

# MATH – GRADE 3

## Assessment Anchors & Eligible Content

Pennsylvania Department of Education  
2005

V05 3-1

### M3.A Numbers and Operations

#### M3.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.

<p><b>M3.A.1.1</b> Apply place-value concepts and numeration to counting, ordering, grouping and equivalency.</p> <p><b>Reference:</b> 2.1.3.C, 2.1.3.F, 2.11.3.A</p>	<p><b>M3.A.1.1.1</b> Match the word name with the appropriate whole number (up through 9,999).</p> <p><b>M3.A.1.1.2</b> Differentiate between an even and odd number.</p> <p><b>M3.A.1.1.3</b> Compare two whole numbers using greater than (&gt;), less than (&lt;) or equal to (=) (up through 9,999).</p> <p><b>M3.A.1.1.4</b> Order a set of whole numbers from least to greatest or greatest to least (up through 9,999; limit sets to no more than four numbers).</p> <p><b>M3.A.1.1.5</b> Match a symbolic representation of numbers to appropriate whole numbers (e.g., place value blocks, 7 hundreds, 4 tens and 8 ones, etc).</p>
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V05 3-2

### M3.A Numbers and Operations

#### M3.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.

<p><b>M3.A.1.2</b> Use fractions to represent quantities as part of a whole.</p> <p><b>Reference:</b> 2.1.3.D</p>	<p><b>M3.A.1.2.1</b> Match the fraction to the appropriate drawing or part of a set.</p>
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V05 3-3

### M3.A Numbers and Operations

#### M3.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.

<p><b>M3.A.1.3</b> Count, compare and make change using a collection of coins and one-dollar bills.</p> <p><b>Reference:</b> 2.1.3.E</p>	<p><b>M3.A.1.3.1</b> Count a collection of bills and coins less than \$5.00 (penny, nickel, dime, quarter, dollar).</p> <p><b>M3.A.1.3.2</b> Compare total values of combinations of coins less than \$5.00 (penny, nickel, dime, quarter, dollar).</p> <p><b>M3.A.1.3.3</b> Make change for an amount up to \$5.00 with no more than \$2.00 change given (penny, nickel, dime, quarter, dollar).</p>
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V05 3-4

**M3.A Numbers and Operations**  
**M3.A.2 Understand the meanings of operations, use operations and understand how they relate to each other.**

<p><b>M3.A.2.1</b> Understand various meanings of operations and the relationship between them.   <b>Reference:</b>  <b>2.1.3.K, 2.2.3.C, 2.5.3.C</b></p>	<p><b>M3.A.2.1.1</b> Understand the relationship between operations or arrays.</p> <ul style="list-style-type: none"> <li>• Represent multiplication as repeated addition.</li> <li>• Demonstrate the inverse relationship between addition and subtraction using fact families.</li> </ul> <p><b>M3.A.2.1.2</b> Choose the correct operation(s) to solve a word problem (no more than 2 operations using +, - and/or x).</p>
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V05 3-5

**M3.A Numbers and Operations**  
**M3.A.3 Compute accurately and fluently and make reasonable estimates.**

<p><b>M3.A.3.1</b> Solve problems using addition, subtraction and multiplication (straight computation and word problems).   <b>Reference:</b>  <b>2.1.3.L, 2.2.3.B</b></p>	<p><b>M3.A.3.1.1</b> Solve single- and double- digit addition and subtraction problems with regrouping in vertical and horizontal form.</p> <p><b>M3.A.3.1.2</b> Solve problems involving multiplication through the 9's tables through 9x5.</p>
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V05 3-6

**M3.A Numbers and Operations**  
**M3.A.3 Compute accurately and fluently and make reasonable estimates.**

<p><b>M3.A.3.2</b> Use estimation skills to arrive at conclusions.   <b>Reference:</b>  <b>2.2.3.E</b></p>	<p><b>M3.A.3.2.1</b> Estimate sums and differences of quantities; round 2-digit numbers to the nearest 10, and 3-digit numbers to the nearest 100, before computing (limit to two numbers).</p> <p><b>M3.A.3.2.2</b> Round whole numbers to the nearest ten, hundred or thousand (no higher than 9000).</p>
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V05 3-7

**MATH – GRADE 5**  
**Assessment Anchors & Eligible Content**  
**Pennsylvania Department of Education**  
**2005**

V05 5-1

**M5.A Numbers and Operations**  
**M5.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.**

<p><b>M5.A.1.1</b> Express numbers in equivalent forms.   <b>Reference:</b>  <b>2.1.5.A</b></p>	<p><b>M5.A.1.1.1</b> Use expanded notation to represent whole numbers or decimals (whole numbers less than 10,000,000 and decimals to hundredths).</p>
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V05 5-2

