



WASHINGTON
MathScape: Seeing and Thinking Mathematically
Course 3 © 2005

GLE Grade 8	MathScape Course 3 Page References
1. The student understands and applies the concepts and procedures of mathematics.	
1.1. Understand and apply concepts and procedures from number sense.	
Number and numeration	
1.1.1. Understand the concept of rational numbers including whole number powers and square roots of square numbers.	150-151, 171, 290-291, 296-301, 309, 311-313 Math Handbook: 102-115, 126-131, 140-143, 154-161, 168-187
<ul style="list-style-type: none"> • Explain the meaning of a whole number exponent. 	296-301, 311-313 Math Handbook: 168-175
<ul style="list-style-type: none"> • Read and use exponential notation to represent large numbers (e.g., $2500 = 50^2$). 	296-301, 311-313 Math Handbook: 168-175
<ul style="list-style-type: none"> • Identify a square number and find its root. 	150-151, 171 Math Handbook: 176-177, 181
<ul style="list-style-type: none"> • Identify different representations of rational numbers and select the best representation in the situation (e.g., percent for sales discount or sales tax, fraction for probability, and decimals for money, distance [4.35 kilometers], batting averages). 	26-27, 42, 242-247, 250-251, 262-265 Math Handbook: 154-161
<ul style="list-style-type: none"> • Write a squared number. 	296 Math Handbook: 169, 175
1.1.2. Understand the relative values of rational numbers including whole number powers and square roots of square numbers.	243, 262 Math Handbook: 75-77, 112-115, 129-131, 177, 181
<ul style="list-style-type: none"> • Compare and order rational numbers using models or implementing strategies. 	243, 262 Math Handbook: 75-77, 112-115, 129-131
<ul style="list-style-type: none"> • Order different representations of rational numbers. 	243, 262
<ul style="list-style-type: none"> • Place symbolic representations of rational numbers on a number line including whole number powers and square roots of square numbers. 	Opportunity to address this objective: 243, 262 Math Handbook: 75-77, 112-115, 129-131, 161-181

1.1.3. Apply properties of addition, multiplication, and the distributive property to the rational number system.	196-197, 216-217 Math Handbook: 78-81, 284-291
<ul style="list-style-type: none"> • Illustrate and explain the distributive property of multiplication over addition (e.g., using an area model or picture). 	196-197, 216-217 Math Handbook: 79, 81, 286-291
<ul style="list-style-type: none"> • Use the distributive property to simplify expressions including those using integers. 	196-199, 216-217 Math Handbook: 290-291
<ul style="list-style-type: none"> • Use the distributive property to factor expressions (e.g., $3 \cdot 9 + 3 = 3 \cdot (9 + 1)$). 	Math Handbook: 288, 291
<ul style="list-style-type: none"> • Identify the multiplicative inverse of a number. 	243 Math Handbook: 123, 125
1.1.4. Apply ratio, percent, and direct proportion in situations.	53, 79, 243-247, 250-251, 262-265, 274-275, 281, 303, 305 Math Handbook: 140-153, 308-311
<ul style="list-style-type: none"> • Solve problems involving ratio and proportion (e.g., similar figures, scale drawings, rates, find unit pricing, increase or decrease a recipe, find the portions for a group converting between different units of measure, or finding medicinal dosages). 	53, 79, 243-247, 250-251, 262-265, 274-275, 281, 303, 305 Math Handbook: 308-311, 424-427
<ul style="list-style-type: none"> • Solve problems involving percentages (e.g., percent increase/decrease, tax, commission, discount). 	246-247, 264 Math Handbook: 141-153
<ul style="list-style-type: none"> • Explain advantages and disadvantages of different representations of ratios or percents in a given situation (e.g., using $\frac{1}{8}$ versus $12\frac{1}{2}\%$). 	Opportunity to address this objective: 246, 251, 262, 264-265 Math Handbook: 154-161
<ul style="list-style-type: none"> • Determine an unknown value for a dimension or a number of events or objects using ratio or proportion. 	53, 79, 251, 263 Math Handbook: 310-311
<ul style="list-style-type: none"> • Complete a proportion in a situation. 	53, 79, 263 Math Handbook: 310-311
Computation	
1.1.5. Understand the meaning of operations on rational numbers (including square roots of square numbers and whole number powers).	150-151, 171, 298-300, 312-313 Math Handbook: 116-125, 132-139, 168-189
<ul style="list-style-type: none"> • Create a problem situation to match a given rational number equation. 	Opportunity to address this objective: 303-304, 306
<ul style="list-style-type: none"> • Explain the meaning of negative and zero 	299-300, 312-313

