Protractor that was provided was **not** easily available to students for practice **prior** to actual assessment- protractor is difficult to "punch-out" of regular computer paper, if printed
- Lack of labels
- Confusion of " %" with " ° "
- Lack of accuracy when creating central angles

Q35: **Strand #4: Measurement**

**7.M.2** Convert **capacities** and volumes within a given system

**Possible errors:**

- Failure to convert from grams to kilograms (or kg to g)
- Incorrect conversion of grams to kilograms (or kg to g)
- Failure to subtract weight of suitcase from total
- Inadequate work shown

Q36: **Strand #3: Geometry**

**7.G.4** Determine the surface area of **prisms** and cylinders, using a calculator and a variety of methods

**Possible errors:**

- Confusion of surface area vs. volume
- Failure to use formula on formula sheet
- Failure to understand formula on formula sheet
- Confusion as to whether or not the box had a "lid"

Q37: **Strand #5: Statistics and Probability**

**6.S.3** Construct Venn diagrams to sort data

**Possible errors**

**(in part a):**

- Post-March 6<sup>th</sup> grade topic
- Failure to title, label or place a number in each section of the diagram

**(in part b):**

- Failure to subtract the number of students who participated in BOTH sports from each of the individual sports

Q38: **Strand #2: Algebra**

**7.A.8** Create algebraic patterns using charts/tables, graphs, equations and expressions

**Possible errors:**

- Wording of the question was open to interpretation- should have said "Between which 2 *consecutive* years did the population increase most?"
- Failure to *justify* the prediction
- Failure to specify "*in millions*" as opposed to simply stating the decimal value

- Failure to conclude the increments are generally 0.5 (in millions)

**General observations/conclusions:**

After analyzing the data and reviewing the test questions, it seems that:

- Student explanations need to be more thorough
- Students must practice using the "actual" tools that will be provided during the "actual" test
- Students must practice using the provided "formula sheet"
- Students must be able to recognize the difference between surface area and volume
- Teachers must review the 6<sup>th</sup> grade post-March topics

NYS 7<sup>th</sup> & 8<sup>th</sup> Grade Mathematics Tests, 2006  
Error Patterns Found in Part I

1. Misunderstanding of what the question is asking in percent problems. (sale price vs. sales tax vs. what was saved)
2. Using exponents to multiply
3. Confusing the definitions of GCF and LCM
4. Distributing only to first term when multiplying using parentheses.
5. Negative times a negative is a positive. Negative plus a negative is a negative.
6. Adding the variables to combine like terms. Should only add the coefficients
7. When dividing a monomial by a monomial, when the top exponent is smaller, it produces a negative exponent.
8. When changing a verbal expression to an algebraic expression, pay close attention to where the numbers go. Which number goes with which operation?
9. Parentheses when adding polynomials. This is a distractor - many students multiply when they see parentheses.
10. A number raised to a power is multiplied by itself, not by the exponent.
11. Usage of absolute value in expressions.
12. Finding a common factor, but not the GCF.
13. Changing from scientific notation to standard form and vice-versa.
14. Doubling (multiplying by 2) instead of squaring a number.
15. Difference between sum and product.
16. "At least" has the same meaning as "greater than or equal to."

Question #28      Strand 2: Number Sense & Operations      8N.4: Apply percents to tax, sales.

Possible errors: misreading of question, calculation errors, sales tax computed incorrectly or not added to partial product.

Question #29      Strand 3: Geometry      8G.4: Determine angle pair relationships when given 2 parallel lines cut by a transversal

Possible errors: thought angles were complementary or congruent instead of supplementary, explanation unclear or not detailed enough.

Question #30      Strand 4: Measurement      7<sup>th</sup> post-march indicator for scale and proportion

Possible errors: set up proportion incorrectly, incorrect scale used, measured incorrectly

Question #31      Strand 2: Algebra      8A.14: Solve equations by combining like terms, using distributive property, moving variable from side to side.

Possible errors: calculation errors, distribute only to 1<sup>st</sup> term, combine unlike terms, explanation of distributive property unclear or incomplete.

Question #32      Strand 3: Geometry      7<sup>th</sup> post-March, Pythagorean theorem.

Possible errors: substituted into formula incorrectly, rounded incorrectly

Question #33:      Strand 2: Algebra      8A.19: Interpret multiple representations using equation, table of values, graph.

Possible errors: rule written incorrectly, table completed incorrectly, slope and y-intercept interchanged.

Question #34:      Strand 4: Measurement      7<sup>th</sup> post-March, unit pricing.

Possible errors: calculation error, found price per pound incorrectly, reading the question

Question #35:      Strand 3: Geometry      7<sup>th</sup> post-March, Pythagorean theorem.

Possible errors: explanation incomplete, application of theorem incorrect.

