

Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

| Content Standard: Number, Number Sense and Operations Grade 8-10 Benchmarks: A. Use scientific notation to express large numbers and numbers less than one. Content Organizer: Number and Number Systems | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 1. Use scientific notation to express numbers that are either large or between 0 and 1. | <p># 1 Subscale: Number and Numeracy</p> <p>Represent and use real numbers in a variety of equivalent forms.</p> <p>Understand the various forms of real numbers-fractions, percents, integers, exponential numbers, and scientific notation.</p> <p>Compare and order numbers in various forms.</p> <p>Determine an equivalent form for a given number.</p> <p>Determine which numbers within a group are not equivalent.</p> <p>Determine relative size or position on a number line.</p> <p>Irrational numbers included-square roots and π</p> | <p>I. Secondary Resource Accelerated Math Algebra Library # 273</p> <p>II. Additional Resource Internet Site www.edhelper.com/exponents15.htm</p> | <p>Introduce the lesson with an explanation of the need for a “short form” of long numbers.</p> <p>Space travel gives us large numbers and intercellular studies give us small numbers.</p> | <p>I. Secondary Resource Accelerated Math (Algebra Library # 273)) can be used to generate individual tests for assessment.</p> |

Mathematical Processes Standard – Students use mathematical processes and knowledge to solve problems. Students apply problem-solving and decision-making techniques, and communicate mathematical ideas. Mathematical processes are used in all content areas and should be incorporated within instruction and assessment of the content-specific standards and benchmarks.

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| Content Standard: Number, Number Sense and Operations Grade 8-10 Benchmarks: B. Identify subsets of the real number system. Content Organizer: Number and Number Systems | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 2. Recognize that real numbers form a system and that natural numbers, whole numbers, integers, rational numbers and irrational numbers are subsets of that system. | (None) | | Students make a Number Systems “Umbrella” | |

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| Content Standard: Number, Number Sense and Operations Grade 8-10 Benchmarks: G: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. Content Organizer: Computation and Estimation | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| <p>5. Determine when an estimate is sufficient and when an exact answer is needed in problem situations, and evaluate estimates in relation to actual answers; e.g., very close, less than, greater than.</p> | <p># 2 Subscale: Number and Numeracy Estimate and compute with real number. Use decimals, fractions, percents, integers, exponential numbers and absolute values (also includes irrationals such as square roots and π) Perform computation in problem-solving/real world context (ex. Apply division to find unit price of item, justify purchase – solve problems in context) Estimate an approximate answer/reasonableness of result. Computation using standard algorithms in isolation will not be assessed – problems will be in real-world type settings.</p> <p># 3 Subscale Number and Numeracy Set-up/solve problems using rates, ratios, proportions, percents, in problem—solving/real-world context (may require multiple steps) Percents may include consumer applications-discounts, interests, gratuities (ex. Successive percentage reductions-find sale price of item with 50% mark down and additional 20% off) Scale drawings Recognize/use multiple representations for situations with percents (25% reductions-same as 75% of original price.) Apply distance formula ($d=rt$) Common units of measure (Know basic conversion facts for units of measure-length, capacity, weight, and time within U.S. standard/metric systems-facts will not be on reference sheet)</p> | <p>I.. Secondary Resource TI-73 Graphing Calculator Workbook: “Graphing Calculator Activities for Enriching Middle School Mathematics” Activity 1 Estimation Games (p. 1)</p> | <p>Introduce the concept of estimation versus exactness with the idea of medication dosage and brain surgery requiring <u>exactness</u>, while estimating the cost of a new shirt which is 25% off.</p> | |

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| Content Standard: Number, Number Sense and Operations Grade 8-10 Benchmarks: G. Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. Content Organizer: Computation and Estimation | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 6. Estimate, compute and solve problems involving rational numbers, including ratio, proportion and percent, and judge the reasonableness of solutions | <p># 2 Subscale: Number and Numeracy Estimate and compute with real number. Use decimals, fractions, percents, integers, exponential numbers and absolute values (also includes irrationals such as square roots and π) Perform computation in problem-solving/real world context (ex. Apply division to find unit price of item, justify purchase – solve problems in context) Estimate an approximate answer/reasonableness of result. Computation using standard algorithms in isolation will not be assessed – problems will be in real-world type settings.</p> <p># 3 Subscale Number and Numeracy Set-up/solve problems using rates, ratios, proportions, percents, in problem—solving/real-world context (may require multiple steps) Percents may include consumer applications-discounts, interests, gratuities (ex. Successive percentage reductions-find sale price of item with 50% mark down and additional 20% off) Scale drawings Recognize/use multiple representations for situations with percents (25% reductions-same as 75% of original price.) Apply distance formula ($d=rt$) Common units of measure (Know basic conversion facts for units of measure-length, capacity, weight, and time within U.S. standard/metric systems-facts will not be on reference sheet)</p> | <p>I. Primary Resource <i>Connected Mathematics</i> “Looking for Pythagorous” Investigation 5 5-1 Analyzing the Wheel of Theodorus (pp. 53-55) 5-2 Representing Fractions as Decimals (p.56) 5-3 Exploring Repeating Decimals (pp. 57-58)</p> <p>II. Additional Resource “Discovering Mathematics with the TI-73: Activities for Grades 5 and 6” Activity 11 - Why Aren't There More Reds in My Bag? (p. 53) Activity 12 - Gemini Candy (p. 61)</p> | Because students receive grades in percentages, they have a good grasp of the concept. | <p>I. Primary Resource <i>Connected Mathematics</i> “Looking for Pythagorous” ACE Questions # 1-31 (pp. 59-62) Math Reflections # 1-5 (p. 63)</p> |

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| Content Standard: Number, Number Sense and Operations Grade 8-10 Benchmarks: C. Apply properties of operations and the real number system and justify when they hold for a set of numbers. Content Organizer: Meaning of Operations | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 4. Explain and use the inverse and identity properties and use inverse relationships (addition/subtraction, multiplication/division, squaring/square roots) to solve problems. | (None) | I. Primary Resource <i>Connected Mathematics</i> “Say It With Symbols” Investigation 3 <i>Connected Mathematics</i> “Looking for Pythagorus” Investigation 4 Journal Entry – Mathematical Reflections (p. 52) II. Additional Resource TI-73 Calculator Workbooks: “Walking the Line: Activities for the TI-73 Number Line” Activity 2: Integer Subtractions –What’s the Difference? (p. 13) “Discovering Math With the TI-73: Activities for Grades 5 & 6” Activity 6 How Totally Square (p. 27) Activity 7 How Totally Square - Part 11 (p. 31) | Score the journal entry using the extended response rubric of the OGT. Students should have time for group feedback and analysis of what constitutes an adequate response. Teachers should use this time to determine if misconceptions need to be cleared up. | I. Primary Resource <i>Connected Mathematics</i> “Say It With Symbols” ACE Questions (pp. 44-51) Journal Entry – Scored with Extended Response Rubric for OGT |

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| Content Standard: Number, Number Sense and Operations Grade 8-10 Benchmarks: H. Find the square root of perfect squares, and approximate the square root of non-perfect squares. Content Organizer: Computation and Estimation | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 7. Find the square root of perfect squares, and approximate the square root of non-perfect squares as consecutive integers between which the root lies; e.g., $\sqrt{130}$ is between 11 and 12. | <p># 1 Subscale: Number and Numeracy Represent and use real numbers in a variety of equivalent forms.</p> <p>Understand the various forms of real numbers- fractions, percents, integers, exponential numbers, and scientific notation.</p> <p>Compare and order numbers in various forms.</p> <p>Determine an equivalent form for a given number.</p> <p>Determine which numbers within a group are not equivalent.</p> <p>Determine relative size or position on a number line.</p> <p>Irrational numbers included-square roots and π</p> | <p>I. Primary Resource <i>Connected Mathematics</i> “Looking for Pythagoras” Investigation 2 (pp. 17-21)</p> <p>II. Additional Resources “Discovering Math with the TI-73: Activities for Grades 5 and 6” Activity 6: How Totally Square (p. 27) Activity 7: How Totally Square, Part 11 (p. 31)</p> | <p>Use Geoboards to “slice” rectangles into triangles in order to illustrate non-perfect square roots.</p> <p>Pythagorean Theorem should be used ($a^2 + b^2 = c^2$) in this activity.</p> | <p>I. Primary Resource <i>Connected Mathematics</i> “Looking for Pythagoras” # 1-15 (pp. 22-25)</p> |

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| Content Standard: Number, Number Sense and Operations Grade 8-10 Benchmarks: I. Estimate, compute and solve problems involving scientific notation, square roots and numbers with integer exponents Content Organizer: Computation and Estimation | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 8. Add, subtract, multiply, divide and compare numbers written in scientific notation. | <p># 2 Subscale: Number and Numeracy</p> <p>Estimate and compute with real number.</p> <p>Use decimals, fractions, percents, integers, exponential numbers and absolute values (also includes irrationals such as square roots and π)</p> <p>Perform computation in problem-solving/real world context (ex. Apply division to find unit price of item, justify purchase – solve problems in context)</p> <p>Estimate an approximate answer/reasonableness of result.</p> <p>Computation using standard algorithms in isolation will not be assessed – problems will be in real-world type settings.</p> | <p>I. Secondary Resource</p> <p>Accelerated Math</p> <p>Algebra Library</p> | | |