exponents.	Math Handbook: 184, 186-187
<ul style="list-style-type: none"> • Demonstrate or describe the meaning of multiplication and division of integers using words, visual, or physical models. 	Math Handbook: 94-95
<ul style="list-style-type: none"> • Create a problem situation involving multiplication or division of integers. 	Opportunity to address this objective: Math Handbook: 94-95
<ul style="list-style-type: none"> • Explain solutions when dividing by fractions (e.g., when dividing by a number between 0 and 1, the result is larger than the dividend). 	Math Handbook: 124-125 See also Course 1: 138, 140, 160
1.1.6. Apply computational procedures with fluency on rational numbers including whole number powers and square roots of square numbers.	8, 13, 17, 35-38, 52-53, 79, 104-111, 115, 119, 126-133, 140-144, 148, 150-151, 167-171, 184, 192, 211, 213-214, 296, 311-313 Math Handbook: 82-83, 93-95, 116-125, 132-139, 176-189
<ul style="list-style-type: none"> • Compute with rational numbers using order of operations. 	8, 13, 17, 35-38, 52-53, 79, 104-111, 115, 119, 126-133, 140-144, 148, 167-171, 184, 192, 211, 213-214 Math Handbook: 82-83, 93-95, 116-125, 132-139
<ul style="list-style-type: none"> • Compute fluently with rational numbers in all forms except exponential. 	8, 13, 17, 35-38, 52-53, 79, 104-111, 115, 119, 126-133, 140-144, 148, 167-171, 184, 192, 211, 213-214 Math Handbook: 82-83, 93-95, 116-125, 132-139
<ul style="list-style-type: none"> • Write and solve problems that involve computation with rational numbers. 	11, 36, 120-121, 168, 192
<ul style="list-style-type: none"> • Solve problems using rational numbers with whole number powers. 	296, 311-313
<ul style="list-style-type: none"> • Solve problems using rational numbers with square roots of perfect squares (e.g., given a square garden with an area of nine square meters, how much fence would be needed to encompass a garden twice the size of the original garden). 	150-151, 171
1.1.7. Understand and apply strategies and tools to complete tasks involving computation on rational numbers.	Throughout course
<ul style="list-style-type: none"> • Select and justify appropriate strategies and tools (e.g., mental computation, estimation, calculators, and paper and pencil) to compute in a problem situation. 	Throughout course
<ul style="list-style-type: none"> • Describe strategies for mentally solving problems involving integers and 	214, 298, 300, 312 Math Handbook: 80-81

exponents.	
<ul style="list-style-type: none"> • Use calculators to compute with whole number powers beyond the cubed numbers. 	301, 311
<ul style="list-style-type: none"> • Use calculators to compute square roots of perfect squares greater than 100. 	Math Handbook: 178
Estimation	
1.1.8. Apply estimation strategies to predict or determine the reasonableness of answers in situations involving computation on rational numbers in any form including whole number powers and square roots of square numbers.	74, 79, 99, 119, 132-133, 138-139, 144-145, 148, 151, 155, 159-161, 175-177, 227-228, 242 Math Handbook: 133-135, 139, 141-143, 151, 153, 372, 377
<ul style="list-style-type: none"> • Identify when an approximation is appropriate. 	Opportunity to address this objective: 119, 132-133, 139, 144-145, 148
<ul style="list-style-type: none"> • Explain situations involving rational numbers where estimates are sufficient and others for which exact value is required. 	Opportunity to address this objective: 119, 132-133
<ul style="list-style-type: none"> • Justify why an estimate would be used rather than an exact answer in a given situation. 	Opportunity to address this objective: 119, 132-133, 139, 144-145, 148
<ul style="list-style-type: none"> • Describe various strategies used during estimation involving integers. 	99, 119, 133, 139, 151, 155, 159-160, 175-177
<ul style="list-style-type: none"> • Use estimation to predict or to verify the reasonableness of calculated results. 	74, 79, 99, 119, 132-133, 138-139, 144-145, 148, 151, 155, 159-161, 175-177, 227-228, 242
1.2. Understand and apply concepts and procedures from measurement.	
Attributes, units, and systems	
1.2.1. Analyze how a change in a linear dimension affects volume and surface area of rectangular prisms and right cylinders.	124, 126, 128
<ul style="list-style-type: none"> • Compare the impact that a change in one dimension has on volume and surface area in right cylinders and rectangular prisms. 	124
<ul style="list-style-type: none"> • Describe the relationships among linear dimensions, volume, and surface area (e.g., changing the length of a side affects the surface area and volume). 	124, 126, 128
<ul style="list-style-type: none"> • Solve problems involving the effects of changes in one dimension on area (e.g., given a box with certain dimensions, make the volume of the box y cubic units by changing only one dimension of the 	124, 130, 133 Math Handbook: 426

