Prentice Hall Mathematics, Algebra 1 © 2009
Correlated to:
Maine Learning Results 2007 Mathematics Grades 9-Diploma

MAINE LEARNING RESULTS 2007 MATHEMATICS GRADES 9-DIPLOMA	PRENTICE HALL MATHEMATICS, ALGEBRA 1 © 2009
A. <u>NUMBER</u>: Students use numbers in everyday and mathematical contexts to quantify or describe phenomena, develop concepts of operations with different types of numbers, use the structure and properties of numbers with operations to *solve* problems, and perform mathematical computations. Students develop number sense related to magnitude, estimation, and the effects of mathematical operations on different types of numbers. It is expected that students use numbers flexibly, using forms of numbers that best match a situation. Students compute efficiently and accurately. *Estimation* should always be used when computing with numbers or solving problems.	
Whole Number: Although no performance indicators are stated, students are expected to continue to use prior concepts and skills in new and familiar contexts.	
Rational Number: Although no performance indicators are stated, students are expected to continue to use prior concepts and skills in new and familiar contexts.	
Real Number:	
1. Students know how to represent and use real numbers.	
a. Use the concept of n^{th} root.	**SE/TE: 176**
b. *Estimate* the value(s) of roots and use technology to approximate them.	**SE/TE: 177, 654**
c. Compute using laws of exponents.	**SE/TE: 441—442, 443—445, 447—451, 453—458**
d. Multiply and divide numbers expressed in scientific notation.	**SE/TE: 442—445, 458—459**
e. Understand that some quadratic equations do not have real solutions and that there exist other number systems to allow for solutions to these equations.	**SE/TE: 566—569, 592—596**
B. <u>DATA:</u> Students make measurements and collect, display, evaluate, analyze, and compute with data to describe or *model* phenomena and to make decisions based on data. Students compute statistics to summarize data sets and use concepts of probability to make predictions and describe the uncertainty inherent in data collection and measurement. It is expected that when working with measurements students: • ***understand*** **that most measurements are approximations and that taking repeated measurements reveals this variability;** • ***understand*** **that a number without a *unit* is not a measurement, and that an appropriate *unit* must always be attached to a number to provide a measurement;** • ***understand*** **that the *precision* and *accuracy* of a measurement depends on selecting the appropriate tools and *units*; and** **use *estimation* comparing measures to *benchmarks* appropriate to the type of measure and *units*.**	
Measurement and Approximation	
1 Students *understand* the relationship between *precision* and *accuracy*.	
a. Express answers to a reasonable degree of *precision* in the context of a given problem.	
b. Represent an approximate measurement using appropriate numbers of significant figures.	
c. Know that most measurements are approximations and explain why it is useful to take the mean of repeated measurements.	**SE/TE: 169—173, 180**

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Data Analysis	
2 Students *understand* correlation and cause and effect.	
a. Recognize when correlation has been confused with cause and effect.	**SE/TE: 35—36**
b. *Create* and *interpret* scatter plots and *estimate* correlation and lines of best fit.	**SE/TE: 33—37, 350—356**
c. Recognize positive and negative correlations based on data from a table or scatter plot.	**SE/TE: 34—36, 725**
d. Estimate the strength of correlation based upon a scatter plot.	
3 Students *understand* and know how to describe distributions and find and use descriptive statistics for a set of data.	
a. Find and apply range, quartiles, mean absolute deviation, and standard deviation (using technology) of a set of data.	**SE/TE: 40—45, 49, 52—53, 636—637**
b. *Interpret*, give examples of, and describe key differences among different types of distributions: uniform, normal, and skewed.	**SE/TE: 305**
c. For the sample mean of normal distributions, use the standard deviation for a group of observations to establish 90%, 95%, or 99% confidence intervals.	
4 Students *understand* that the purpose of random sampling is to reduce bias when creating a representative sample for a set of data.	
a. Describe and account for the difference between sample statistics and statistics describing the distribution of the entire population.	**SE/TE: 426—427**
b. Recognize that sample statistics produce *estimates* for the distribution of an entire population and recognize that larger sample sizes will produce more reliable *estimates*.	**SE/TE: 107, 546—547**
c. Apply methods of *creating* random samples and recognize possible sources of bias in samples.	**SE/TE: 426**
Probability	
5 Students *understand* the relationship of probability to relative frequency and know how to find the probability of compound events.	
a. Find the expected frequency of an event.	**SE/TE: 94, 96—98, 111**
b. Find the expected value of events.	
c. Find the probability of compound events including independent and dependent events.	**SE/TE: 101—106, 111**