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| Content Standard: Number, Number Sense and Operations Grade 8-10 Benchmarks: I. Estimate, compute and solve problems involving scientific notation, square roots and numbers with integer exponents. Content Organizer: Meaning of Operations | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| <p>3. Apply order of operation to simplify expressions and perform computation involving integer exponents and radicals.</p> | <p># 2 Subscale: Number and Numeracy Estimate and compute with real number. Use decimals, fractions, percents, integers, exponential numbers and absolute values (also includes irrationals such as square roots and π) Perform computation in problem-solving/real world context (ex. Apply division to find unit price of item, justify purchase – solve problems in context) Estimate an approximate answer/reasonableness of result. Computation using standard algorithms in isolation will not be assessed – problems will be in real-world type settings.</p> <p># 1 Subscale: Number and Numeracy Understand the various forms of real numbers—fractions, percents, integers, exponential numbers, and scientific notation Compare and order numbers in various forms Determine an equivalent form for a given number Determine which numbers within a group are not equivalent Determine relative size or position on a number line Irrational numbers included-square roots and π</p> | <p>I. Primary Resource <i>Connected Mathematics</i> “Looking for Pythagoras” Investigation 2 Lessons 2.1-2.3 (pp. 17-21)</p> <p>ACE Questions #1-15 (pp. 22-25) Materials List T.E. p. 16h</p> <p>Journal entry – Mathematical Reflections # 1-3 (p. 26)</p> <p>II. Additional Resource TI-73 Calculator Workbooks “ Discovering Math with the TI-73: Activities for Grades 5 & 6” Activity 1 “What’s Your Address?” (p. 1)</p> | <p>Illustrations: Use with Lessons 2.1-2.3: Transparencies 2.1=2.3 Lab Sheets 2.1, 2.2, 2.3 ACE Students explore square roots of perfect squares by experimenting with squares on Geoboards. Students construct triangles and squares using Geoplex ® manipulatives to discover perfect squares and square roots that are irrational numbers. Students will better understand square roots by constructing squares using centimeter dot paper and centimeter rulers. (Encourage students to draw squares with base length that is not a whole number) Students will experiment with square roots by using Algebra Tiles to build squares, then find square roots.</p> <p><u>Vocabulary</u> (Students add the list below to their notebooks, then add definitions as the words take meaning). Student Notebook Checklist-T.E. (p. 87) hypotenuse, irrational number, perpendicular, repeating decimal, Pythagorean Theorem, square root</p> | <p>I. Primary Resource <i>Connected Mathematics</i> ACE Questions # 1-15 (pp. 22-25)</p> <p>Mathematical Reflections # 1-3 (p. 2)</p> <p>Check-Up T.E. (pp. 76-77) Answer Key: T.E. (pp. 89-90)</p> <p>Question Bank T.E. (pp. 80-84) Answer Key: T.E. (pp. 91-93)</p> <p>Additional Practice T.E. (pp. 140-141) Answer key: T.E. (pp. 150-151)</p> <p>Self-Assessment T.E. (p. 88)</p> |

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| Content Standard: Measurement Grade 8-10 Benchmark: D. Use proportional reasoning and apply indirect measurement techniques, including right triangle trigonometry and properties of similar triangles, to solve problems involving measurements and rates. Content Organizer: Measurement Units | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| <p>1. Compare and order the relative size of common U.S. customary units and metric; e.g., mile and kilometer, gallon and liter, pound and kilogram.</p> | <p># 11 Subscale: Geometry and Measurement Use measurement techniques including scale drawings, formulas, and geometric relationships to find length, perimeter, area, surface area, and volume.</p> <p>Understand length, perimeter, circumference, area, surface area, and volume in simple geometric shapes/objects or combination of shapes</p> <p>Choose appropriate units of measure (length, area, and volume)</p> <p>Apply formulas</p> <p>Use Pythagorean Theorem</p> <p>Analyze effect of changing one dimension of a figure or of using a different unit of measure</p> <p>Note: metric/customary units are used but no conversion between systems</p> | <p>I. Secondary Resources Internet Site edhelper.com http://www.mathbuilder.com/cgi-bin/math3.cgi</p> <p>The Big G – Visual Aid Appendix (p. 4)</p> | <p>Teacher adaption for use</p> <p>Use acronym for converting metrics to metrics (KHDUDCM) King Henry Died Under Dirty Clumpy Milk</p> <p style="text-align: center;">For</p> <p><u>K</u>ilo, <u>H</u>ecto, <u>D</u>eka, <u>U</u>nit, <u>D</u>eci, <u>C</u>enti., <u>M</u>illi</p> <p>II. Give students a copy of “The Big G” as a reference tool. This is review material, but for visual learners, it is a good intervention strategy.</p> | |

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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| <p>2. Use proportional relationships and formulas to convert units from one measurement system to another; e.g., degrees Fahrenheit to degrees Celsius.</p> | <p># 11 Subscale: Geometry and Measurement</p> <p>Use measurement techniques including scale drawings, formulas, and geometric relationships to find length, perimeter, area, surface area, and volume.</p> <p>Understand length, perimeter, circumference, area, surface area, and volume in simple geometric shapes/objects or combination of shapes</p> <p>Choose appropriate units of measure (length, area, and volume)</p> <p>Apply formulas</p> <p>Use Pythagorean Theorem</p> <p>Analyze effect of changing one dimension of a figure or of using a different unit of measure</p> <p>Note: metric/customary units are used but no conversion between systems</p> | <p>I. Secondary Resources</p> <p>Internet Site: edhelper.com http://www.edhelper.com/measurement.htm</p> <p>Accelerated Math Algebra Library 333, 334, 443-452 Algebra Library # 53.</p> <p>Calculator Workbook: “Discovering Mathematics with the TI-73: Activities for Grades 7 and 8” Appendix C Using Formulas in Lists (pp. 125-128)</p> | <p>Formulas:</p> <p>$F=9/5C + 32$ 1 yard = .9144 meters 1 inch = 2.54 cm 1 km = 0.6 mile 1 L = 1.06 qts. 1 qt. = .946 liter 1 gram = .002 lb. 1 pound = 453.6 g. 1 kg. = 2.2 lb.</p> | <p>Test can be made from Internet site: http://www.edhelper.com/measurement.htm</p> |

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| Content Standard: Measurement Grade 8-10 Benchmark: B. Use formulas to find surface area and volume for specified three-dimensional objects accurate to a specified level of precision. E. Estimate and compute various attributes, including lengths, angle measure, area and volume to a specified level of precision. Content Organizer: Use Measurement Techniques and Tools | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 3. Use appropriate levels of precision when calculating with measurements. | <p># 11 Subscale: Geometry and Measurement</p> <p>Use measurement techniques including scale drawings, formulas, and geometric relationships to find length, perimeter, area, surface area, and volume.</p> <p>Understand length, perimeter, circumference, area, surface area, and volume in simple geometric shapes/objects or combination of shapes</p> <p>Choose appropriate units of measure (length, area, and volume)</p> <p>Apply formulas</p> <p>Use Pythagorean Theorem</p> <p>Analyze effect of changing one dimension of a figure or of using a different unit of measure</p> <p>Note: metric/customary units are used but no conversion between systems</p> | <p>I. Secondary Resource:</p> <p>“Discovering Mathematics with the TI-73: Activities for Grades 5 and 6” Activity 7 How Totally Square, Part II (pp. 31-34)</p> | <p>Volume – relate to cubes</p> <p>Students at grade 8 confuse perimeter and area. A few memory triggers which have been helpful to my students are listed below:</p> <p>Surface - “Area” Squarea (a rhyme)</p> <p>Perimeter - Peri (sounds like Perry)</p> <p>Meter</p> <p>A little man named Peri Meter has the job of walking on edges. How far does he walk?</p> <p>Length – relate to length of foot = approximately 1 foot.</p> <p>Mr. PeriMeter walks on the outside edge of any figures. The distance he walks his named after him. “Perimeter”</p> | |

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| Content Standard: Measurement Grade 8-10 Benchmark: B. Use formulas to find surface area and volume for specified three-dimensional objects accurate to a specified level of precision. Content Organizer: Use Measurement Techniques and Tools | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 4. Derive formulas for surface area and volume and justify them using geometric models and common materials for example; find: <ul style="list-style-type: none"> (a) The surface area of a cylinder as a function of its height and radius; (b) That the volume of a pyramid (or cone) is one-third of the volume of a prism (or cylinder) with the same base area and height. | # 11 Subscale: Geometry and Measurement Use measurement techniques including scale drawings, formulas, and geometric relationships to find length, perimeter, area, surface area, and volume. Understand length, perimeter, circumference, area, surface area, and volume in simple geometric shapes/objects or combination of shapes Choose appropriate units of measure (length, area, and volume) Apply formulas Use Pythagorean Theorem Analyze effect of changing one dimension of a figure or of using a different unit of measure Note: metric/customary units are used but no conversion between systems | I. Primary Resource <i>Connected Mathematics</i> “Looking for Pythagoras” Investigation 2 Finding Areas and Lengths (pp. 17-21) Lesson 2.1 Finding Areas (pp. 17-18) ACE Questions # 1, 3, 8, 13, 14 (pp. 22-25) II. Additional Resource Website for practice on area: www.mathgoodies.com/lessons/toc_voll.shtml | Students will better understand area by constructing regular polygons and composite figures using centimeter dot paper and centimeter rulers. Students will experiment with squares and rectangles using Algebra Tiles to build polygons. Students will create formulas for finding the area of various polygons. Journal Entry: Mathematical Reflection # 1-3 (p. 26) Use OGT extended response rubric for class discussion. After completing the response, have students underline the important parts of their response. | I. Primary Resource <i>Connected Mathematics</i> Journal Response – Mathematical Reflection Students should be able to determine what constitutes a strong, average or weak response. |

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| Content Standard: Measurement Grade 8-10 Benchmark: C. Apply indirect measurement techniques, tools and formulas, as appropriate, to find perimeter, circumference, and area of circles, triangles, quadrilaterals and composite shapes, and to find volume of prisms, cylinders, and pyramids. Content Organizer: Use Measurement Techniques and Tools | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 5. Determine surface area for pyramids by analyzing their parts. | # 11 Subscale: Geometry and Measurement Use measurement techniques including scale drawings, formulas, and geometric relationships to find length, perimeter, area, surface area, and volume. Understand length, perimeter, circumference, area, surface area, and volume in simple geometric shapes/objects or combination of shapes Choose appropriate units of measure (length, area, and volume) Apply formulas Use Pythagorean Theorem Analyze effect of changing one dimension of a figure or of using a different unit of measure Note: metric/customary units are used but no conversion between systems | I. Secondary Resource Accelerated Math Algebra Library | Students make poster board pyramid, cut apart their faces, analyze nets and use formulas to find their surface area. | |