**M5.A Numbers and Operations**  
**M5.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.**

<p><b>M5.A.1.2</b> Demonstrate understanding of place value of whole numbers and decimals.   <b>Reference:</b>  <b>2.1.3.I</b></p>	<p><b>M5.A.1.2.1</b> Read and write decimal numbers through the thousandths.   <b>M5.A.1.2.2</b> Identify the number with its place value (from millions to thousandths).</p>
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V05 5-3

**M5.A Numbers and Operations**  
**M5.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.**

<p><b>M5.A.1.3</b> Compare quantities or magnitudes of numbers.   <b>Reference:</b>  <b>2.11.5.A</b></p>	<p><b>M5.A.1.3.1</b> Compare whole numbers through 9 digits using the words more, less, equal, least, most, greater than, less than or the symbols <math>&lt;</math>, <math>&gt;</math>, <math>=</math>.   <b>M5.A.1.3.2</b> Compare and/or order decimals through the thousandths.   <b>M5.A.1.3.3</b> Compare proper fractions to 16ths with like and unlike denominators.</p>
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V05 5-4

**M5.A Numbers and Operations**  
**M5.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.**

<p><b>M5.A.1.4</b> Use simple applications of negative numbers (number line, counting, temperature).   <b>Reference:</b>  <b>2.1.5.F</b></p>	<p><b>M5.A.1.4.1</b> Identify negative numbers on a number line (greater than or equal to -20).   <b>M5.A.1.4.2</b> Identify negative numbers on a thermometer (<math>^{\circ}</math>C or <math>^{\circ}</math>F).</p>
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V05 5-5

## M5.A Numbers and Operations

### M5.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.

<b>M5.A.1.5</b> Use or develop models to represent fractions and/or mixed numbers. <b>Reference:</b> <b>2.1.5.D</b>	<b>M5.A.1.5.1</b> Use or develop regions and/or sets (e.g., circle graph, hundred-blocks) to model fractions and mixed numbers to hundredths (may include reducing the fractions).
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V05 5-6

## M5.A Numbers and Operations

### M5.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.

<b>M5.A.1.6</b> Apply number theory concepts (i.e., primes, factors, multiples, composites). <b>Reference:</b> <b>2.1.5.E</b>	<b>M5.A.1.6.1</b> Name/identify prime and composite numbers less than or equal to 100. <b>M5.A.1.6.2</b> List/identify factors and/or multiples of a given number less than or equal to 50.
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V05 5-7

## M5.A Numbers and Operations

### M5.A.2 Understand the meanings of operations, use operations and understand how they relate to each other.

<b>M5.A.2.1</b> Solve problems involving decimals, fractions and/or whole numbers (straight computation or word problems). <b>Reference:</b> <b>2.2.5.A, 2.2.5.B, 2.2.5.C, 2.2.5.I</b>	<b>M5.A.2.1.1</b> Solve problems involving addition, subtraction, multiplication and division of whole numbers (multipliers up to 2 digits – divisors of one digit) and decimals (answer to hundredths – whole number divisors).
	<b>M5.A.2.1.2</b> Solve problems involving addition and subtraction of fractions (to 16ths – like and unlike denominators – for unlike denominators, the LCD must be one of the given denominators).
	<b>M5.A.2.1.3</b> Choose the correct operation(s) to solve a problem (no more than 2 operations).

V05 5-8

## M5.A Numbers and Operations

### M5.A.3 Compute accurately and fluently and make reasonable estimates.

<b>M5.A.3.1</b> Apply estimation strategies to a variety of problems. <b>Reference:</b> <b>2.2.5.D, 2.2.5.E, 2.2.5.G</b>	<b>M5.A.3.1.1</b> Round whole numbers through millions and decimals through hundredths. <b>M5.A.3.1.2</b> Use estimation to solve problems involving whole numbers and/or decimals (up to 2-digit multipliers, single-digit divisors or multiples of 10; whole numbers to thousands and decimals to hundredths).
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V05 5-9

**M5.A Numbers and Operations**  
**M11A.3 Compute accurately and fluently and make reasonable estimates.**

**M5.A.3.2** Compute accurately without the use of a calculator (straight computation or 1 operation word problems).  
**Reference:**  
**2.2.5.A**

**M5.A.3.2.1** Use addition, subtraction, multiplication and division to compute accurately without a calculator (multipliers up to 2 digits, single - digit whole number divisors or multiples of 10 – whole numbers to thousands and decimals to hundredths).