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C. <u>GEOMETRY:</u> Students use measurement and observation to describe objects based on their sizes and shapes; *model* or construct two-dimensional and three-dimensional objects; *solve* problems involving geometric properties; compute areas and volumes based on object properties and dimensions; and perform transformations on geometric figures. When making or calculating measures students use *estimation* to check the reasonableness of results.	
Geometric Figures	
1 Students *justify* statements about polygons and *solve* problems.	
a. Use the properties of triangles to prove theorems about figures and relationships among figures.	**SE/TE: 130, 149, 181—187, 188—189, 193**
b. *Solve* for missing dimensions based on congruence and similarity.	**SE/TE: 150—154**
c. Use the Pythagorean Theorem in situations where right triangles are created by adding segments to figures.	**SE/TE: 181—187, 193**
d. Use the distance formula.	**SE/TE: 186**
2 Students *justify* statements about circles and *solve* problems.	
a. Use the concepts of central and inscribed angles to *solve* problems and *justify* statements.	
b. Use the relationships among arc length and circumference, and areas of circles and sectors to *solve* problems and *justify* statements.	
3 Students *understand* and use basic ideas of trigonometry.	
a. Identify and find the value of trigonometric ratios for angles in right triangles.	**SE/TE: 646—648**
b. Use trigonometry to *solve* for missing lengths in right triangles.	**SE/TE: 647—649, 650—653**
c. Use inverse trigonometric functions to find missing angles in right triangles.	
Geometric Measurement	
4 Students find the surface area and volume of three-dimensional objects.	
a. Find the volume and surface area of three-dimensional figures including cones and spheres.	**SE/TE: 14, 450—451, 567—568, 635, 675**
b. Determine the effect of changes in linear dimensions on the volume and surface area of similar and other three-dimensional figures.	**SE/TE: 15 (#73), 156—157**
Transformations:	
Although no performance indicators are stated, students are expected to continue to use prior concepts and skills in new and familiar contexts. Methods of transformational geometry might also be used in Geometric Figures 9-Diploma Performance Indicator 1.	**SE/TE: 358, 359—362, 367, 639—642, 757**

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D. <u>ALGEBRA:</u> Students use symbols to represent or *model* quantities, patterns, and relationships and use symbolic manipulation to *evaluate* expressions and *solve* equations. Students *solve* problems using symbols, tables, graphs, and verbal rules choosing the most effective representation and converting among representations.	
Symbols and Expressions	
1 Students *understand* and use polynomials and expressions with rational exponents.	
a. *Simplify* expressions including those with rational exponents.	**SE/TE: 9—13, 71—74, 80—84, 176, 178, 431—435, 448—450, 453—458, 485—486, 617—620, 622—625, 655—656, 672—676**
b. Add, subtract, and multiply polynomials.	**SE/TE: 494—498, 500—502, 504, 505—509, 512—517**
c. Factor the common term out of polynomial expressions.	**SE/TE: 525, 526 (#32, 36, 37), 530 (#5), 532—533, 537**
d. Divide polynomials by (ax+b).	**SE/TE: 683—686, 716**
Equations and Inequalities	
2 Students *solve* families of equations and inequalities.	
a. *Solve* systems of linear equations and inequalities in two unknowns and interpret their graphs.	**SE/TE: 374—379, 380, 382—385, 387—393, 395, 396—402, 411—417, 421—423**
b. *Solve* quadratic equations graphically, by factoring in cases where factoring is efficient, and by applying the quadratic formula.	**SE/TE: 565—570, 571, 572—575, 585—590, 608—609**
c. *Solve* simple rational equations similar to $\frac{1}{2x+1}=5$	**SE/TE: 692—697, 716—717**
d. *Solve* absolute value equations and inequalities and interpret the results.	**SE/TE: 235—239, 245**
e. Apply the *understanding* that the solution(s) to equations of the form $f(x) = g(x)$ are the x–value(s) of the point(s) of intersection of the graphs of $f(x)$ and $g(x)$ and common outputs in table of values.	**SE/TE: 125, 136—137**
f. Explain why the coordinates of the point of intersection of the lines represented by a system of equations is its solution and apply this *understanding* to solving problems.	**SE/TE: 374—375, 378, 396—397**
3 Students *understand* and apply ideas of logarithms.	
a. Use and *interpret* logarithmic scales.	
b. *Solve* equations in the form of $x = b^y$ using the equivalent form $y = \log_b x$	

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Functions and Relations	
4 Students *understand* and *interpret* the characteristics of functions using graphs, tables, and algebraic techniques.	
a. Recognize the graphs and sketch graphs of the basic functions $f(x) = x^n$, *where n = 1 to 3;* $f(x) = ax^2 + bx + c$; $f(x) = \sqrt{x}$; $f(x) = \lvert x \rvert$; $f(x) = \frac{a}{x}$; $f(x) = a^x$; *and* $f(x) = kx + b$	**SE/TE: 265—267, 285—286, 317—319, 331, 359, 469—471, 550—555, 557—562, 597—603, 605, 638—639, 664—668**
b. Apply functions from these families to problem situations.	**SE/TE: 289, 321, 334, 475—481, 560—562, 641, 669**
c. Use concepts such as domain, range, zeros, intercepts, and maximum and minimum values.	**SE/TE: 29, 267 (#41), 472 (#42), 551, 553, 559—561, 638, 640**
d. Use the concepts of average rate of change (table of values) and increasing and decreasing over intervals, and use these characteristics to compare functions.	**SE/TE: 308—309, 365**
5 Students express relationships *recursively* and use *iterative* methods to *solve* problems.	
a. Express the (n+1) st term in terms of the nth term and describe relationships in terms of a starting point and rule followed to transform one term to the next.	**SE/TE: 293—297, 301, 461—464**
b. Use technology to perform repeated calculations to develop solutions to real life problems involving linear, exponential, and other patterns of change.	**SE/TE: 476—481**