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| Content Standard: Measurement Grade 8-10 Benchmark: A. Solve increasingly complex non-routine measurement problems and check for reasonableness of results. F. Write and solve real-world, multi-step problems involving money, elapsed time, and temperature, and verify reasonableness of solutions. Content Organizer: Use Measurement Techniques and Tools | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| <p>6. Solve and determine the reasonableness of the results for problems involving rates and derived measurements, such as velocity and density, using formulas, models and graphs.</p> | <p># 11 Subscale: Geometry and Measurement</p> <p>Use measurement techniques including scale drawings, formulas, and geometric relationships to find length, perimeter, area, surface area, and volume.</p> <p>Understand length, perimeter, circumference, area, surface area, and volume in simple geometric shapes/objects or combination of shapes</p> <p>Choose appropriate units of measure (length, area, and volume)</p> <p>Apply formulas</p> <p>Use Pythagorean Theorem</p> <p>Analyze effect of changing one dimension of a figure or of using a different unit of measure</p> <p>Note: metric/customary units are used but no conversion between systems</p> | <p>Volume & Density Lab from AIMS, 1995 “It Floats, It Sinks” (p. 146) Appendix (pp. 9-11)</p> | <p>Graph onto grid paper the results of calculations done to visually demonstrate (Interest, cost, or velocity) change as dependent variables change.</p> | |

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| Content Standard: Measurement Grade 8-10 Benchmark: D. Use proportional reasoning and apply indirect measurement techniques, including right triangle trigonometry and properties of similar triangles, to solve problems involving measurements and rates. Content Organizer: Use Measurement Techniques and Tools | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 7. Apply proportional reasoning to solve problems involving indirect measurements or rates. | <p># 11 Subscale: Geometry and Measurement Use measurement techniques including scale drawings, formulas, and geometric relationships to find length, perimeter, area, surface area, and volume.</p> <p>Understand length, perimeter, circumference, area, surface area, and volume in simple geometric shapes/objects or combination of shapes</p> <p>Choose appropriate units of measure (length, area, and volume)</p> <p>Apply formulas</p> <p>Use Pythagorean Theorem</p> <p>Analyze effect of changing one dimension of a figure or of using a different unit of measure</p> <p>Note: metric/customary units are used but no conversion between systems</p> | <p>I. Secondary Resource Accelerated Math Algebra Library Objective # 184</p> <p>II. Additional Resource Internet Site http://www.edhelper.com</p> | <p>Draw a picture. Example-</p> <p>Find how many cups of sugar will be needed if a recipe is doubled, and the recipe calls for 2 cups sugar to 3 cups of flour.</p> <p><u>SSFFF</u> SSFFF</p> <p>Transfer pictures to numbers 2:3=4:6</p> | |

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Course of Study

| <p>Content Standard: Measurement Grade 8-10 Benchmark: Includes aspects of E. Estimate and compute various attributes, including lengths, angle measure, area and volume to a specified level of precision. Content Organizer: Use Measurement Techniques and Tools</p> | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 8. Find the sum of the interior and exterior angles of regular convex polygons with and without measuring the angles with a protractor. | <p># 11 Subscale: Geometry and Measurement Use measurement techniques including scale drawings, formulas, and geometric relationships to find length, perimeter, area, surface area, and volume.</p> <p>Understand length, perimeter, circumference, area, surface area, and volume in simple geometric shapes/objects or combination of shapes</p> <p>Choose appropriate units of measure (length, area, and volume)</p> <p>Apply formulas</p> <p>Use Pythagorean Theorem</p> <p>Analyze effect of changing one dimension of a figure or of using a different unit of measure</p> <p>Note: metric/customary units are used but no conversion between systems</p> | <p>I. Secondary Resource Accelerated Math Pre-Algebra and Algebra Library</p> | <p>Instruction/students use of protractors are essential at the onset of this lesson.</p> <p>Students need to remember that a line measures 180^0 and a circle measures 360^0</p> | <p>I. Rubric “Assessment of protractor use” Points = 1-4 see below:</p> <ol style="list-style-type: none"> 1. Shows inability to line up the protractor with the angles and is not consistent when reading the degree of measure. 2. Demonstrates little ability to line up the protractor with the angle and is inconsistent when reading the degree of measure. 3. Demonstrates ability to line up the protractor with the angles and is usually correct when reading the degree of measure. 4. Demonstrates accuracy when lining up the protractor with the angles and is consistently correct when reading the degree of measure. <p>II. Secondary Resource Accelerated Math could be used to formally assess each student.</p> |

Mathematical Processes Standard – Students use mathematical processes and knowledge to solve problems. Students apply problem-solving and decision-making techniques, and communicate mathematical ideas. Mathematical processes are used in all content areas and should be incorporated within instruction and assessment of the content-specific standards and benchmarks.

Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

| Content Standard: Measurement Grade 8-10 Benchmark: C. Apply indirect measurement techniques, tools and formulas, as appropriate, to find perimeter, circumference, and area of circles, triangles, quadrilaterals and composite shapes, and to find volume of prisms, cylinders, and pyramids. Content Organizer: Use Measurement Techniques and Tools | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 9. Demonstrate understanding of the concepts of perimeter, circumference and area by using established formula for triangles, quadrilaterals, and circles to determine the surface area and volume of prisms, pyramids, cylinders, spheres, and cones. (Note: Only volume should be calculated for spheres and cones.) | <p># 11 Subscale: Geometry and Measurement</p> <p>Use measurement techniques including scale drawings, formulas, and geometric relationships to find length, perimeter, area, surface area, and volume.</p> <p>Understand length, perimeter, circumference, area, surface area, and volume in simple geometric shapes/objects or combination of shapes</p> <p>Choose appropriate units of measure (length, area, and volume)</p> <p>Apply formulas</p> <p>Use Pythagorean Theorem</p> <p>Analyze effect of changing one dimension of a figure or of using a different unit of measure</p> <p>Note: metric/customary units are used but no conversion between systems</p> | <p>I. Secondary Resources</p> <p>Accelerated Math</p> <p>Algebra and Pre-Algebra Libraries</p> <p>Internet Site: http://www.edhelper.com</p> | <p>Formula for volume of a sphere: $\frac{4}{3} \pi r^3$ (This formula is not in the Merrill Pre-Algebra text)</p> <p>To help with understanding, students measure perimeters with strings, volume with dice or blocks, surface area by cutting cm. square paper and covering objects.</p> <p>Key concept – Surface is the outside and volume represents the inside.</p> | |

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Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

| <p>Content Standard: Measurement Grade 8-10 Benchmark: Includes aspects of E. Estimate and compute various attributes, including lengths, angle measure, area and volume to a specified level of precision. Content Organizer: Use Measurement Techniques and Tools</p> | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 10. Use conventional formulas to find the surface area and volume of prisms, pyramids and cylinders and the volume of spheres and cones to a specified level of precision. | <p># 11 Subscale: Geometry and Measurement</p> <p>Use measurement techniques including scale drawings, formulas, and geometric relationships to find length, perimeter, area, surface area, and volume.</p> <p>Understand length, perimeter, circumference, area, surface area, and volume in simple geometric shapes/objects or combination of shapes</p> <p>Choose appropriate units of measure (length, area, and volume)</p> <p>Apply formulas</p> <p>Use Pythagorean Theorem</p> <p>Analyze effect of changing one dimension of a figure or of using a different unit of measure</p> <p>Note: metric/customary units are used but no conversion between systems</p> | <p>I. Primary Resource <i>Connected Mathematics</i> “Say It with Symbols” Investigation 2 (pp. 20-33)</p> <p>II. Additional Resources <i>Amsco’s Preparing for Qualifying Examinations in Mathematics</i> Chapter 3 “Algebraic Operations and Reasoning” (pp. 78-84) Chapter 4 “Factoring and Quadratic Equations” (pp. 112-122)</p> <p>Teacher Reference <i>Algebra To Go</i> “Using FOIL when Factoring Quadratic Polynomials” (pp. 189-190)</p> | <p>Relate factoring to the distributive property</p> <p>Use the “FOIL” method to multiply binomials</p> <p>Compare and contrast the three methods:</p> <ul style="list-style-type: none"> • Distributive method • Column method • FOIL method | <p>I. Primary Resource <i>Connected Mathematics</i> “Say it with Symbols” ACE Questions (pp. 30-33)</p> <p>II. Amsco’s Preparing for Qualifying Examinations in Mathematics (p. 79) # 1-18 (p. 115) # 1-20 (p. 119) # 1-20 (p. 120) # 1-20</p> |

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Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

| Content Standard: Patterns, Functions and Algebra Grade 8-10 Benchmarks: C. Translate information from one representation (words, table, graph or equation) to another representation of a relation or function. Content Organizer: Use Patterns, Relations, and Functions | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 1. Relate the various representations of a relationship, i.e., relate a table to graph, description, and symbolic form. | # 6 Subscale: Algebra and Functions Represent a mathematical relationship using a table, graph, symbols, and words, and describe how a change in the value of one variable affects the value of a related variable. Translate among mathematical relationships in various forms Analyze/represent mathematical relationships Provide an example of a situation demonstrating a mathematical relationship Identify missing number or point in a table, symbolic, or graphical representation Identify how a change in one variable affects the value of another | I. Primary Resource <i>Connected Mathematics</i> “Frogs, Fleas, and Painted Cubes” Investigation 1 Introduction to Quadratic Relationships (pp. 5-11) Lesson 1.2 Reading a Graph (pp. 7-9) ACE Questions (pp. 12-17) Additional Practice TE (pp. 146-147) Journal Entry Mathematical Reflections See Teacher Edition p. 18 # 3 | Demonstrate graphing a function by using Transparency 1.2A. Lab Sheets 2.1 –2 ACE Students will brainstorm as a class about other functions, or relationships where one variable is dependent upon another. After deciding on 2-3 functions, students will design graphs which demonstrate the relationships seen on Transparency 1.2C: Linear relationship, Exponential relationship, or Quadratic relationship. | I. Primary Resource <i>Connected Mathematics</i> Check-up # 1 (pp. 87-88) *Provide grid paper for check-up. *Answer keys for “Frogs, Fleas, and Painted Cubes” (pp. 155-158) Students will present their graphs to the class explaining how the graphs show a function and what type of relationship is graphed. Assess using “Graphing Data” or “Graphs and Charts” in Appendix (pp.) Journal entries should be evaluated using the extended response rubric for the Ohio Graduation Test. |

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Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

Content Standard: Patterns, Functions and Algebra

Grade 8-10 Benchmarks: A. Generalize and explain patterns and sequences in order to find the next term and the n th term. B. Identify and classify functions as linear or nonlinear, and contrast their properties from tables, graphs or equations. D. Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations.