V05 5-10

**MATH – GRADE 8**  
**Assessment Anchors & Eligible Content**  
 Pennsylvania Department of Education  
 2005

V05 8-1

**M8.A Numbers and Operations**  
**M8.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.**

**M8.A.1.1** Represent numbers in equivalent forms.  
**Reference:**  
**2.1.8.A, 2.1.8.B**

**M8.A.1.1.1** Convert fractions, decimals and/or percents to equivalent forms (e.g.,  $1/3 = 33\ 1/3\% = .333$ ).

**M8.A.1.1.2** Use scientific notation or exponential forms to express numbers.

**M8.A.1.1.3** Find the square or cube of a whole number and/or the square root of a perfect square (without a calculator).

V05 8-2

**M8.A Numbers and Operations**  
**M8.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.**

**M8.A.1.2** Compare quantities or magnitudes of real numbers.  
**Reference:**  
**2.1.8.C**

**M8.A.1.2.1** Locate or plot decimals, fractions, mixed numbers and/or integers on a number line (a mix of these number forms may be on the same number line).

**M8.A.1.2.2** Order a set (up to 5 numbers) of decimals, fractions, mixed numbers and/or integers from least to greatest (a mix of these number forms may be in the same set).

V05 8-3

**M8.A Numbers and Operations**  
**M8.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.**

<p><b>M8.A.1.3</b> Apply number theory concepts.   <b>Reference:</b>  <b>2.1.5.G</b></p>	<p><b>M8.A.1.3.1</b> Use divisibility rules for 2, 3, 5 and 10 to draw conclusions and/or solve problems.</p> <p><b>M8.A.1.3.2</b> Find and/or use the Greatest Common Factor (GCF) and/or Least Common Multiple (LCM) of 2 or 3 numbers.</p>
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V05 8-4

**M8.A Numbers and Operations**  
**M8.A.2 Understand the meanings of operations, use operations and understand how they relate to each other.**

<p><b>M8.A.2.1</b> Complete calculations by applying the order of operations.   <b>Reference:</b>  <b>2.2.8.A</b></p>	<p><b>M8.A.2.1.1</b> Simplify expressions involving integers, using the order of operations (include all types of grouping symbols – parentheses, brackets, braces).</p>
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V05 8-5

**M8.A Numbers and Operations**  
**M8.A.2 Understand the meanings of operations, use operations and understand how they relate to each other.**

<p><b>M8.A.2.2</b> Represent or solve problems using rates, ratios, proportions and/or percents.   <b>Reference:</b>  <b>2.1.8.D, 2.3.8.B</b></p>	<p><b>M8.A.2.2.1</b> Select or use ratios, proportions and percents to solve problems (e.g., tax, discounts, etc. – straight computation or word problems).</p> <p><b>M8.A.2.2.2</b> Represent or solve rate problems (e.g., unit rates, simple interest, distance, etc.). Students may be asked to solve for any term (formulas provided on the reference sheet for distance and interest).</p>
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V05 8-6

**M8.A Numbers and Operations**  
**M8.A.3 Compute accurately and fluently and make reasonable estimates.**

<p><b>M8.A.3.1</b> Determine the appropriateness of overestimating, underestimating or calculating an exact answer in problem-solving situations.   <b>Reference:</b>  <b>2.2.8.F</b></p>	<p><b>M8.A.3.1.1</b> Identify, apply and/or explain when it is appropriate to round up or round down.</p> <p><b>M8.A.3.1.2</b> Identify, apply and/or explain when an exact answer is needed or when estimation is appropriate.</p>
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V05 8-7

**M8.A Numbers and Operations**  
**M8.A.3 Compute accurately and fluently and make reasonable estimates.**

<p><b>M8.A.3.2</b> Use estimation strategies in problem-solving situations.   <b>Reference:</b>  <b>2.2.8.D</b></p>	<p><b>M8.A.3.2.1</b> Estimate answers to problems involving simple percents (1%, 10%, 15%, 20%, 25%, 50% or 75%).</p>
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V05 8-8

**M8.A Numbers and Operations**  
**M8.A.3 Compute accurately and fluently and make reasonable estimates.**

<p><b>M8.A.3.3</b> Compute and/or explain operations with integers, fractions and/or decimals.   <b>Reference:</b>  <b>2.2.8.B</b></p>	<p><b>M8.A.3.3.1</b> Add, subtract, multiply and/or divide integers, fractions and/or decimals with and without a calculator (straight computation or word problems).</p>
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V05 8-9

