

Boston Public Schools
Course 438, Algebra – Middle School
Scope and Sequence
2006-2007

The Scope and Sequence is a guide to be used by teachers when planning daily and weekly lessons. The scope and sequence sets forth the content of the mathematics curriculum and a suggested number of days for each topic. It is based on the suggested timeline developed by the publishers of our curriculum materials with adjustments made to reflect the particular needs of our district.

It is expected that the number of days that teachers and students will need to complete the topics listed in the scope and sequence will vary from class to class. Each term has unassigned days that teachers may use flexibly as the need arises to spend additional time on a topic and/or engage in enrichment activities. There are 31 unassigned days in this scope and sequence.

The scope and sequence includes key dates that teachers can use as reference points to determine the likelihood that a class will complete the mathematics curriculum for this course. Teachers and administrators should make regular use of the scope and sequence as one measure of assessing whether or not students are accessing the full curriculum for a course.

Please note the mid-year exam will be given at the beginning of term three in this course for this year. This is being done in order to fit the exam more efficiently into the curriculum. The result of this exam will continue to be a part of the third term grade.

Note: Specific dates for the Formative Assessment and the Open Response section of the Final Exam will be forthcoming.

T E R M	Investigation	Days	Learning Outcomes After completing each section, students will be able to:
Moving Straight Ahead			
1	4: Solving Equations	3 days	<ul style="list-style-type: none"> ◦ Solve an equation of the form $y = mx + b$ symbolically. ◦ Connect various methods of finding information in graphs and in tables and by solving equations. ◦
1	5: Exploring Slope	3 days	<ul style="list-style-type: none"> ◦ Develop a more formal understanding of the concept of slope. ◦ Find the constant rate, or slope, from a table. ◦ Find the slope of a line given two points on the line. ◦ Relate the slope and the y-intercept to the equation of a line.
1	6: Writing an Equation for a Line (omit 6.3)	4 days	<ul style="list-style-type: none"> ◦ Find the equation of a line given two points. ◦ Review important ideas about linear relationships. ◦ Use knowledge about linear relationships to solve problems
	End Moving Straight Ahead	10 days	

T E R M	Investigation	Days	Learning Outcomes After completing each section, students will be able to:
Thinking with Mathematical Models			
1	1: Linear Models	6 days	<ul style="list-style-type: none"> ◦ Collect data, record data in tables, and represent data in coordinate graphs. ◦ Fit a linear model to a graph. ◦ Make predictions from data tables and graph models. ◦ Write an equation given the graph of a line. ◦ Review the meaning of slope and y-intercept in relation to a set of data. ◦ Write the equation of a line given the slope and the y-intercept, the slope and the coordinates of a point on the line, or the coordinates of two points on the line.
1	2: Nonlinear Models	4 days	<ul style="list-style-type: none"> ◦ Express data in tables and graphs. ◦ Make predictions from tables and graph models. ◦ Distinguish between linear and nonlinear relationships. ◦ Identify inverse relationships and describe their characteristics.
1	3: More Nonlinear Models	3 days	<ul style="list-style-type: none"> ◦ Use knowledge about percents and fractions to generate data. ◦ Explore a new type of graph model and to compare it to those explored previously. ◦ Use a graph model to make predictions. ◦ Continue to develop the idea of using a graph to model the trend in a data set.
1	4: A World of Patterns	4 days	<ul style="list-style-type: none"> ◦ To use intuitive ideas about rates of change to sketch graphs for, and to match graphs to, given situations. ◦ To use intuitive ideas about rates of change to create stories that fit given graphs. ◦ To extend understanding of graph models to include new shapes. ◦ To explore symbolic representations for several graph models.
1	Reflections	1 day	
1	End Module/ Chapter Test	1 day	
	End Thinking With Mathematical Models	19 days	
Growing, Growing, Growing			
	Investigation		
1	1: Exponential Growth	5 days	<ul style="list-style-type: none"> ◦ To gain an intuitive understanding of basic exponential growth patterns. ◦ To begin to recognize exponential patterns in tables, graphs, and equations. ◦ To solve problems involving exponential growth. ◦ To express a number that is the product of identical factors in exponential form and standard form.
1	2: Growth Patterns	5 days	<ul style="list-style-type: none"> ◦ To recognize patterns of exponential growth in tables and equations. ◦ To compare and contrast exponential growth with linear growth. ◦ To reason with and solve problems involving exponents and exponential growth. ◦ To determine the growth factor in a given exponential model.