Content Organizer: Use Patterns, Relations, and Functions

| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
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| <p>2. Generalize patterns and sequences by describing, in words, how to find the nth term.</p> <p>3. Identify functions as linear or nonlinear based on information given in a table, graph or equation</p> <p>4. Extend the uses of variables to include covariants where y depends on x.</p> | <p># 7 Subscale: Algebra and Functions Create and analyze graphs of linear and simple non-linear functions</p> <p>Basic understanding of linear/non-linear functions Slope of a line, characteristics of graphs, differences between graphs of linear/non-linear functions</p> <p>Ex. Relate equation to its graph, graph to equation, recognize connection between slope and real-world situation Recognize/use equivalent ideas--zeros of functions, roots of equations, and/or solution of an equation Non-linear functions--recognize graphs (quadratics, exponential growth/decay) Interpret graphs Plot points-- distinguish linear/non-linear relationships Note: quadratic functions will have integer solutions</p> | <p>I. Primary Resource <i>Connected Mathematics</i> “Say It With Symbols” Investigation 4 Solving Equations (pp. 53-58)</p> <p>II. Additional Resources <i>Algebra To Go</i> (Section 127)</p> <p>Historical Connections to Math (1992 AIMS Educ. Fnd) 1. “A Series Surprise” (p. 61) 2. “The Binomial Theorem” (p. 62)</p> <p>TI-Graphing calculator Activities for Enriching Middle School Mathematics “Linear Equations” (p. 107)</p> <p>Accelerated Math Algebra Library 3 # 112 & 107</p> | <p>Encourage students to develop the following understanding:</p> <ul style="list-style-type: none"> • Any number that makes an equation true is a “solution of that equation” • Replacing a variable in an equation with a number that makes the equation true is “solving the equation” • Ask students to explain in words why a number can/cannot be a solution of an equation • Engage students in the identification of the solution set for an equation. <p>*Modify the directions for all assessments to correspond with the stated objectives (explanation of “solution of an equation”</p> | <p>I. Primary Resource <i>Connected Mathematics</i> “Say It With Symbols” ACE Questions (pp. 59-63)</p> <p>)</p> |

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Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

| Content Standard: Patterns, Functions and Algebra Grade 8-10 Benchmarks: D. Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. Content Organizer: Use Algebraic Representations | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 5. Use physical models to add and subtract monomials and polynomials, and multiply a polynomial by a monomial. | # 6 Subscale: Algebra and Functions Represent a mathematical relationship using a table, graph, symbols, and words, and describe how a change in the value of one variable affects the value of a related variable. Translate among mathematical relationships in various forms Analyze/represent mathematical relationships Provide an example of a situation demonstrating a mathematical relationship Identify missing number or point in a table, symbolic, or graphical representation Identify how a change in one variable affects the value of another. | | Use models such as different color cubes, chips, or pattern blocks to illustrate monomial and polynomial operations. | |

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Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

| Content Standard: Patterns, Functions and Algebra Grade 8-10 Benchmarks: None Content Organizer : Use Algebraic Reasoning | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 6. Describe the relationship between the graph of a line and its equation, including being able to explain the meaning of slope as a constant rate of change and y-intercept in real world problems. | (None) | I. TI-83 Graphing Calculators & Motion Sensor & CBL (p. 113) from TI Graphing Calculator “Activities for Enriching Middle School Mathematics” II. TI-83 Discovering Mathematics with the TI-73 Activities for Grades 7 & 8. (pp. 89-94) “Step Up” III. Developing Skills with Tables and Graphs Level 6-8 “Cricket thermometers”, (p. 39) | Introduce the concept of “slope” of a line as being similar to the “pitch” of a roof; the higher the <u>peak</u> , the higher the <u>slope</u> . The slope of lines can be positive, negative, zero, or undefined. The slope of a line on a graph shows <u>how much</u> and <u>how fast</u> something is changing. “ A constant rate of change” | |

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Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

| <p>Content Standard: Patterns, Functions and Algebra Grade 8-10 Benchmarks: D. Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. F. Solve and graph linear equations and inequalities. Content Organizer : Use Algebraic Representations</p> | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| <p>7. Use symbolic algebra (equations and inequalities), graphs, and tables to represent situations and solve problems.</p> | <p># 5 Subscale: Algebra and Functions Use algebraic equations and inequalities to solve problems Equations and inequalities may involve whole numbers, decimals, fractions, and integers Systems of equations will be limited to two variables Formulate equations and inequalities to represent a problem situation, then solve # 4 Algebra and Functions Write, interpret, simplify, evaluate, and/or use algebraic expressions and formulas. Understand algebraic expressions/formulas Represent mathematical/real-world situations Algebraically construct/apply expressions /equations Identify meaning of expressions/formulas Apply order of operations and laws of exponents # 6 Subscale: Algebra and Functions Represent a mathematical relationship using a table, graph, symbols, and words, and describe how a change in the value of one variable affects the value of a related variable. Translate among mathematical relationships in various forms Analyze/represent mathematical relationships Provide an example of a situation demonstrating a mathematical relationship Identify missing number or point in a table, symbolic, or graphical representation Identify how a change in one variable affects the value of another.</p> | <p>I. Primary Resource <i>Connected Mathematics</i> “Say It With Symbols” Investigation 1 Order of Operations (pp. 5- 11)</p> | <p>Using a journal entry to practice extended responses should be a weekly activity.</p> <p>Review components of a high quality response (p.7) Information Guide to OGT (August 2000) and remind students that they are not limited to written text, but can include drawings, graphs, etc.</p> <p>Select three responses to analyze as a class. Place on overhead and ask for comments. Underline or circle effective parts of response. Cross out incorrect or vague sections and replace with effective sentences.</p> | <p>I. Primary Resource <i>Connected Mathematics</i> “Say It With Symbols” ACE Questions pp. 12-18</p> <p>Mathematical Reflections (p. 19) Graded using extended response rubric</p> |

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Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

Content Standard: Patterns, Functions and Algebra
Grade 8-10 Benchmarks: D. Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. F. Solve and graph linear equations and inequalities.
Content Organizer : Use Algebraic Representations

| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
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| <p>7. Use symbolic algebra (equations and inequalities), graphs, and tables to represent situations and solve problems.</p> | <p># 5 Subscale: Algebra and Functions Use algebraic equations and inequalities to solve problems Equations and inequalities may involve whole numbers, decimals, fractions, and integers Systems of equations will be limited to two variables Formulate equations and inequalities to represent a problem situation, then solve # 4 Algebra and Functions Write, interpret, simplify, evaluate, and/or use algebraic expressions and formulas. Understand algebraic expressions/formulas Represent mathematical/real-world situations Algebraically construct/apply expressions /equations Identify meaning of expressions/formulas Apply order of operations and laws of exponents # 6 Subscale: Algebra and Functions Represent a mathematical relationship using a table, graph, symbols, and words, and describe how a change in the value of one variable affects the value of a related variable. Translate among mathematical relationships in various forms Analyze/represent mathematical relationships Provide an example of a situation demonstrating a mathematical relationship Identify missing number or point in a table, symbolic, or graphical representation Identify how a change in one variable affects the value of another.</p> | <p>III. Developing Skills With Tables and Graphs, Levels 6-8 “Ordering Supplies” p. 6 “Dinner Time” p. 4</p> <p>IV. Additional Resources Internet Site The Math Forum http://mathforum.org/graph/cslope/ (This site contains the slope-intercept formulas with the visuals of the coordinate grid and graphed equation). Plus much more.</p> <p>VI. TI-73 Calculator Activities Discovering Mathematics with the TI-73 Activities for Grades 7 & 8 Activity 2 “Try Angles?” Activity 3 “A Prime Investigation with 7, 11, and 13”</p> | <p>Instructional Strategies Student will practice writing symbols instead of numbers. Students can make a “secret code” with a key, then present it to the class for interpretation. When the students realize they cannot break the code without a key, the teacher should relate that incident to the importance of an Algebra “Key” that helps us to “break” the code. Algebra “Keys” are values for some variables <u>or</u> steps to solve for variables.</p> | |

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Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

| Content Standard: Patterns, Functions and Algebra Grade 8-10 Benchmarks: D. Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. Content Organizer: Use Algebraic Representations | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| <p>8. Write, simplify and evaluate algebraic expressions (including formulas) to generalize situations and solve problems.</p> | <p># 4 Subscale: Algebra and Functions Write, interpret, simplify, evaluate, and/or use algebraic expressions and formulas.</p> <p>Understand algebraic expressions/formulas Represent mathematical/real-world situations Algebraically construct/apply expressions /equations Identify meaning of expressions/formulas Apply order of operations and laws of exponents</p> <p># 6 Subscale: Algebra and Functions Represent a mathematical relationship using a table, graph, symbols, and words, and describe how a change in the value of one variable affects the value of a related variable.</p> <p>Translate among mathematical relationships in various forms Analyze/represent mathematical relationships Provide an example of a situation demonstrating a mathematical relationship Identify missing number or point in a table, symbolic, or graphical representation Identify how a change in one variable affects the value of another</p> | <p>I. Primary Resource <i>Connected Mathematics</i> “Frogs, Fleas and Painted Cubes” Investigation 3 3.1 Counting Handshakes (pp. 41-42) Exploring Triangular Numbers (pp. 42-44)</p> <p>III. Additional Resource TI-73 Calculator Activity from “Graphing Calculator Activities for Enriching Middle School Mathematics” –Activity 11 “What’s My Line?” (p. 107)</p> | <p>Students “act out” the Counting Handshakes investigation.</p> <p>III. Using different colored markers, have students connect points with line segments in order to discover patterns in the number of points of the shape to the number of line segments needed.</p> | |