Question #36:      Strand 2: Algebra      8A12: Apply algebra to determine the measure of angles formed by parallel lines cut by a transversal.

Possible errors: Angles thought to be supplementary instead of congruent, solving the equation incorrectly.

Question #37: Strand 3: Geometry 8G.10: Draw the image of a figure under a translation.

Possible errors: not labeled as instructed, reflected instead of translated.

Question #38: Strand 2: Algebra 8A.14: Solve equations by moving the variable from one side to the other.

Possible errors: computational errors

Question #39: Strand 1: Number Sense and Operations 8N.4: Apply percent to tax and sales.

Possible errors: reading, adding 25% rather than subtracting, and subtracting tax rather than adding it.

Question #40: Strand 4: Measurement 7<sup>th</sup> Post-March, proportions.

Possible errors: setting up a proportion incorrectly

Question #41: Strand 2: Algebra 8A.14: Solve equations by using distributive property and combining like terms.

Possible errors: distributed only to first term, combined unlike terms, computational error

Question #42 Strand 2: Algebra 8A.19: Interpret multiple representations using equation, table of values and graph.

Possible errors: computational, function notation missing, confusing y-intercept and slope.

Question #43 Strand 3: Geometry 8G.9: Draw the image of a figure over a given line.

Possible errors: reflected over the y-axis, labeled incorrectly.

Question #44 Strand 1: Number Sense & Operations 8N.4: Apply percent to sales.

Possible errors: explanation incomplete, difficulty reading with understanding what the problem is asking.

Question #45 Strand 4: Measurement 8M.1: Solve equations/proportions to convert equivalent measurements.

Possible errors: reading with understanding what the problem is asking, conversions and computation.

### Some Overall Conclusions:

In looking at parts 2 & 3, it is obvious more time needs to be spent reviewing the post-7 indicators; they were quite heavily tested. The concentration seems to be on a few indicators and not spread out at all, at least on this first new test. Not as heavy on reading as the past 8<sup>th</sup> grade tests.

Math A: June 15, 2006

Percent Passing: 65-100: **88.1%** 55-100: **100%**

Q #	% Correct	Std. #	Q Type	Max Point	1	2	3	4
1	90.4	4	MC	2	2	1	<b>38</b>	1
2	76.1	7	MC	2	2	4	<b>32</b>	4
3	83.3	3	MC	2	0	2	5	<b>35</b>
4	66.7	3	MC	2	5	3	5	<b>28</b>
5	80.9	6	MC	2	<b>34</b>	3	5	0
6	83.3	4	MC	2	3	3	<b>35</b>	1
7	80.9	6	MC	2	<b>34</b>	0	7	1
8	61.9	5	MC	2	7	5	4	<b>26</b>
9	76.1	2	MC	2	3	5	2	<b>32</b>
10	61.9	5	MC	2	0	<b>26</b>	14	2
11	42.9	4	MC	2	2	7	<b>18</b>	15
12	57.1	7	MC	2	7	<b>24</b>	8	3
13	50.0	7	MC	2	5	2	<b>21</b>	14
14	80.9	1	MC	2	3	1	4	<b>34</b>
15	71.4	4	MC	2	5	5	2	<b>30</b>
16	66.7	2	MC	2	6	<b>28</b>	8	1
17	47.6	4	MC	2	7	<b>20</b>	12	3
18	54.8	5	MC	2	0	<b>23</b>	17	2
19	78.6	4	MC	2	4	3	<b>33</b>	2
20	40.5	7	MC	2	<b>17</b>	5	12	8
21	35.7	4	MC	2	<b>15</b>	4	19	4
22	47.6	1	MC	2	7	12	<b>20</b>	3
23	23.8	3	MC	2	<b>10</b>	6	8	18
24	30.9	2	MC	2	24	0	5	<b>13</b>
25	30.9	3	MC	2	1	19	<b>13</b>	4
26	61.9	4	MC	2	4	<b>26</b>	3	9
27	35.7	3	MC	2	15	<b>15</b>	3	7
28	54.8	3	MC	2	<b>23</b>	15	1	3
29	40.5	4	MC	2	8	5	<b>17</b>	11
30	19.0	6	MC	2	19	7	8	<b>8</b>

The number of students who selected the correct choice is in bold.