box).	
1.2.2. Understand and apply derived units of measurement.	50, 52-57, 60, 78-81, 303-304 Math Handbook: 308-309, 311
<ul style="list-style-type: none"> • Explain the concept of a rate. 	Opportunity to address this objective: 50, 52-57, 60, 78-81, 303-304
<ul style="list-style-type: none"> • Explain how division of measurements produces a derived unit of measurement (e.g., miles traveled divided by hours traveled yields the derived unit [miles per hour]). 	Opportunity to address this objective: 50, 52-57, 60, 78-81, 303-304
<ul style="list-style-type: none"> • Find a rate of change in a situation (e.g., increase per year in stamp cost) and label the results. 	50, 52-57, 60, 78-81, 303-304 Math Handbook: 308-309, 311
<ul style="list-style-type: none"> • Use unit analysis to find equivalent rates (e.g., miles per hour to feet per second). 	52
<ul style="list-style-type: none"> • Use rate to determine a measured outcome. 	50, 52-57, 60-81, 303-304 Math Handbook: 308-309, 311
1.2.3. Understand why different situations require different levels of precision.	50-52, 60, 104, 115, 226-227, 231, 236, 246, 250 Math Handbook: 410
<ul style="list-style-type: none"> • Explain the relationships among units within both the customary and metric system (e.g., kilograms to grams, feet to inches). 	118-119, 132 Math Handbook: 413-415
<ul style="list-style-type: none"> • Justify the use of a unit of measure (e.g., measuring to order fencing requires a different precision than if one is selling land and needs to be precise about borders). 	Opportunity to address this objective: 50-52, 60, 104, 115, 226-227, 231, 236, 246, 250
<ul style="list-style-type: none"> • Compare situations for the level of precision needed. 	Opportunity to address this objective: 50-52, 60, 104, 115, 226-227, 231, 236, 246, 250
<ul style="list-style-type: none"> • Explain and give examples of situations that require more and less precision. 	Opportunity to address this objective: 50-52, 60, 104, 115, 226-227, 231, 236, 246, 250
1.2.5. Understand and apply formulas including the Pythagorean Theorem to right prisms, right cylinders, and triangles.	104-111, 115, 117, 126-131, 133, 237-239, 260-261 Math Handbook: 367-371, 373-387, 389-390, 392-397
<ul style="list-style-type: none"> • Explain how to use a formula for finding the surface area and volume of a solid. 	98-99, 104-109, 111, 115, 117, 124, 126-131, 133 Math Handbook: 378-387
<ul style="list-style-type: none"> • Find missing sides or area of right triangles (e.g., use the Pythagorean Theorem to find any of the missing 	237-239, 260-261 Math Handbook: 369-371, 394-397

values).	
<ul style="list-style-type: none"> • Calculate measures of objects for which no direct information is given (e.g., apply ratio, proportion, and scale to determine the area, surface area, and/or volume of a similar figure or solid). 	128, 229, 231, 238-239, 255, 257-258, 261, 264-266 Math Handbook: 401
<ul style="list-style-type: none"> • Compare surface areas of shapes with given volumes (e.g., compare cost of material to make various right cylinder and right prism containers with a given volume). 	100-101, 120-121, 125-126, 133
1.2.6. Apply strategies to obtain reasonable estimates of volume and surface area measurements for right cylinders, right prisms, and of the lengths of sides of right triangles.	99
<ul style="list-style-type: none"> • Estimate volume and surface area for right cylinders and right prisms. 	99
<ul style="list-style-type: none"> • Estimate the length of the remaining side of a right triangle given the lengths of two sides. 	237-239, 251, 260-261, 264-265, 267 Math Handbook: 396-397
<ul style="list-style-type: none"> • Approximate distance or height in a problem situation using similar triangles or Pythagorean relationships (e.g., height of a flagpole using proportional reasoning, distance across a lake using Pythagorean relationship). 	238-239, 251, 255, 261, 264-265, 267
<ul style="list-style-type: none"> • Use or describe a process for finding area of a right triangle. 	Math Handbook: 375
1.3. Understand and apply concepts and procedures from geometric sense.	
Properties and relationships	
1.3.1. Apply understanding of characteristics and relationships among one-dimensional, two-dimensional, and three-dimensional figures to solve problems.	94-133, 226-267 Math Handbook: 342-401
<ul style="list-style-type: none"> • Identify and label rays, lines, end points, line segments, vertices, and angles. 	Math Handbook: 342-344, 349
<ul style="list-style-type: none"> • Match or draw three-dimensional objects from different perspectives using the same properties and relationships (e.g., match to the correct net, draw the top view). 	94-97, 122-123 See also Course 1: 168-171, 188-189, 195-197, 203
<ul style="list-style-type: none"> • Draw and label with names and symbols, nets of prisms, and cylinders. 	94-95, 108, 122, 128 Math Handbook: 378