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Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

| <p>Content Standard: Patterns, Functions and Algebra Grade 8-10 Benchmarks: F. Solve and graph linear equations and inequalities. Content Organizer: Use Algebraic Representations</p> | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| <p>9. Solve linear equations and inequalities graphically, symbolically and using technology.</p> | <p># 5 Subscale: Algebra and Functions Use linear equations and inequalities.</p> <p>Use algebraic equations and inequalities to solve problems.</p> <p>Equations and inequalities may involve whole numbers, decimals, fractions, and integers.</p> <p>Systems of equations will be limited to two variables.</p> <p>Formulate equations and inequalities to represent a problem situation, then solve.</p> | <p>I. Secondary Resource Texas Instrument Workbook and TI-73 graphing calculator “Graphing Calculator Activities for Enriching Middle School Mathematics” –Activity II “What’s My Line?” (p. 107) Activity 12 – “A Move in the Right Direction” (p. 113)</p> | <p>Students follow the step-by- step instructions from the TI-73 Instruments worksheets to solve equations and inequalities.</p> | <p>II. Secondary Resource Texas Instrument Workbook and Ti-73 graphing calculator</p> <p>Check the students’ TI-73 calculators to evaluate the graph of linear equations and inequalities.</p> |

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Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

| Content Standard: Patterns, Functions and Algebra Grade 8-10 Benchmarks: H. Solve systems of linear equations involving two variables graphically and symbolically. Content Organizer: Use Algebraic Representations | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 10. Solve 2 by 2 systems of linear equations graphically and by simple substitution. 11. Interpret the meaning of the solution of a 2 by 2 system of equations; i.e., point, line, no solution | # 5 Subscale Algebra and Functions Use linear equations and inequalities. Use algebraic equations and inequalities to solve problems. Equations and inequalities may involve whole numbers, decimals, fractions, and integers. Systems of equations will be limited to two variables. Formulate equations and inequalities to represent a problem situation, then solve. | I. Internet Sites 1. www.edhelper.com to create practice problems. 2. www.mathforum.com 3. PBS.ORG “You Make the Call” | Vocabulary – System of equations = as set of equations with the same variables. Visually demonstrate that the point where lines on the graph intersect is called the “System of Equations” for those equations. | |

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Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

| Content Standard: Patterns, Functions and Algebra Grade 8-10 Benchmarks: G. Solve quadratic equations with real roots by graphing, formula and factoring. Content Organizer: Use Algebraic Representations | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 12. Solve simple quadratic equations graphically; e.g., $y = x^2 - 16$. | <p>#7 Subscale: Algebra and Functions</p> <p>Create and analyze graphs of linear and simple non-linear functions.</p> <p>Represent a mathematical relationship using a table, graph, symbols, and words, and describe how a change in the value of one variable affects the value of a related variable.</p> <p>Translate among mathematical relationships in various forms.</p> <p>Analyze/represent mathematical relationships.</p> <p>Provide an example of a situation demonstrating a mathematical relationship.</p> <p>Identify missing number or point in a tabular, symbolic, or graphical representation.</p> <p>Identify how a change in one variable affects the value of another.</p> | <p>I. Primary Resource <i>Connected Mathematics</i> “Frogs, Fleas, and Painted Cubes” Investigation 2.1 2.4 Quadratic Expressions (pp. 19-30) “Say It With Symbols” Investigation 2 Equivalent Expressions (pp. 20-33)</p> <p>II. Additional Resources <i>Amsco’s Qualifying Examinations in Mathematics</i> Chapter 3 “Algebraic Operations and Reasoning” (pp. 78-81) Chapter 4 “Factoring Quadratic Equations” (p. 112-122) Teacher Reference <i>Algebra To Go</i> (pp. 189-190) “Using FOIL when Factoring Quadratic Polynomials” *TI-73 Calculator Activity Graphing Calculator Activities for Enriching Middle School Mathematics Activity 2: “The Shrinking Dollar” (p.9)</p> | <p>Explain/Describe to students the meaning of factored form</p> <p>Use given problems to allow students to manipulate equations into their factored forms.</p> <p>Relate factoring to the distributive property</p> <p>Use the “FOIL” method to multiply binomials</p> <p>Compare and contrast the three methods</p> <ul style="list-style-type: none"> • Distributive method • Column method • FOIL method | |

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Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

| Content Standard: Patterns, Functions and Algebra Grade 8-10 Benchmarks: Includes aspects of I. Model and solve problem situation involving direct and inverse variation. Content Organizer: Analyze Change | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 14. Differentiate and explain types of changes in mathematical relationships, such as linear vs. non-linear, continuous vs. non-continuous, direct variation vs. inverse variation. | # 7 Subscale: Algebra and Functions Basic understanding of linear/non-linear functions Slope of a line, characteristics of graphs, differences between graphs of linear/non-linear functions Ex. Relate equation to its graph, graph to equation, recognize connection between slope and real-world situation Recognize/use equivalent ideas--zeros of functions, roots of equations, and/or solution of an equation Non-linear functions--recognize graphs (quadratics, exponential growth/decay) Interpret graphs Plot points-- distinguish linear/non-linear relationships Note: quadratic functions will have integer solutions | I.. Secondary Resource <i>Accelerated Math</i> Algebra and Pre-algebra Libraries Continuous vs. non-continuous Direct vs. indirect variation. | Linear vs. non-linear If the equation has an exponent, it's non-linear. If it has an absolute value, it will be a "v" shape when graphed. | I. Secondary Resource Accelerated Math Algebra and Pre-Algebra Libraries. |

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Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

| Content Standard: Patterns, Functions and Algebra Grade 8-10 Benchmarks: J. Describe and interpret rates of change from graphical and numerical data. Content Organizer: Use Algebraic Representations | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| <p>13. Compute and interpret slope, midpoint and distance given a set of ordered pairs.</p> | <p># 6 Subscale: Algebra and Functions Represent a mathematical relationship using a table, graph, symbols, and words, and describe how a change in the value of one variable affects the value of a related variable.</p> <p>Translate among mathematical relationships in various forms</p> <p>Analyze/represent mathematical relationships</p> <p>Provide an example of a situation demonstrating a mathematical relationship</p> <p>Identify missing number or point in a table, symbolic, or graphical representation</p> <p>Identify how a change in one variable affects the value of another</p> | <p>I. Primary Resource <i>Connected Mathematics</i> “Looking for Pythagoras” Investigation 1 Locating Points (pp. 5-11) ACE Questions # 1-13 (pp. 12-15) Journal Entry: Mathematical Reflections (p. 16) # 1-3</p> <p>II. Additional Resources *TI-73 Calculator Activity “Graphing Calculator Activities for Enriching Middle School Mathematics” Activity 3 “How Do You Measure Up” (p. 21)</p> | <p>I. Primary Resource Illustrations: Overhead transparencies 1.1 to 1.3 should be used to illustrate how to locate points on a grid, map, or coordinate plane. Real-World Connection: Students make the correlation between the coordinates of points on a grid to the route a car follows. The distance a car travels in blocks compares to the distance between two points on the coordinate plane.</p> <p>Using a centimeter ruler, students will measure the distance of a line between two points on a centimeter grid.</p> <p>Vocabulary: Students will add the list below to their notebooks, then add definitions as the words take meaning. Student Notebook Checklist – T.E. (p. 87) Parallel lines, square number, diagonal, y-axis, square numbers, coordinate pair, x-axis Possible homework assignments (pp. 291, 292, 295) (pp. 306-307)</p> | <p>I. Primary Resource <i>Connected Mathematics</i> “Looking for Pythagoras” ACE Questions # 1-13 (pp. 12-15) Additional Practice # 1-12 T.E. (pp. 138-139) Answer Key: T.E. (pp. 149-150) Question Bank T.E. (pp. 80-84) Answer Key: T.E. (p. 91)</p> |

Mathematical Processes Standard – Students use mathematical processes and knowledge to solve problems. Students apply problem-solving and decision-making techniques, and communicate mathematical ideas. Mathematical processes are used in all content areas and should be incorporated within instruction and assessment of the content–specific standards and benchmarks.

Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

| Content Standard: Patterns, Functions and Algebra Grade 8-10 Benchmarks: J. Describe and interpret rates of change from graphical and numerical data. Content Organizer: Analyze Changes | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| <p>15. Describe and compare how changes in an equation affects the related graphs; e.g., for a linear equation changing the coefficient of x affects the slope and changing the constant affects the intercepts.</p> | <p># 6 Subscale: Algebra and Functions Represent a mathematical relationship using a table, graph, symbols, and words, and describe how a change in the value of one variable affects the value of a related variable. Translate among mathematical relationships in various forms. Analyze/represent mathematical relationships. Provide an example of a situation demonstrating a mathematical relationship. Identify missing number or point in a table, symbolic, or graphical representation. Identify how a change in one variable affects the value of another.</p> <p># 7 Subscale: Algebra and Functions Create and analyze graphs of linear and simple non-linear functions. Basic understanding of linear/non-linear functions Slope of a line, characteristics of graphs, differences between graphs of linear/non-linear functions Ex. Relate equation to its graph, graph to equation, recognize connection between slope and real-world situation Recognize/use equivalent ideas--zeros of functions, roots of equations, and/or solution of an equation Non-linear functions--recognize graphs (quadratics, exponential growth/decay) Interpret graphs Plot points-- distinguish linear/non-linear relationships Note: quadratic functions will have integer solutions.</p> | <p>I. Primary Resource <i>Connected Mathematics</i> “Looking for Pythagoras” Investigation 4 Using the Pythagorean Theorem (pp. 41-45)</p> | <p>Students use grid paper and rulers to draw linear equations and compare slopes.</p> <p>Organize a class schedule to allow students time to respond to Mathematical Reflections, page 52, and to receive immediate feedback from both peers and teacher.</p> | <p>I. Primary Resource Connected Mathematics “Looking for Pythagoras” ACE Questions # 1-12 (pp. 46-51) Students will respond to questions on page 52, Mathematical Reflections, using the short response scoring rubric of the OGT.</p> |