**MATH – GRADE 11**  
**Assessment Anchors & Eligible Content**  
 Pennsylvania Department of Education  
 2005

V05 11-1

**M11.A Numbers and Operations**  
**M11.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.**

<p><b>M11.A.1.1</b> Represent and/or use numbers in equivalent forms (e.g., integers, fractions, decimals, percents, square roots, exponents and scientific notation).   <b>Reference:</b>  <b>2.1.8.A, 2.1.8.B, 2.1.11.A</b></p>	<p><b>M11.A.1.1.1</b> Represent and/or use fractions as decimals and percents (item may ask for 2 of any of these 3 – change percent to fraction, change fraction to decimal, etc.).</p> <p><b>M11.A.1.1.2</b> Find the square root of an integer using either a calculator or estimation (integer may or may not be a perfect square – answer may be a range of values).</p> <p><b>M11.A.1.1.3</b> Express numbers and/or simplify expressions using scientific notation (including numbers less than 1).</p> <p><b>M11.A.1.1.4</b> Simplify square roots (e.g., the square root of 24).</p>
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V05 11-2

**M11.A Numbers and Operations**  
**M11.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.**

<b>M11.A.1.2</b> Apply number theory concepts to show relationships between real numbers in problem solving settings.  <b>Reference:</b> <b>2.1.8.E</b>	<b>M11.A.1.2.1</b> Factor algebraic expressions, including difference of squares and trinomials (trinomials limited to the form $ax^2+bx+c$ where $a$ is not equal to 0).
	<b>M11.A.1.2.2</b> Find the Greatest Common Factor (GCF) for sets of monomials and/or factor polynomial expressions using the greatest common monomial factor.
	<b>M11.A.1.2.3</b> Simplify algebraic fractions.

V05 11-3

**M11.A Numbers and Operations**  
**M11.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.**

<b>M11.A.1.3</b> Estimate the value of an irrational number.  <b>Reference:</b> <b>2.2.8.C</b>	<b>M11.A.1.3.1</b> Compare and/or plot irrational numbers at the approximate location on a number line.
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V05 11-4

**M11.A Numbers and Operations**  
**M11.A.2 Understand the meanings of operations, use operations and understand how they relate to each other.**

<b>M11.A.2.1</b> Apply ratio and/or proportion in problem-solving situations.  <b>Reference:</b> <b>2.2.11.A,</b> <b>2.8.11.P</b>	<b>M11.A.2.1.1</b> Solve problems using operations with rational numbers including rates and percents (single and multi-step and multiple procedure operations) (e.g., distance, work and mixture problems, etc.).
	<b>M11.A.2.1.2</b> Solve problems using direct and inverse proportions.
	<b>M11.A.2.1.3</b> Identify and/or use proportional relationships in problem solving settings.

V05 11-5

**M11.A Numbers and Operations**  
**M11.A.2 Understand the meanings of operations, use operations and understand how they relate to each other.**

<b>M11.A.2.2</b> Use exponents, roots and/or absolute value to solve problems.  <b>Reference:</b> <b>2.1.11.A</b>	<b>M11.A.2.2.1</b> Simplify expressions involving positive and negative exponents, roots and/or absolute value (may contain all types of real numbers – exponents should not exceed 10).  <b>M11.A.2.2.2</b> Simplify expressions involving multiplying with exponents (e.g., $x^6 * x^7 = x^{13}$ ), powers of powers (e.g., $(x^6)^7=x^{42}$ ) and powers of products $(2x^2)^3=8x^6$ (positive exponents only).
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V05 11-6

**M11.A Numbers and Operations**  
**M11.A.3 Compute accurately and fluently and make reasonable estimates.**

**M11.A.3.1** Apply the order of operations in computation and in problem-solving situations.

**Reference:**  
**2.2.8.A**

**M11.A.3.1.1** Simplify expressions using the order of operations to solve problems (any rational numbers may be used).

V05 11-7

**M11.A Numbers and Operations**  
**M11A.3 Compute accurately and fluently and make reasonable estimates.**

**M11.A.3.2** Use estimation strategies in problem-solving situations.

**Reference:**  
**2.2.11.B,**  
**2.2.11.D**

**M11.A.3.2.1** Use estimation to check reasonableness of calculations in problem solving situations involving rational numbers (e.g., significant digits; rounding not to exceed 3 decimal places).

**M11.A.3.2.2** Use estimation to solve problems for which an exact answer is not needed.

V05 11-8