Q#	%Correct	Std #	Q type	Max point	0 pt	1 pt	2 pt	3 pt	4 pt
31	56.0	5	OE-2	2	15	7	20		
32	50.0	6	OE-2	2	16	10	16		
33	22.6	5	OE-2	2	30	5	7		
34	58.3	7	OE-2	2	14	7	21		
35	90.5	3	OE-2	2	2	4	36		
36	45.2	7	OE-3	3	13	14	2	13	
37	82.5	5	OE-3	3	1	3	13	25	
38	54.8	7	OE-4	4	11	8	4	0	19
39	58.9	5	OE-4	4	9	1	7	16	9

## Results by Standard

## Math A 2006

	Question #	Percent Correct	Question type – # of points	Average points Earned
1 – Mathematical Reasoning				64.2%
2 Questions	14	80.9	MC	
	22	47.6	MC	
2 – Number and Numeration				57.9%
3 Questions	9	76.1	MC	
	16	66.7	MC	
	24	30.9	MC	
3 – Operations				55.1%
7 Questions	3	83.3	MC	
	4	66.7	MC	
	23	23.8	MC	
	25	30.9	MC	
	27	35.7	MC	
	28	54.8	MC	
	35	90.5	OE-2	
4 – Modeling Multiple Representation				61.4%
9 Questions	1	90.4	MC	
	6	83.3	MC	
	11	42.9	MC	
	15	71.4	MC	
	17	47.6	MC	
	19	78.6	MC	
	21	35.7	MC	
	26	61.9	MC	
	29	40.5	MC	

5 – Measurement				59.0%
7 Questions	8	61.9	MC	
	10	61.9	MC	
	18	54.8	MC	
	31	56.0	OE-2	
	33	22.6	OE-2	
	37	82.5	OE-3	
	39	58.9	OE-4	
6 – Uncertainty				57.7%
4 Questions	5	80.9	MC	
	7	80.9	MC	
	30	19.0	MC	
	32	50.0	OE-2	
7 – Patterns and Functions				54.0%
7 Questions	2	76.1	MC	
	12	57.1	MC	
	13	50.0	MC	
	20	40.5	MC	
	34	58.3	OE-2	
	36	45.2	OE-3	
	38	54.8	OE-4	

Q #	% Correct	Std. #	Q type	Max Point	0	1	2	3	4	5	6
1		7		2		0	1	<b>22</b>	0		
2		3		2		<b>21</b>	1	1	0		
3		5		2		0	<b>21</b>	2	0		
4		7		2		0	1	0	<b>22</b>		
5		3		2		0	1	<b>22</b>	0		
6		2		2		<b>15</b>	4	2	2		
7		7		2		<b>20</b>	0	1	2		
8		5		2		2	<b>21</b>	0	0		
9		5		2		5	1	<b>13</b>	4		
10		7		2		<b>19</b>	0	1	3		
11		3		2		5	<b>18</b>	0	0		
12		7		2		2	<b>16</b>	1	4		
13		4		2		1	0	1	<b>21</b>		
14		2		2		3	1	6	<b>13</b>		
15		3		2		1	<b>17</b>	4	1		
16		4		2		4	2	0	<b>17</b>		
17		7		2		<b>14</b>	2	6	1		
18		4		2		8	<b>14</b>	1	0		
19		6		2		4	4	<b>15</b>	0		
20		5		2		<b>10</b>	11	2	1		
21		4		2							
22		5		2							
23		4		2							
24		6		2							
25		6		2							
26		5		2							
27		4		4							
28		2		4							
29		7		4							
30		7		4							
31		6		4							
32		4		4							
33		1		6							
34		5		6							

## Results by Standard:

	Question #	Percent Correct	Question Type-pts	Avg Pts Earned
<b>1 – Mathematical Reasoning</b>				<b>86.3 %</b>
1 Question	33	86.3	OE-6	
<b>2 – Number and Numeration</b>				<b>62.3 %</b>
3 Questions	6	65.3	MC	
	14	56.5	MC	
	28	63	OE-4	
<b>3 – Operations</b>				<b>84.8 %</b>
4 Questions	2	91.3	MC	
	5	95.7	MC	
	11	78.3	MC	
	15	73.9	MC	
<b>4 – Modeling Multiple Representation</b>				<b>62.6 %</b>
7 Questions	13	91.3	MC	
	16	73.9	MC	
	18	60.9	MC	
	21	91.3	OE-2	
	23	69.6	OE-2	
	27	9.8	OE-4	
	32	78.3	OE-4	
<b>5 – Measurement</b>				<b>68.9 %</b>
7 Questions	3	91.3	MC	
	8	91.3	MC	
	9	56.5	MC	
	20	43.5	MC	
	22	87	OE-2	
	26	58.7	OE-2	
	34	63.8	OE-6	
<b>6 – Uncertainty</b>				<b>75.2 %</b>
4 Questions	19	65.3	MC	
	24	60.9	OE-2	
	25	71.7	OE-2	

	31	89.1	OE-4	
7 – Patterns and Functions				<b>75.9 %</b>
8 Questions	1	95.7	MC	
	4	95.7	MC	
	7	87	MC	
	10	82.6	MC	
	12	69.6	MC	
	17	60.9	MC	
	29	76.1	OE-4	
	30	57.6	OE-4	

Open ended = total points earned/ total points possible