

Optimum Resource Inc.'s MiddleWare Software

| Michigan Standards - Seventh Grade Mathematics | Math Word Problems |
|--|--------------------|
| Patterns, Relationships and Functions | |
| <i>Student recognize similarities & generalized patterns, use patterns to create models & make predictions, describe the nature of patterns & relationships, & construct representations of mathematical relationships</i> | ✓ |
| Describe analyze & generalize patterns arising in a variety of contexts & express them in general terms | ✓ |
| Represent & record patterns in a variety of ways including table, charts, and graphs, & translate between various representations | ✓ |
| Use patterns & their generalizations to make & justify inferences & predictions | |
| Explore & describe patterns for linear expressions & other near-linear patterns such as step & constant functions | |
| Use patterns & generalizations to solve problems & explore new content | ✓ |

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|---|--------------------|
| Variability and Change | |
| <i>Students describe the relationships among variables, predict what will happen to one variable as another variable is changed, & compare patterns of change</i> | ✓ |
| Identify & describe the nature of change; recognize change in more abstract & complex situations & introduce different kinds of change | ✓ |
| Connect an initial state to a final state & generalize a rule that describes a pattern of change | |
| Begin to investigate applications in bivariate data & linear relationships & explore questions of what will happen to one quantity if another variable is changed | |
| Represent variability or change by ordered pairs, tables, graphs, and equations | |
| Differentiate between types of relationships such as linear vs. not linear, direct vs. indirect, & continuous vs. noncontinuous | |
| Continue to explore relationships arising from interesting contexts & use variables & relationships to solve mathematical problems | ✓ |

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| GEOMETRY AND MEASUREMENT | |
| Shapes & Shape Relationships | |
| <i>Students develop spatial sense, identify characteristics & define shapes, identify properties & describe relationships among shapes</i> | |
| Distinguish among shapes & differentiate between examples & non-examples of shapes based on their properties; generalize about shapes of graphs & data distributions | |
| Generalize the characteristics of shapes & apply their generalizations to classes of shapes | |
| Derive generalizations about shapes & apply those generalizations to develop classifications of familiar shapes | |
| Construct familiar shapes using coordinates, & appropriate tools, sketching and drawing 2 and 3 dimensional shapes | |
| Combine, dissect, & transform shapes | |
| Generalize about the common properties of similar, congruent, parallel, & perpendicular shapes & verify their generalizations informally | |
| Use concepts of shapes & their properties & relationships as studied at the elementary level to describe the physical world & to solve problems | |

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| Position | |
| <i>Students identify locations of objects, identify location relative to other objects, & describe the effects transformations on an object</i> | |
| Locate & describe objects in terms of their position, including compass directions, Cartesian coordinates, latitude & longitude, & midpoints | |
| Locate & describe objects in terms of their orientation and relative position-coincident, collinear, parallel, perpendicular, recognize & describe examples of bilateral and rotational symmetry | |
| Describe translations, reflections, rotations, & dilations using the language of transformations & employ transformations to verify congruence of figures | |
| Accrete the position of points or objects described by two or more conditions; locate all the points that satisfy a given condition | |
| Use concepts of position, direction, and orientation to describe the physical world & to solve problems | |

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| Measurement | |
| <i>Students compare attributes of two objects, or of one object with a standard (unit), & analyze situations to determine what measurement(s) should be made & to what level of precision</i> | |
| Measure objects using standard units in both metric & common systems, & measure angles in degrees | |
| Identify the attribute to be measured & select the appropriate unit of measurement for length, mass(weight), time, temperature, perimeter, area, volume, & angle | |
| Estimate measures with a specified degree of accuracy & decide if an estimate or a measurement is "close enough." | |
| Select & use appropriate tools to measure length, mass, time, temperature, perimeter, area, volume, and angle | |
| Interpret measurements & recognize that two objects may have the same measurement on one attribute, but not necessarily on another | |
| Use proportional reasoning & indirect measurements to draw inferences | |
| apply measurement to describe the real world & to solve problems | |

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| DATA ANALYSIS AND STATISTICS | |
| Collection, Organization & Presentation of Data | |
| <i>Students collect & explore data, organize data into a useful form, & develop skill in representing & reading data displayed in different formats</i> | |
| Collect & explore data through observation, measurement, surveys samplings techniques and simulations | |
| Organize data using tables, charts, graphs box plots, tree diagram, stem-&-leaf plots, spreadsheets, and data bases | |
| Present data using a variety of appropriate representations & explain why one representations preferred over another or how a particular representation may bias the presentation | |
| Identify what data are needed to answer a particular question or solve a given problem, using tables charts graphs, box plots, tree diagrams, stem-&-leaf plots, spreadsheets, & data bases & help design & implement strategies to obtain, organize & present data | |

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| Description & Interpretation | |
| <i>Students examine data & describe characteristics of a distribution, relate data to the situation from which they arose, & use data to answer questions convincingly and persuasively</i> | |
| Critically read data from tables, charts, or graphs & explain the source of the data & what the data represent | |
| Critically question the source of data as well as the collection, organization, & presentation of data & the inferences drawn from the data | |
| Describe the shape of a data distribution & identify the center, the speed, correlation, & any outliers | |
| Draw, explain, & justify conclusions based on data | |
| Recognize bias in data & critique presentations of data such as in advertisements or survey results | |
| Formulate questions & problems, and gather & interpret data to answer those questions | |