<ul style="list-style-type: none"> • Describe everyday objects in terms of their geometric characteristics. 	94, 109, 111, 121, 125-128, 130, 132-133
<ul style="list-style-type: none"> • Identify the two-dimensional components of three-dimensional figures. 	94-98, 100-101, 104, 106, 108, 111, 114, 116, 122-131, 133 Math Handbook: 378-381
1.3.2. Apply understanding of similarity to two-dimensional figures.	229, 231, 234-235, 238, 257 Math Handbook: 424-427
<ul style="list-style-type: none"> • Use properties of similarity to draw, describe, and compare two-dimensional figures. 	229, 231, 234-235, 238, 257 Math Handbook: 424-427
<ul style="list-style-type: none"> • Find the length of a missing side or the measure of a missing angle of one of the figures, given two similar figures. 	229, 231, 238 Math Handbook: 427
<ul style="list-style-type: none"> • Create symmetrical, congruent, or similar figures using a variety of tools (e.g., ruler, pattern blocks, geoboards). 	231, 234-235, 238, 257 Math Handbook: 360-362, 365, 424-427
<ul style="list-style-type: none"> • Draw a similar shape to a given shape. 	231, 234-235, 238, 257 Math Handbook: 424-427
<ul style="list-style-type: none"> • Use properties of circles, cylinders, and figures with rotational symmetry to compare figures. 	108-109, 128 Math Handbook: 356, 363, 380-381, 384, 387-393
<ul style="list-style-type: none"> • Create a scale drawing and label the scale and the dimensions. 	231, 234-235, 238, 257 Math Handbook: 424-427
Locations and transformations	
1.3.3. Understand and apply procedures to find distance between points in two-dimensional representations.	16, 52, 60, 104, 229, 231, 237-239, 257-261, 395-397 Math Handbook: 396-370, 395-397
<ul style="list-style-type: none"> • Locate a missing vertex given the coordinates of the vertices of a regular polygon. 	Opportunity to address this objective: Math Handbook: 351
<ul style="list-style-type: none"> • Apply the Pythagorean Theorem to find the length of a side of a right triangle or distance between two points. 	237-239, 260-261 Math Handbook: 396-370, 395-397
<ul style="list-style-type: none"> • Explain a method for finding the missing side of a triangle in a real-world setting (e.g., the height of a totem pole or building). 	229, 231, 238-239, 257-259, 261
<ul style="list-style-type: none"> • Describe the relationship of any two or more points on a coordinate grid. 	Opportunity to address this objective: 237-239, 260-261
<ul style="list-style-type: none"> • Find the distance between two points on a coordinate grid including lines that are non-parallel with either axis (oblique). 	Opportunity to address this objective: 237-239, 260-261
1.3.4. Understand and apply transformations to figures.	Course 2: 289, 308
<ul style="list-style-type: none"> • Identify and explain how a shape has 	Course 2: 289, 308

been translated, reflected, or rotated with or without a grid (e.g., location of the North Star, rotate the Big Dipper).	
<ul style="list-style-type: none"> Use transformations (rotations, reflections, and translations) to draw or locate congruent two-dimensional figures. 	Course 2: 289, 308
<ul style="list-style-type: none"> Find the image of a given shape after a combination of transformations. 	Opportunity to address this objective: Course 2: 289, 308
<ul style="list-style-type: none"> Tessellate a plane by using transformations. 	259
<ul style="list-style-type: none"> Create a design using a combination of two or more transformations with one or two two-dimensional figures. 	Opportunity to address this objective: Course 2: 289, 308
1.4. Understand and apply concepts and procedures from probability and statistics.	
Probability	
1.4.1. Understand the concept of compound events.	26-27, 31, 42, 44-45 Math Handbook: 246-247, 249-251
<ul style="list-style-type: none"> Determine and explain when events are compound. 	Opportunity to address this objective: 26-27, 31, 42, 44-45 Math Handbook: 246-247, 249-251
<ul style="list-style-type: none"> Explain the difference between compound events involving ‘and’ and ‘or’ (e.g., rolling a six and rolling an odd number vs. rolling a six or rolling an odd number). 	Opportunity to address this objective: 31, 44 Math Handbook: 248
1.4.2. Understand and apply the procedures for comparing theoretical probability and empirical results for independent or compound events.	26-27, 42
<ul style="list-style-type: none"> Calculate the probability of two independent events occurring simultaneously using various methods (e.g., organized list, tree diagram, counting procedures, and area model). 	27, 30-31, 33, 42, 44-45 Math Handbook: 246-247, 249
<ul style="list-style-type: none"> Explain the relationship between theoretical and empirical probability of compound events. 	26-27, 42
<ul style="list-style-type: none"> Predict the probability of outcomes of experiments and compare the predictions to empirical results. 	26-27, 42
<ul style="list-style-type: none"> Design or create a situation that would produce a given probability (e.g., how many of each colored marble would it take to have a given probability of 	Course 2: 59-63, 83-85