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Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

| Content Standard: Patterns, Functions and Algebra Grade 8-10 Benchmarks: J. Describe and interpret rates of change from graphical and numerical data. Content Organizer: Analyze Changes | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 16. Use graphing calculators and computers to analyze change; e.g., interest compounded over time as a nonlinear growth pattern. | <p># 6 Subscale: Algebra and Functions Represent a mathematical relationship using a table, graph, symbols, and words, and describe how a change in the value of one variable affects the value of a related variable. Translate among mathematical relationships in various forms Analyze/represent mathematical relationships.. Provide an example of a situation demonstrating a mathematical relationship. Identify missing number or point in a table, symbolic, or graphical representation. Identify how a change in one variable affects the value of another.</p> <p># 7 Subscale: Algebra and Functions Basic understanding of linear/non-linear functions Slope of a line, characteristics of graphs, differences between graphs of linear/non-linear functions Ex. Relate equation to its graph, graph to equation, recognize connection between slope and real-world situation Recognize/use equivalent ideas--zeros of functions, roots of equations, and/or solution of an equation Non-linear functions--recognize graphs (quadratics, exponential growth/decay) Interpret graphs Plot points-- distinguish linear/non-linear relationships Note: quadratic functions will have integer solutions</p> | <p>I. Primary Resource TI – 73 7th and 8th grade Workbooks “Graphing Calculator Activities for Enriching Middle School Mathematics” Activity 2: “The Shrinking Dollar” (p.9)</p> <p>“Discovering Mathematics with the TI-73 Activities for Grades 7 and 8”. Activity 12 “A Penny Saved is a Penny Earned” (p. 111)</p> | <p>Use various activities from the TI 7th and 8th workbooks to instruct the class on procedures to analyze interest.</p> <p>Need specifics</p> | <p>I. Primary Resource TI-73 “Graphing Calculator Activities for Enriching Middle School Mathematics” Activity 2: “The Shrinking Dollar” (p.9)</p> <p>“Discovering Mathematics with the TI-73 Activities for Grades 7-8” Activity 12 “A Penny Saved is a Penny Earned” (p. 111)</p> |

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Mathematics – Grade 8

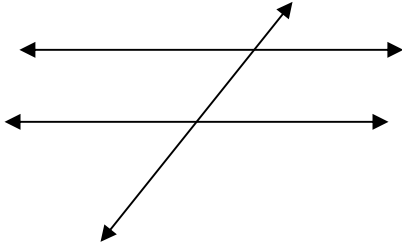
Adams County/Ohio Valley
Course of Study

| Content Standard: Geometry and Spatial Sense Grade 8-10 Benchmarks: B. Describe and apply the properties of similar and congruent figures; and justify conjectures involving similarity and congruence. D. Use coordinate geometry to represent and examine the properties of geometric figures. H. Establish the validity of conjectures about geometric objects, their properties and relationships by counter-example, inductive and deductive reasoning, and critiquing arguments made by others. Content Organizer: Characteristics and Properties | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 1. Make and test conjectures about characteristics and properties (i.e., sides, angles, symmetry, etc.) of two-dimensional figures and three-dimensional objects. | <p># 9 Subscale: Geometry and Measurement Recognize and apply characteristics of congruent and similar figures.</p> <p>Apply concepts of congruency/similarity to solve problems. Examples: Create/identify proportions Solve problems-indirect measurement of similar triangles Solve problems-relationships between angle measures or lengths of sides in triangles or quadrilaterals Use scale drawings to solve problems.</p> <p># 10 Subscale: Geometry and Measurement Apply visualization, spatial sense, and properties of two-dimensional figures and three-dimensional objects.</p> <p>Understand geometric properties of two/three dimensional figures/objects Recognize/use geometric properties. Classify objects by properties. Apply visual estimation in real-world context. Recognize/apply transformations. (Some may use coordinate plane.)</p> | <p>I. Primary Resource <i>Connected mathematics</i> Frogs, Fleas, and painted Cubes” Investigation 5 (pp. 71-74) Lessons 5.1 and 5.2 (pp. 71-74) ACE Questions # 1-25 (pp. 75-83)</p> <p>II. Secondary Resource Fibonacci Numbers Website: www.mcs.surrey.ac.uk/Personal/R.Knott/Fibonacci/Fibnat.html#Rabbits Factorials Website; http://mathforum.com/library/to_picts/factorials/</p> | <p>Students investigate a Rubik’s Cube.</p> <p>Students relate the Rubik’s Cube to a base ten cube, then place colored stick-on dots to cover each square on a base-ten cube, representing one square unit for each dot. Students draw the conclusion that the number or dots represents the surface area of the cube.</p> <p>Illustrate students’ lab work by using Transparencies 5.1A, 5.1B, and 5.2. (There are not student lab sheets for these two lessons).</p> <p>Computer: Pairs of students solve the Fibonacci numbers brainteaser found at the URL listed under “Instructional Resources.” Computer: Students go to 3-4 of the factorials links at the Website listed under “Instructional Resources” and choose one to report about to the class. Students will be able to describe the activities available at the site and will be able to explain what “factorials” are. Students sketch a graph showing the relationship between the edge length and surface area and volume.</p> | <p>I. Primary Resource <i>Connected Mathematics</i> Observation of students working with cubes.</p> <p>Additional Practice T.E. # 1-12 (p. 154) Answer Key T.E. (p. 158)</p> <p>Student Self-Assessment T.E. (p. 100)</p> <p>Notebook Checklist T.E. (p. 99)</p> <p>Question Bank T.E. # 11-C (p. 95)</p> <p>Assess the graph.</p> |

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Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

| <p>Content Standard: Geometry and Spatial Sense Grade 8-10 Benchmarks: C. Recognize and apply angle relationships in situations involving intersecting lines, perpendicular lines and parallel lines. Formally define geometric figures. Content Organizer: Characteristics and Properties</p> | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| <p>2. Recognize the angles formed and the relationship between the angles when two lines intersect and when parallel lines are cut by a transversal.</p> | <p>#8 Subscale: Geometry and Measurement Apply angle relationships to situations involving intersecting lines, perpendicular lines, and parallel lines.</p> <p>Demonstrate understanding of geometry of lines and angles in context of mathematical or real-world situations. Solve problems involving lines and angles (interior, vertical, corresponding, complementary, or supplementary, exterior) Emphasis on plane geometry-coordinate geometry may be included Application of basic angle relationships (ex. Sum of angles of a triangle) Angle measures will be in degrees and limited to whole numbers.</p> | <p>I. Secondary Resource Accelerated Math Pre-Algebra Library</p> | <p>Using colored electric tape, make parallel lines and a transversal on the wall of your room.</p>  <p>Write on post-it notes and have students place appropriately.</p> <p>Supplementary and complementary angles parallel perpendicular.</p> <p>Vertical angles Alternative interior angles Alternate exterior angles Corresponding angles Adjacent angles</p> | <p>II. Secondary Resource Accelerated Math Pre-Algebra library</p> |

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Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

| Content Standard: Geometry and Spatial Sense Grade 8-10 Benchmarks: B. Describe and apply the properties of similar and congruent figures; and justify conjectures involving similarity and congruence. Content Organizer: Characteristics and Properties | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 3. Use proportions in several forms to solve problems involving similar figures (part-to-part, part-to-whole, corresponding sides between figures). | <p>#9 Subscale: Geometry and Measurement</p> <p>Recognize and apply characteristics of congruent and similar figures</p> <p>Apply concepts of congruency/similarity to solve problems.</p> <p>Examples: Create/identify proportions. Solve problems-indirect measurement of similar triangles. Solve problems-relationships between angle measures or lengths of sides in triangles or quadrilaterals Use scale drawings to solve problems.</p> | <p>I. Secondary Resource Accelerated Math Pre-Algebra library</p> <p>II. Additional Resource Internet Site edhelper.com http://www.spellbuilder.com/cgi-i-bin/math4.cgi</p> | <p>Introduce the concept by explaining “similar” triangles are like one triangle put on the copy machine and shrunk or enlarged.</p> <p>Proportions of these triangles are the same, though they are different sizes.</p> | |

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Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

| Content Standard: Geometry and Spatial Sense Grade 8-10 Benchmarks: D. Use coordinate geometry to represent and examine the properties of geometric figures. Includes aspects of G. Prove or disprove conjectures and solve problems involving two and three-dimensional objects represented within a coordinate system. Content Organizer: Spatial Relationships | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 4. Represent and analyze shapes using coordinate geometry; e.g., given three vertices and the type of quadrilateral, find the coordinates of the fourth vertex. | <p>#10 Subscale: Geometry and Spatial</p> <p>Apply visualization, spatial sense, and properties of two-dimensional figures and three dimensional objects.</p> <p>Understand geometric properties of two/three dimensional figures/objects</p> <p>Apply visual estimation in real—world context</p> <p>Recognize/apply transformations (some may use coordinate plane)</p> | <p>I. Primary Resource TI-73 Calculator Geoboard program</p> <p>II. Secondary Resource Internet site edhelper.com</p> <p>Pairs of students can visit an animated Pythagorean Theorem website: http://www.nada.navy.mil/MathDept/mdm/pyth.html</p> | <p>Students explore quadrilaterals using geoboards or TI-73 calculators with Geoboards program.</p> <p>Geoboard Students utilize geoboards to construct right triangles, then make squares on each leg. Students then prove the Pythagorean Theorem by adding the areas (measuring with a metric ruler) of each square built on legs A and B. The sum will equal the area of the square built on the hypotenuse.</p> <p>Construction Paper: Students cut from construction paper a right triangle. Then, they measure the lengths of each leg and make three squares with side lengths matching each leg of the triangle. Each student glues the right onto a piece of poster board, then matches each square onto the correct leg of the triangle, gluing them into place and labeling each square with the appropriate label; a^2, b^2, or c^2. The student then cuts duplicates of a^2 and b^2. Using c^2 as a puzzle frame, each student cuts the duplicate squares so that the two squares fit onto c^2. This is an additional proof of the Pythagorean Theorem.</p> | Assess students on geoboards or check the graphing on TI-73 calculators. |