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| Inference and Prediction | |
| <i>Students draw defensible inferences about unknown outcomes, make predictions, & identify the degree of confidence they have in their predictions</i> | |
| Make and test hypotheses | |
| Design experiments to model & solve problems using sampling, simulations, & controlled investigations | |
| Formulate & communicate arguments & conclusions based on data & evaluate their arguments & those of others | |
| Make predictions & decisions based on data, including interpolations & extrapolations | |
| Employ investigations, mathematical models, & simulations to make inferences & predictions to answer questions & solve problems | |
| | |
| NUMBER SENSE AND NUMERATION | |
| Concepts and Properties of Numbers | |
| <i>Students experience counting and measuring activities to develop intuitive sense about numbers, develop understanding about properties of numbers, understand the need for & existence of different sets of numbers, & investigate properties of special numbers</i> | ✓ |

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| Develop an understanding of integers & rational numbers, & represent rational numbers in both fraction & decimal form | |
| Extend their understanding of numeration systems to include decimal numeration & scientific numeration | ✓ |
| Develop an understanding of the properties of the integer & rational number systems & of the properties of special numbers including 0 and 1, & the additive & multiplicative inverses | ✓ |
| apply their understanding of number systems, including integers & rational numbers to model & solve mathematical & applied problems | ✓ |
| | |
| Representation and Uses of Numbers | |
| <i>Students recognize that numbers are used in different ways such as counting, measuring, ordering and estimating, understand & produce multiple representations of a number, & translate among equivalent representations</i> | ✓ |
| give geometric representations of fractions, prime & composite numbers, triangular & spare numbers, & other number concepts; represent rational numbers & integers on the number line | ✓ |
| Recognize equivalent representations of a number, especially fractions decimals, & percents, & translate freely among representations | |
| Distinguish between numbers that are used for counting, numbers that are used for ordering, numbers that are used for measuring, & numbers that are used for naming | |

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| Develop & refine strategies for estimating quantities, including fractional quantities, & evaluate the reasonableness & appropriateness of their estimates | |
| Select appropriate representations for numbers, including integers & rational numbers in order to simplify & solve problems | ✓ |
| | |
| Number Relationships | |
| <i>Students investigate relationships such as equality, inequality, inverses, factors & multiples, & represent & compare very large & very small numbers</i> | |
| Compare & order integers & rational numbers using relations of equality & inequality | |
| Express numerical comparisons as ratios & rates | |
| Distinguish between prime & composite numbers; identify factors, multiples, common factors & multiples, & relatively prime numbers; & apply divisibility tests to numbers | |
| Explain the meaning of power & roots of numbers & use calculators to compute powers & square roots | |
| Apply their understanding of number relationships in solving problems | |
| NUMERICAL & ALGEBRAIC OPERATIONS & ANALYTICAL THINKING | |
| Operations and Their Properties | |
| <i>Students understand & use various types of operations to solve problems</i> | ✓ |
| Use manipulative & diagrams to model operations & their inverses with integers & rational numbers & relate the models to their symbolic expressions | |

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| Compute with integers, rational numbers & simple algebraic expressions using mental computation, estimation, calculators, & paper-&-pencil; explain what they are doing & how they know which operations to perform in a given situation | ✓ |
| Describe the properties of operations with rationales and integers & give examples of how they use those properties | ✓ |
| Efficiently & accurately apply operations with integers, rational numbers, & simple algebraic expressions in solving problems | ✓ |
| <p>Algebraic and Analytic Thinking <i>Students analyze problems to determine an appropriate process for solution, & use algebraic notations to model or represent problems</i></p> | |
| Read & write algebraic expression; develop original examples expressed verbally & algebraically; simplify expressions & translate between verbal & algebraic expressions; & solve linear equations & inequalities | |
| Represent algebraic concepts with geometric models tables, and graphs; & write algebraic expressions to correspond to the multiple representations | |
| Solve linear equalities & inequalities using algebraic & geometric methods, & use the context of the problem to interpret & explain their solutions | |
| Analyze problems modeled by linear functions, determine strategies for solving the problems, & evaluate the adequacy of the solutions in the problems | |

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| <p>Michigan Standards - Seventh Grade Mathematics</p> <p>Explore problems that reflect the contemporary uses of mathematics in significant contexts drawn from many fields of work, study & recreation; use the power of technology & algebraic & analytic reasoning to experience the ways mathematics is used in society</p> | |
| | |
| <p>PROBABILITY AND DISCRETE MATHEMATICS</p> | |
| <p>Probability</p> | |
| <p><i>Students develop an understanding of the notion of certainty & of probability as a measure of the degree of likelihood that can be assigned to a given event based on the knowledge available, & make critical judgments about claims that are made in probabilistic situations</i></p> | |
| <p>Describe events as likely or unlikely & give qualitative & quantitative descriptions of the degree of likelihood</p> | |
| <p>Describe probability as a measure of certainty ranging from 0 to 1, & conduct activities that allow them to express probabilities of simple events in mathematical terms</p> | |
| <p>Conduct experiments & give examples to illustrate the difference between dependent & independent events</p> | |
| <p>Explain the difference between probabilities determined from experiments or chance events & probabilities derived mathematically & explain how the empirical probability changes for a large number of trials</p> | |
| <p>Conduct probability experiments & simulations to model & solve problems</p> | |

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| <p>Michigan Standards - Seventh Grade Mathematics</p> | |
| <p><i>Students investigate practice situations such as scheduling, routing, sequencing, networking, organizing & classifying, and analyze ideas like recurrence relations, inductions, iteration</i></p> | |
| <p>Use manipulative & diagrams to explore problems involving counting & arranging objects & arranging objects</p> | |
| <p>Explore sets & set relationships by sorting & classifying objects</p> | |
| <p>Explore situations in which they model & trace paths using paths figures consisting of vertices connected by edges</p> | |
| <p>Explore, develop & invent their own algorithms to accomplish a task or solve numerical problems</p> | |
| <p>Use discrete mathematics concepts as described above to model situations & solve problems; & look for whether or not there is a solution & decide upon a best solution</p> | |