selecting one particular color).	
<ul style="list-style-type: none"> Design a game using compound probabilities with equal chances of winning for all players. 	Course 2: 67, 69, 87
Statistics	
1.4.3. Analyze how different samples of a population affect the data.	Math Handbook: 196-199, 201
<ul style="list-style-type: none"> Identify sources of sampling bias given a situation (e.g., interviewing only girls, only a certain age group, or too few people). 	Math Handbook: 197-198, 201
<ul style="list-style-type: none"> Describe a procedure for selecting an unbiased sample. 	Math Handbook: 197-198, 201
<ul style="list-style-type: none"> Compare the results of a survey given two different sample groups. 	Opportunity to address this objective: Math Handbook: 197-198, 201
<ul style="list-style-type: none"> Identify the appropriate population for a given research question. 	Math Handbook: 196-197, 201
<ul style="list-style-type: none"> Describe how sampling may have affected the resulting data. 	Math Handbook: 196-198, 201
1.4.4. Analyze variations in data to determine the effect on the measures of central tendency.	8-13, 35-37
<ul style="list-style-type: none"> Identify clusters and outliers and determine how clusters or outliers may affect measures of central tendency. 	Opportunity to address this objective: 12-13
<ul style="list-style-type: none"> Alter a set of data so that the median is a more reasonable measure than the mean. 	11, 36
<ul style="list-style-type: none"> Use and interpret the most appropriate measure of central tendency and the range to describe a given set of data (e.g., the model hourly wage earned by eighth graders is \$5.75 per hour and the range is \$5.00 to \$6.50; therefore, there are very small differences in hourly wages for eighth graders). 	9, 13, 35, 37 Math Handbook: 231
1.4.5. Understand and apply data techniques to interpret bivariate data.	18-23, 39-41 Math Handbook: 214-218, 221
<ul style="list-style-type: none"> Interpret graphic and tabular representations of bivariate data. 	18-23, 39-41 Math Handbook: 214-218, 221
<ul style="list-style-type: none"> Use a line of best fit to predict a future value of a variable. 	Math Handbook: 218
<ul style="list-style-type: none"> Use a line of best fit to interpolate between existing data values. 	22-23, 41
<ul style="list-style-type: none"> Draw trend lines with or without technology and make predictions about 	22-23, 41 Math Handbook: 218

real-world situations (e.g., population trends, socio-economic trends).	
<ul style="list-style-type: none"> Examine data in a two-column table to interpolate or extrapolate additional values. 	Course 1: 23
<ul style="list-style-type: none"> Use observations about differences between two or more samples to make conjectures about the populations from which the samples were taken (e.g., age groups, regions of the U.S., genders, racial/ethnic distributions). 	Outside the scope of this course
1.4.6. Evaluate how statistics and graphic displays can be used to support different points of view.	Course 1: 15, 39
<ul style="list-style-type: none"> Critique the use of data and data displays for bivariate data. 	18-23, 39-41
<ul style="list-style-type: none"> Judge the reasonableness of conclusions drawn from a set of data and support that position with evidence (e.g., from newspapers, web sites, opinion polls). 	9, 12-13, 17-23, 35, 38-40
<ul style="list-style-type: none"> Determine whether a prediction is reasonable based on a trend line and explain the rationale. 	22-23
<ul style="list-style-type: none"> Determine whether claims made about results are based on biased representations of data (e.g., whether a scale has been intentionally used to support a point of view). 	Course 1: 15, 39
1.5. Understand and apply concepts and procedures from algebraic sense.	
Patterns, functions, and other relations	
1.5.1. Apply understanding of linear and non-linear relationships to analyze patterns, sequences, and situations.	138-177, 272-313
<ul style="list-style-type: none"> Extend, represent, or create linear and non-linear patterns and sequences using tables and graphs. 	138-177, 272-313
<ul style="list-style-type: none"> Explain the difference between linear and non-linear relationships. 	280-297, 305-311
<ul style="list-style-type: none"> Predict an outcome given a linear relationship (e.g., from a graph of profit projections, predict the profit). 	22-23, 41, 79, 144-145, 151, 169-170
<ul style="list-style-type: none"> Use technology to generate linear and non-linear relationship. 	168
1.5.2. Analyze a pattern, table, graph, or situation to develop a rule.	140-141, 144, 148-152, 154, 158, 160, 166-167, 169-171, 173-175, 274-275, 284, 303,