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Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

| Content Standard: Geometry and Spatial Sense Grade 8-10 Benchmarks: F. Represent and model transformations in a coordinate plane and describe the results. Content Organizer: Transformations and Symmetry | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 5. Draw the results of translations, reflections, rotations and dilations of objects in the coordinate plane, and determine properties that remain fixed; e.g., lengths of sides remain the same under translations. | <p>#10 Subscale: Geometry and Spatial</p> <p>Apply visualization, spatial sense, and properties of two-dimensional figures and three dimensional objects.</p> <p>Understand geometric properties of two/three dimensional figures/objects</p> <p>Apply visual estimation in real—world context</p> <p>Recognize/apply transformations (some may use coordinate plane)</p> | <p>I. Primary Resource <i>Connected Mathematics</i> “Kaleidoscopes, Hubcaps, and Mirrors” Investigation 1 Three Types of Symmetry (pp. 5-14) Lesson 1.1, 1.2, 1.3, and 1.4 Also see ACE Questions # 1-27 (pp. 15-22)</p> <p>Investigation 2 Symmetry Transformations Lessons 2.1, 2.2, 2.3 and 2.4 (pp. 24-33) Also see ACE Questions # 1-23 (pp. 34-40)</p> <p>II. Secondary Resource <i>Algebra To Go</i></p> | <p>Check for reflectional symmetry by using mirrors or image reflectors.</p> <p>Utilize protractors to measure the angle of rotationally symmetrical drawings.</p> <p>Make kaleidoscopes to deepen the understanding of rotational symmetry. 271-275</p> <p>Trace and cut out the basic design element and use this as a template to reproduce the translation or tessellation, deepening understanding. 271-275</p> | <p>I. Primary Resource <i>Connected Mathematics</i> “Kaleidoscopes Hubcaps, and Mirrors”</p> <p>Mathematical Reflections (p. 23) Check-up 1, (p. 79)</p> |

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Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

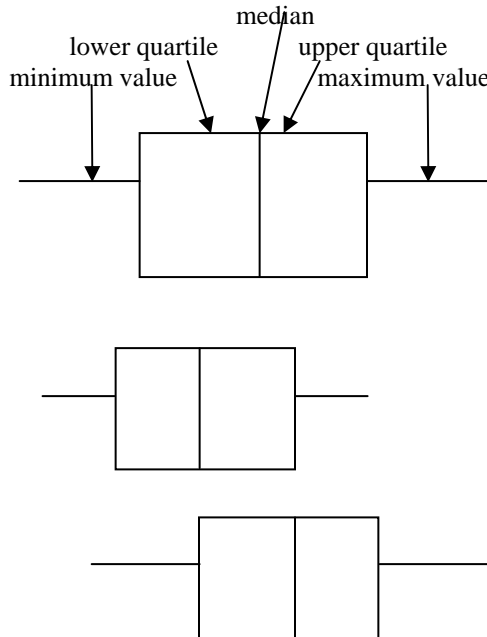
Content Standard: Geometry and Spatial Sense
Grade 8-10 Benchmarks: E. Draw and construct representations of two-and three-dimensional geometric objects using a variety of tools, such as straightedge, compass and technology.
Content Organizer: Visualization and Geometric Models

| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
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| 6. Draw nets for a variety of prisms, pyramids, cylinders and cones. | (None) | | | |

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Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

| Content Standard: Data Analysis & Probability Grade 8-10 Benchmarks: A. Create, interpret and use graphical displays and statistical measures to describe data; e.g., box-and-whisker plots, histograms, scatter plots, measures of center and variability. Content Organizer: Data Collection | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 1. Use, create and interpret scatter plots and other types of graphs as appropriate. | <p>#12 Subscale: Data Analysis and Probability</p> <p>Create, interpret and/or analyze tables, charts, and graphs involving data.</p> <p>Interpret/analyze information from visual representations-line bar, circle graphs, histograms, stem and leaf, box and whisker, scatter plots, charts, and tables.</p> <p>Identify patterns/trends, draw conclusions.</p> <p>Select appropriate kind of graph, determine suitable scale, create appropriate display of given data.</p> | <p>I. Primary Resource <i>Connected Mathematics</i> “Samples and Populations” Investigation 1 (pp. 7-14) “Comparing Data Sets” Lessons 1.2, 1.3, 1.4, 1.5</p> <p>II. Additional Resource <i>Amsco’s Preparing for Qualifying Examinations in Mathematics</i> (pp. 367-369) Activity 4: “What’s the Average?”</p> | <p>Relate median to box-and – whisker plots.</p>  <p>Comparing two sets of information (Data)</p> <p>0 12 20 30 40 50 60 70 80 90 100 Quality Ratings</p> <p>Include discussion of interquartile range as a measure of variation.</p> | <p>I. Primary Resource <i>Connected Mathematics</i> Investigation 1 ACE Questions # 2-9 (pp. 16-22) “Mathematical Reflections” # 1-4 (p. 23)</p> |

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Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

| <p>Content Standard: Data Analysis & Probability Grade 8-10 Benchmarks: B. Evaluate different graphical representations of the same data to determine which is the most appropriate representation for an identified purpose. Content Organizer: Data Collection</p> | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| <p>2. Evaluate different graphical representations of the same data to determine which is the most appropriate representation for an identified purpose, e.g., line graph for change over time, circle graph for part to whole comparison, scatter plot for relationship between two variants.</p> <p>3. Differentiate between discrete and continuous data and appropriate ways to represent each.</p> | <p># 12 Subscale: Data Analysis and Probability</p> <p>Create, interpret and/or analyze tables, charts, and graphs involving data.</p> <p>Interpret/analyze information from visual representations-line bar, circle graphs, histograms, stem and leaf, box and whisker, scatter plots, charts, and tables.</p> <p>Identify patterns/trends, draw conclusions.</p> <p>Select appropriate kind of graph, determine suitable scale, create appropriate display of given data.</p> | <p>I. Primary Resource <i>Connected Mathematics</i> “Samples and Populations” Investigation 4 - (pp. 49-62) “Samples and Populations for Assessment” - (pp. 69-70) Journal entry – “Mathematical Reflections” (p. 62)</p> <p><i>Connect to NCTM Standards 2000</i> Representing Data in Different Ways (pp.128-133) Modeling Data with Scatter Plots (pp. 134-139)</p> <p>Computer Line Graphs: Website: “math for Morons Like Us” URL: http://library.thinkquest.org/20991/prealg/graph.html#linegraphs</p> <p>Computer Circle Graphs: Website: URL: bigchalk.com *attached activity from site II. Appendix (p.1)</p> | <p>Use the three questions on page 62, “Samples and Population” to practice writing an extended response. This can be assigned as homework. Prior to writing and evaluating, students must review the OGT rubric and the point standards. After completing the assignment, students should first, self-evaluate their response, then read their responses in their small group, and ask for a 0-4 point evaluation. Teachers should collect the responses and select four journal entries ranging from a one response to a four for class discussion. Students should re-evaluate their work to determine if their self-analysis is on target. Note: Students must learn to accurately evaluate their work if they are going to make significant progress.</p> <p>Discrete data = can be counted with whole numbers Continuous Data = can be counted with fractional numbers</p> | <p>I. Primary Resource <i>Connected Mathematics</i> “Samples and Populations” ACE questions (pp. 55-61) Additional Resource Check up (pp. 69-70)</p> <p><i>Connect to NCTM Standards 2000</i> (p. 133) (p. 139)</p> |

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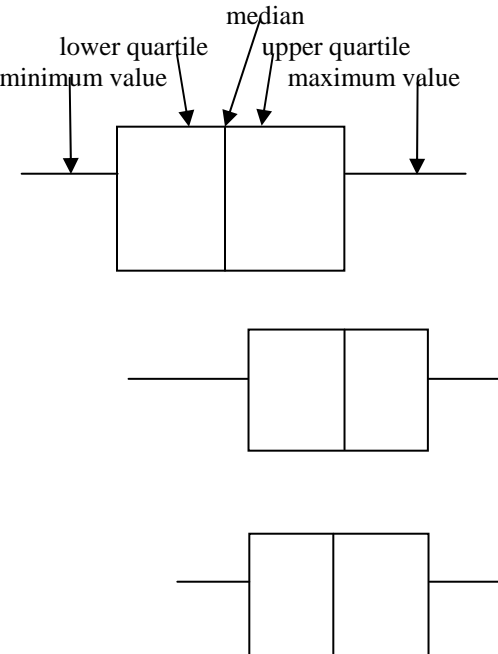
Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

Content Standard: Data Analysis & Probability

Grade 8-10 Benchmarks: C. Compare the characteristics of the mean, median, and mode for a given set of data, and explain which measure of center best represents the data.

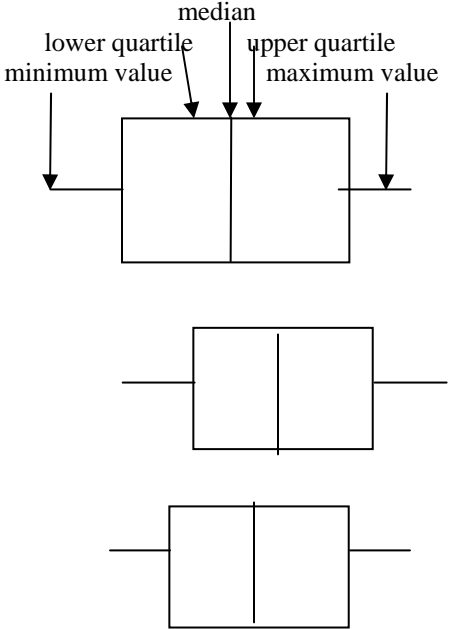
Content Organizer: Statistical Methods

| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
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| <p>4. Compare two sets of data using measures of center (mean, mode, median) and measures of spread (range, quartiles, interquartile range, percentiles).</p> | <p># 13 Subscale: Data Analysis and Probability</p> <p>Choose and apply measures of central tendency (mean, median, and mode) and variability (range and visual displays of information).</p> <p>Understand mean, median, mode, and range.</p> <p>Describe data using measures of central tendency or range.</p> <p>Determine which measure (central tendency) gives best description.</p> <p>Draw line to represent trend in scatter plot.</p> | <p>I. Primary Resource <i>Connected Mathematics</i> “Samples and Populations” Investigation 1 (pp. 7-14) “Comparing Data Sets” Lessons 1.2, 1.3, 1.4, 1.5</p> <p>II. Additional Resource <i>Amsco’s Preparing for Qualifying Examinations in Mathematics</i> (pp. 367-369) Activity 4: What’s the Average?</p> | <p>Relate median to box-and – whisker plots.</p>  <p style="text-align: center;"><u>Comparing two sets of information (Data)</u> 0 12 20 30 40 50 60 70 80 90 100 Quality Ratings</p> <p>Include discussion of interquartile range as a measure of variation.</p> | <p>I. Primary Resource <i>Connected Mathematics</i> Investigation 1 ACE Questions # 2-9 (pp. 16-22) Mathematical Reflections # 1-4 (p. 23)</p> <p style="text-align: right;">3</p> |