	307
<ul style="list-style-type: none"> • Use technology to help develop a table or graph from an iterative definition (e.g., the number of cells doubles every hour starting with one cell at noon). 	168
<ul style="list-style-type: none"> • Explain the nature of changes in quantities in linear relationships using graphs, tables, or expressions. 	274-275, 280-285, 303, 305-307
<ul style="list-style-type: none"> • Develop recursive equations that describe linear relations in terms of current and previous values (e.g., start = 7; Current = Previous + 5 would give a set of values (1, 7), (2, 12), (3, 17), ...). 	140-141, 144, 148-152, 154, 158, 160, 166-167, 169-171, 173-175
<ul style="list-style-type: none"> • Use words or algebraic symbols to describe a rule for a linear relationship between two sets of numbers (e.g., given a table, describe a rule). 	274-275, 284, 303, 307
Symbols and representations	
1.5.3. Understand relationships between quantities including whole number exponents, square roots, and absolute value.	9, 13, 35, 37, 150-151, 171, 243, 262, 264, 296-300, 311-312 Math Handbook: 92-93, 95, 104-115, 129-131, 154-161
<ul style="list-style-type: none"> • Represent relationships between quantities using exponents (squares) and radicals (roots). 	150-151, 171, 296-300, 311-312 Math Handbook: 168-181
<ul style="list-style-type: none"> • Explain the placement of numbers including square roots and exponents on a number line. 	Course 1: 114, 122, 149, 216, 244, 246, 250, 259, 271, 273
<ul style="list-style-type: none"> • Model or describe a real-life situation using absolute value (e.g., the taxi-cab distance from one point to another can be represented by the sum of two absolute values). 	Opportunity to address this objective: Math Handbook: 92-93, 95
<ul style="list-style-type: none"> • Use relational symbols to express relationships between rational numbers including percents, square roots, absolute value, and exponents. 	Math Handbook: 112-115, 129-131
1.5.4. Apply understanding of concepts of algebra to represent situations involving single-variable relationships.	206-209, 220-221
<ul style="list-style-type: none"> • Represent variable quantities, through expressions, linear equations, inequalities, tables, and graphs of situations. 	182-187, 194-199, 202-213, 215-221, 274-277, 282-285, 288-291, 297, 303-304, 306-311
<ul style="list-style-type: none"> • Write an expression, equation, or 	208-209, 217, 221

inequality with a single variable representing a situation or real-world problem.	
<ul style="list-style-type: none"> Identify and use variables to read and write relationships involving rational numbers. 	107, 115, 196-197, 203, 208-209, 217-218, 221, 274-277, 284-285, 289, 303
<ul style="list-style-type: none"> Model a given description or situation involving relationships with a graph or table. 	60-65, 70, 73, 77, 82, 84, 274-277, 288, 290-291, 293, 296-297, 303-304, 306, 308, 310
<ul style="list-style-type: none"> Describe a situation involving relationships that matches a given graph. 	66-67, 72, 75, 82-88, 273, 284-285, 289
<ul style="list-style-type: none"> Create a table or graph given a description of, or an expression for, a situation involving a linear or non-linear relationship. 	274-277, 280-283, 288, 290-291, 293, 296-297, 304, 307, 309-312
Evaluating and solving	
1.5.5. Understand and apply the procedures for simplifying single-variable expressions.	183, 186-187, 194-197, 199, 202-203, 210, 212, 215-218 Math Handbook: 284-291
<ul style="list-style-type: none"> Simplify expressions and evaluate formulas involving integers. 	183-187, 194-197, 199, 202-203, 210-213, 215-218 Math Handbook: 284-295
<ul style="list-style-type: none"> Match expressions to equivalent simplified expressions. 	187, 196, 210, 216-217
<ul style="list-style-type: none"> Explain a simplification of an expression involving integers. 	183, 186-187, 192-197, 202-203, 210, 212, 214 Math Handbook: 284-290
<ul style="list-style-type: none"> Simplify expressions by combining like terms. 	183, 194-196, 202-203, 210, 213, 215, 217-218 Math Handbook: 289-291
<ul style="list-style-type: none"> Simplify expressions using mathematical properties (distributive, commutative, associative, etc.). 	183, 194-196, 202-203, 210, 213, 215, 217-218 Math Handbook: 284-291
<ul style="list-style-type: none"> Determine the expression that represents a given situation. 	198-199, 208, 210, 212, 214-215, 217 Math Handbook: 276-283
<ul style="list-style-type: none"> Describe a situation that fits with a given expression. 	Math Handbook: 276
1.5.6. Understand and apply a variety of strategies to solve multi-step equations and one-step inequalities with one variable.	204-207, 209, 219-221 Math Handbook: 296-307
<ul style="list-style-type: none"> Solve multi-step equations and one-step inequalities with one variable. 	204-207, 209, 219-221 Math Handbook: 296-307 See also Course 2: 207, 221
<ul style="list-style-type: none"> Solve single variable equations involving parentheses, like terms, or variables on 	204-207, 209, 219-221 Math Handbook: 302-307

both sides of the equal sign.	
<ul style="list-style-type: none"> • Solve one-step inequalities (e.g., $2x < 6$, $x + 4 > 10$). 	Course 2: 207, 221
<ul style="list-style-type: none"> • Solve real-world situations involving single variable equations and proportional relationships and verify that the solution is reasonable for the problem. 	209, 219-221, 229, 231, 257-258
2. The student uses mathematics to define and solve problems.	
2.1. Understand problems.	
2.1.1. Analyze a situation to define a problem.	Throughout course
<ul style="list-style-type: none"> • Use strategies to become informed about the situation (e.g., listing information, asking questions). 	Throughout course
<ul style="list-style-type: none"> • Summarize the problem (e.g., we have information about the relationship between the number of steps per second and the speed in feet per second; we wish to find approximate speed or stride rates). 	Throughout course
<ul style="list-style-type: none"> • Determine whether enough information is given to find a solution (e.g., list what is needed to find the relationship between stride rate and speed; list known and unknown information). 	Throughout course
<ul style="list-style-type: none"> • Determine whether information is missing or extraneous (e.g., compare the list of known things to the list of needed things to see if there are things that are not needed — names, location). 	Throughout course
<ul style="list-style-type: none"> • Define the problem (e.g., find the relationship between the steps per second and speed). 	Throughout course
2.2. Apply strategies to construct solutions.	
2.2.1. Apply strategies, concepts, and procedures to devise a plan to solve the problem.	Throughout course
<ul style="list-style-type: none"> • Organize relevant information from multiple sources. 	Throughout course
<ul style="list-style-type: none"> • Select and apply appropriate mathematical tools for a situation (e.g., plot steps per second vs. speed; check to see if model is linear; calculate successive differences or quotients to 	Throughout course

see if a pattern emerges; find an equation for a line that approximates the relationship or extend the pattern to approximate the speed at 5 steps per second).	
2.2.2. Apply mathematical tools to solve the problem.	Throughout course
<ul style="list-style-type: none"> Implement the plan devised to solve the problem or answer the question posed (e.g., in a table of values of lengths, widths, and areas find the one that shows the largest area; check smaller increments to see if this is the largest that works). 	Throughout course
<ul style="list-style-type: none"> Identify when an approach is unproductive and modify or try a new approach (e.g., if an additive model didn't work, try a multiplicative model). 	Throughout course
<ul style="list-style-type: none"> Check the solution to see if it works (e.g., if the solution for a speed of 19 feet per second is 5 steps per second, perhaps the assumption of linearity was incorrect). 	Throughout course
3. The student uses mathematical reasoning.	
3.1. Analyze information.	
3.1.1. Analyze information from a variety of sources to interpret and compare information.	Throughout course
<ul style="list-style-type: none"> Predict the probability of outcomes of experiments and compare the predication to empirical results. 	26-27
<ul style="list-style-type: none"> Predict an outcome given a linear relationship and a particular input (e.g., from a graph of profit projections, predict the profit in 2005). 	22-23, 41, 144-145, 148, 151, 154-155, 158-160, 169-171, 174-175
3.2. Make predictions, inferences, conjectures, and draw conclusions.	
3.2.1. Apply prediction and inference skills to make or evaluate conjectures.	Throughout course
<ul style="list-style-type: none"> Use observations about differences between two or more samples to make conjectures about the populations from which the samples were taken (e.g., age groups, regions of the U.S., genders, racial/ethnic distribution). 	Opportunity to address this objective: Math Handbook: 196-201
3.2.2. Apply the skill of drawing conclusions and support those conclusions	Throughout course

using evidence.	
<ul style="list-style-type: none"> • Draw conclusions from displays, texts, or oral discussions and justify those conclusions with logical reasoning or other evidence (e.g., read an editorial or ad, draw a conclusion and support that conclusion with evidence in the article or elsewhere). 	Throughout course
3.2.3. Analyze procedures and results in various situations.	Throughout course
<ul style="list-style-type: none"> • Critique conclusions drawn from a set of data and support with evidence (e.g., from magazines, newspapers, web sites, opinion polls). 	6-9, 12-13, 17-19, 22-23, 34-35, 37-39
3.3. Verify results.	
3.3.1. Analyze procedures and information used to justify results using evidence.	Throughout course
<ul style="list-style-type: none"> • Use estimation to predict or to verify the reasonableness of calculated results. 	99, 119, 132, 313
3.3.2. Analyze thinking and mathematical ideas using models, known facts, patterns, relationships, or counter examples.	Throughout course
<ul style="list-style-type: none"> • Explain why a given rational number is greater than or less than another rational number. 	243, 262 Math Handbook: 112-114
4. The student communicates knowledge and understanding in both everyday and mathematical language.	
4.1. Gather information.	
4.1.1. Apply a planning process to collect information for a given purpose.	Throughout course
<ul style="list-style-type: none"> • Describe a procedure for selecting an unbiased sample. 	Math Handbook: 75-76, 197-198, 201, 129-130
4.1.2. Synthesize information from multiple sources using reading, listening, and observation.	Throughout course
<ul style="list-style-type: none"> • Compare the results of a survey given two different sample groups. 	Beyond the scope of this course
<ul style="list-style-type: none"> • Model the relationship with a table or graph given a description of, or an equation for, a situation involving an inequality or linear relationship. 	144, 148-149, 152-155, 169-172, 174-175, 274-275, 282-283, 303, 306
4.2. Organize, represent, and share information.	
4.2.1. Apply organizational skills for a given purpose.	Throughout course
<ul style="list-style-type: none"> • Design and conduct a simulation, with 	Course 2: 77-79, 90-91