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Mathematics – Grade 8

Adams County/Ohio Valley
Course of Study

| Content Standard: Data Analysis & Probability Grade 8-10 Benchmarks: C. Compare the characteristics of the mean, median, and mode for a given set of data, and explain which measure of center best represents the data. Includes aspects of F. Construct convincing arguments based on analysis of data and interpretation of graphs. Content Organizer: Statistical Methods | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| <p>5. Explain the mean’s sensitivity to extremes and its use in comparison with the median and mode.</p> <p>6. Make conjectures about possible relationship in a scatterplot and approximate line of best fit.</p> | <p># 12 Subscale: Data Analysis and Probability</p> <p>Create, interpret and/or analyze tables, charts, and graphs involving data. Interpret/analyze information from visual representations- line bar, circle graphs, histograms, stem and leaf, box and whisker, scatter plots, charts, and tables. Identify patterns/trends, draw conclusions.</p> <p># 13 Subscale: Data Analysis and Probability</p> <p>Choose and apply measures of central tendency (mean, median, and mode) and variability (range and visual displays of information). Understand mean, median, mode, and range Describe data using measures of central tendency or range Determine which measure (central tendency) gives best description Draw line to represent trend in scatter plot</p> | <p>I. Primary Resource <i>Connected Mathematics</i> “Samples and Populations” Investigation 1 (pp. 7-14) “Comparing Data Sets” Lessons 1.2, 1.3, 1.4, 1.5</p> <p>II.. Additional Resource <i>Amsco’s Preparing for Qualifying Examinations in Mathematics</i> Activity 4: What’s the Average? (pp. 367-369)</p> | <p>Relate median to box-and – whisker plots.</p>  <p>Comparing two sets of information.(Data)</p> <p style="text-align: center;">0 12 20 30 40 50 60 70 80 90 100 Quality Ratings</p> <p>Include discussion of interquartile range as a measure of variation.</p> | <p>I. Primary Resource <i>Connected Mathematics</i> Investigation 1 ACE Questions # 2-9 (pp. 16-22) Mathematical Reflections # 1-4 (p. 23)</p> <p style="text-align: right;">1</p> |

Mathematical Processes Standard – Students use mathematical processes and knowledge to solve problems. Students apply problem-solving and decision-making techniques, and communicate mathematical ideas. Mathematical processes are used in all content areas and should be incorporated within instruction and assessment of the content–specific standards and benchmarks.

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| Content Standard: Data Analysis & Probability Grade 8-10 Benchmarks: G. Describe sampling methods and analyze the effects of method chosen on how well the resulting sample represents the population Content Organizer: Statistical Methods | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 7. Identify different ways of selecting samples, such as survey response, random sample, representative sample and convenience sample. | None | I. Primary Resource <i>Connected Mathematics</i> “Samples and Populations” Investigation 2 Conducting Surveys (pp. 24-30) Lessons 2.1 and 2.3 | Use a “sampling plan” to determine a representative population. | I. Primary Resource <i>Connected Mathematics</i> Answers to “Think About This!” (p.6) ACE Questions #1,2,5,6,9,10 (pp. 9-13) ACE Questions # 1-9, 11, 12 (pp. 31-35) |

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| Content Standard: Data Analysis & Probability Grade 8-10 Benchmarks: Includes aspects of E. Evaluate the validity of claims and predictions that are based on data by examining the appropriateness of the data collection and analysis. Content Organizer: Statistical Methods | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 8. Describe how the relative size of a sample compared to the target population affects the validity of predictions. | # 13 Subscale: Data Analysis and Probability Choose and apply measures of central tendency (mean, median, and mode) and variability (range and visual displays of information). Understand mean, median, mode, and range Describe data using measures of central tendency or range Determine which measure (central tendency) gives best description Draw line to represent trend in scatter plot | I. Primary Resource <i>Connected Mathematics</i> “Samples and Populations” Investigation 2 Conducting Surveys (pp. 24-30) Lessons 2.1 and 2.3 | Use a “sampling plan” to determine a representative population | I. Primary Resource <i>Connected Mathematics</i> Answers to Think About This! (p. 6) ACE Questions #1-2, 5-6, 9-10 (pp. 9-13) ACE Questions # 1-9, # 11-12 (pp. 31-35) |

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| Content Standard: Data Analysis & Probability Grade 8-10 Benchmarks: Includes aspects of F. Construct convincing arguments based on analysis of data and interpretation of graphs. Content Organizer: Statistical Methods | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 9. Construct convincing arguments based on analysis of data and interpretation of graphs. | <p># 13 Subscale: Data Analysis and Probability</p> <p>Choose and apply measures of central tendency (mean, median, and mode) and variability (range and visual displays of information).</p> <p>Understand mean, median, mode, and range</p> <p>Describe data using measures of central tendency or range</p> <p>Determine which measure (central tendency) gives best description</p> <p>Draw line to represent trend in scatter plot</p> | <p>I.. Secondary Resource <i>Connected Mathematics</i> “Clever Counting” Investigation 5 5-1 “Catching A Bicycle Thief” (p. 47-49)</p> | <p>Find a graph in a magazine or newspaper. Redo the graph so that the data will appear to show different results.</p> <p>Identify situations when people try to show information in the best light for themselves-such as advertisements.</p> <p>Introduce broken scale on a graph which will make data appear to show different results.</p> | <p>I.. Secondary Resource <i>Connected Mathematics</i> “Clever Counting” Wrapping Up Lesson ACE Questions # 1-11 (pp. 50-54) ACE Extended Questions #12-17 (pp. 54-55)</p> |

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| Content Standard: Data Analysis & Probability Grade 8-10 Benchmarks: H. Use counting techniques, such as permutations and combinations, to determine the total number of options and possible outcomes. Content Organizer: Probability | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| <p>10. Calculate the number of possible outcomes for a situation, recognizing and accounting for when items may occur more than once or when order is important.</p> | <p># 14 Subscale: Data Analysis and Probability</p> <p>Represent and interpret the possible outcomes for a mathematical situation and calculate probabilities. Basic concepts of probability</p> <p>Use counting procedures-- listing, ordering, tree diagrams. multiplication principle</p> <p>Solve problems--simple or compound events, complementary probabilities, independent and simple dependent events</p> <p>Compare experimental/theoretical Probabilities</p> <p>Determine sample space</p> | <p>I. Primary Resource <i>Connected Mathematics</i> “Clever Counting” Investigation 3 (pp. 27-31) Networks Lessons 3.2 3.3 Also see ACE Questions # 1-10 (pp.32-35) TI-73 Activity – Appendix (pp. 5-8)</p> <p>“Clever Counting” Investigation 4.1. (pp. 37-46) “Playing Dominoes” (pp. 37-38) Lesson Two 4.2 “Choosing Locks” (pp. 39-40)</p> | <p>Journal Entry/Extended Response Mathematical Reflections (p. 36) Pre-writing - Class discussion on which problem-solving technique would best fit this reflection- Walk students through the process of taking notes, or using other techniques. Allow ten minutes for group work and then students should complete their individual responses. Provide immediate feedback by responding to students’ questions with a question of your own, rather than by answering student questions.</p> <p>Unit Project Options “Clever Counting” Option # 1: Writing a Detective Story (p. 57) Option #2: Making Trains (p. 58)</p> | <p>I. Primary Resource <i>Connected Mathematics</i> “Clever Counting” ACE Questions # 1-3 (p. 41) Connections # 4-9 (p. 42-44)</p> <p>Self-Assessment (p. 71) T. E.</p> |

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| Content Standard: Data Analysis & Probability Grade 8-10 Benchmarks: J. Compute probabilities of compound events, independent events, and simple dependent events. Content Organizer: Probability | | | | |
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| Grade Level Indicator | OGT Competency Focus | Resources | Instructional Activities/Strategies | Assessment |
| 11. Demonstrate an understanding that the probability of either of two disjoint events occurring can be found by adding the probabilities for each and that the probability of one independent event following another can be found by multiplying the probabilities. | <p># 14 Subscale: Data Analysis and Probability</p> <p>Represent and interpret the possible outcomes for a mathematical situation and calculate probabilities. Basic concepts of probability</p> <p>Use counting procedures--listing, ordering, tree diagrams. multiplication principle</p> <p>Solve problems--simple or compound events, complementary probabilities, independent and simple dependent events</p> <p>Compare experimental/theoretical Probabilities</p> <p>Determine sample space</p> | <p>I. Primary Resource <i>Connected Mathematics</i> “Clever Counting”</p> <p>Investigation I (pp. 5-8) Counting Possibilities - A Robbery Scenario Lessons 1.1 and 1.2 Also see ACE Questions # 1-19 (pp. 9-13)</p> <p><i>Data, Chance and probability Activity Book:</i> Which Card? 3-Card Special</p> <p><i>Probability Model Masters:</i> Playing Card Masters Spinner Masters Circular Protractor Master</p> <p><i>Daily Problems and Weekly Puzzlers</i> Problems # 4, 13, 22, 31, 40, 49, 58, 67, 76, 84, 94, 103, 114, 121, 130, 139</p> | <p>Relate the terms “combinations” and “probability.”</p> <p>Demonstrate a tree diagram as a method to find all possible combinations.</p> <p>Journal Entry Mathematical Reflections (p. 14) For suggested strategy see grade-level indicator # 10 (Data Analysis and Probability)</p> | <p>I. Primary Resource <i>Connected Mathematics</i> “Clever Counting”</p> <p>Check-Up 1 (pp. 60-61) T.E. Quiz (pp. 62-63) T.E. Question Bank (pp. 64-66) T.E.</p> |

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