and without technology, to determine the probability of an event occurring.	
4.2.2. Apply communication skills to clearly and effectively express or present ideas and situations using mathematical language or notation.	Throughout course
<ul style="list-style-type: none"> • Articulate various strategies used during estimation involving integers. 	99, 119
<ul style="list-style-type: none"> • Clearly explain, describe, or represent mathematical information in a pictorial, tabular, graphical, two- or three-dimensional drawing, or other form as appropriate for the mathematical information (e.g., time, distance, categories), audience, and/or purpose, such as to perform or persuade, with notation and labels as needed. 	Throughout course
<ul style="list-style-type: none"> • Explain situations involving real numbers where estimates are sufficient and others for which exact value is required. 	Opportunity to address this objective: 99, 119, 132
5. The student understands how mathematical ideas connect within mathematics, to other subject areas, and to real-life situations.	
5.1. Relate concepts and procedures within mathematics.	
5.1.1. Apply concepts and procedures from a variety of mathematical areas in a given problem or situation.	Throughout course
<ul style="list-style-type: none"> • Solve problems involving ratio and proportion (e.g., similar figures, scale drawings, rates, find unit pricing, increase or decrease a recipe, find the portions for a group converting between different units of measure, or finding medicinal dosages). 	229, 231, 238, 243-247, 250-255, 257-258, 262-267 Math Handbook: 310-311
<ul style="list-style-type: none"> • Find the area of a circle given the coordinates of the center and a point on the circle. 	Beyond the scope of this course
5.1.2. Apply different mathematical models and representations to the same situation.	Throughout course
<ul style="list-style-type: none"> • Create a problem situation to match a given rational number equation. 	Opportunity to address this objective: 204-209, 219-221, 272-277, 283, 303-304, 306
<ul style="list-style-type: none"> • Match a situation with a data set or graph. 	62-67, 70-73, 75, 83-88
5.2. Relate mathematical concepts and procedures to other disciplines.	
5.2.1. Analyze mathematical patterns and	Throughout course

ideas to extend mathematical thinking and modeling to other disciplines.	
<ul style="list-style-type: none"> Use observations about differences between two or more samples to make conjectures about the populations from which the samples were taken (e.g., age groups, regions of the U.S., genders, racial/ethnic distribution). 	Beyond the scope of this course
<ul style="list-style-type: none"> Check to see if a corner is square using the Pythagorean Theorem. 	Opportunity to address this objective: 236-239, 260-261 Math Handbook: 394-397
<ul style="list-style-type: none"> Calculate the one repetition maximum for strength training of one muscle group. 	Opportunity to address this objective: 6-23, 34-41
<ul style="list-style-type: none"> Monitor/track a diet and evaluate the relationship to physical performance (e.g., does it meet daily nutritional requirements/energy for various populations and energy requirements based on lifestyle, safe-work practices, and leisure activities). 	Opportunity to address this objective: 6-23, 34-41
5.2.2. Know the contributions of individuals and cultures to the development of mathematics.	42, 109, 123, 126, 130, 168, 213, 256, 261, 263, 264, 267
<ul style="list-style-type: none"> Recognize the contributions of a variety of people to the development of mathematics (e.g., research the history of the Pythagorean Theorem). 	42, 109, 123, 126, 130, 168, 213, 256, 261, 263, 264, 267
5.3. Relate mathematical concepts and procedures to real-world situations.	
5.3.1. Understand that mathematics is used in daily life and extensively outside the classroom.	6-89, 109, 111, 118-121, 123, 125-128, 130, 132-133, 138-139, 144-145, 148, 151, 154-155, 160-172, 174-177, 208-209, 213-214, 219-221, 226-235, 238-247, 252-259, 261-267, 274-277, 302-306, 308, 310-313
<ul style="list-style-type: none"> Use estimation to predict or to verify the reasonableness of calculated results. 	99, 119, 132, 313
<ul style="list-style-type: none"> Evaluate conclusions drawn from a set of data and support with evidence (e.g., from newspapers, web sites, opinion polls). 	6-9, 12-13, 16-23, 34-35, 37-41 Math Handbook: 202-221
<ul style="list-style-type: none"> Analyze data from a newspaper article to see if the conclusions are reasonable. 	Opportunity to address this objective: 6-9, 12-13, 16-23, 34-35, 37-41
<ul style="list-style-type: none"> Research how coding and decoding has played a part in history. 	Beyond the scope of this course
5.3.2. Understand that mathematics is used	22-23, 70, 78, 111, 120-121, 139, 239, 244-

within many occupations or careers.	247, 252-255, 267
• Explain how mathematics is used in careers or occupations of interest (e.g., complete a mathematically-based project).	22-23, 70, 78, 111, 120-121, 139, 239, 244-247, 252-255, 267