T E R M	Investigation	Days	Learning Outcomes After completing each section, students will be able to:
End of Term One: 45 Days - November 9, 2006			
1 Formative Assessment Day 38 Instructional Days 1 End Module/Chapter Test 5 Discretionary Days			
2	3: Growth Factors	5 days	<ul style="list-style-type: none"> ◦ To determine growth factors and create representations of an exponential population model given sample population data. ◦ To investigate increases in the value of an asset due to compound growth. ◦ To review and extend understanding of percent.
2	4: Exponential Decay	5 days	<ul style="list-style-type: none"> ◦ To recognize patterns of exponential decay in tables, graphs, and equations. ◦ To use knowledge of exponents to write equations for models of exponential decay. ◦ To reason about problems involving exponents and exponential decay. ◦ To describe the effects of varying the values of a and b in the equation $y = a(b^x)$ on the graph of that equation.
2	Reflections	1 day	
2	End Module/ Chapter Test	1 day	
	End Growing, Growing, Growing	22 days	
Looking for Pythagoras			
	Investigation		
2	1: Locating Points	4 days	<ul style="list-style-type: none"> ◦ Review the use of coordinates for specifying locations. ◦ Use coordinates to specify direction and distance. ◦ Connect properties of geometric shapes, such as parallel sides, to coordinate representations.
2	2: Finding Areas and Lengths	4 days	<ul style="list-style-type: none"> ◦ Find areas of polygons drawn on a dot grid using various strategies. ◦ Find the length of a line segment drawn on a grid by thinking of it as the side of a square. ◦ Begin to develop an understanding of the concept of square root.
2	3: The Pythagorean Theorem	5 days	<ul style="list-style-type: none"> ◦ Deduce the Pythagorean Theorem through exploration. ◦ Use the Pythagorean Theorem to find areas of squares drawn on a dot grid. ◦ Use the Pythagorean Theorem to find the distance between two points on a grid. ◦ Determine whether a triangle is a right triangle. ◦ Relate areas of squares to the length of the sides.
2	4: Using the Pythagorean Theorem	4 days	<ul style="list-style-type: none"> ◦ Apply the Pythagorean Theorem in several problem situations. ◦ Investigate the special properties of a 30-60-90 right triangle. ◦ Use the properties of special right triangles to solve problems.
2	5: Irrational Numbers	4 days	<ul style="list-style-type: none"> ◦ Connect decimal and fractional representations of rational numbers. ◦ Estimate lengths of hypotenuses of right triangles. ◦ Explore patterns in terminating and repeating decimals.
2	Reflections	1 day	

T E R M	Investigation	Days	Learning Outcomes After completing each section, students will be able to:
2	End Module/ Chapter Test	1 day	
	End Looking for Pythagoras	23 days	
Frogs, Fleas, and Painted Cubes			
	Investigation		
2	1: Introduction to Quadratic Relationships	5 days	<ul style="list-style-type: none"> ◦ To develop an awareness of quadratic functions and how to recognize them from patterns in tables and graphs. ◦ To describe patterns in tables of quadratic functions and predict subsequent entries. ◦ To recognize the characteristic shape of the graph of a quadratic function and observe such features as lines of symmetry, maximum points, and intercepts. ◦ To use tables and graphs of quadratic relationships to answer questions about a situation. ◦ To represent some quadratic relationships with equations.
End of Term Two: 47 Days – January 31, 2007			
37 Instructional Days 2 End Module/ Chapter Test Days 8 Discretionary Days			
3		1 day	Administer Mid-Year Examination
3		1 day	Review Mid-Year Exam
3	2: Quadratic Expressions	7 days	<ul style="list-style-type: none"> ◦ To develop an awareness of quadratic functions and how they can be recognized from patterns in tables, graphs, and equations. ◦ To recognize a characteristic shape of the graph of a quadratic function and identify its line of symmetry, vertex, and intercepts. ◦ To develop an understanding of equivalent expressions, that is, of two expressions that model the same relationship. ◦ To recognize a quadratic function from an equation, written as a product of two linear factors, or in expanded form as $ax^2 + bx + c$.
3	3: Quadratic Patterns of Change	6 days	<ul style="list-style-type: none"> ◦ To observe and describe patterns of regularity and change in data. ◦ To express data from a problem situation in tables, graphs, and equations. ◦ To make predictions based on data. ◦ To observe the pattern of change in a quadratic relationship and use it to predict the next entry in a table. ◦ To understand that the same equation may model different situations.
3	4: What is a Quadratic Function	5 days	<ul style="list-style-type: none"> ◦ To predict from tables, graphs, and equations whether quadratic functions have maximum or minimum values. ◦ To find and interpret maximum and minimum values from tables, graphs, and the factored form of equations. ◦ To describe patterns of change in tables and graphs of quadratic relationships. ◦ To make predictions based on data.

T E R M	Investigation	Days	Learning Outcomes After completing each section, students will be able to:
3	5: Painted Cubes	4 days	<ul style="list-style-type: none"> ◦ To observe patterns in tables of data. ◦ To express data from a problem situation in tables, graphs, and equations. ◦ To make predictions based on data. ◦ To develop a deeper sense of the properties that characterize quadratic relationships by comparing quadratic relationships to linear and cubic relationships.
3	Reflections	1 day	
3	End Module/ Chapter Test	1 day	
	End Frogs, Fleas and Painted Cubes	29 days	
Say It with Symbols			
	Investigation		
3	1: Order of Operations	4 days	<ul style="list-style-type: none"> ◦ Make sense of symbolic expressions involving addition, subtraction, multiplication, division, and exponents. ◦ Develop an understanding of the conventional <i>order of operations</i> rules by being attentive to the ways expressions are written and evaluated in a variety of settings. ◦ Evaluate expressions by applying the rules of order of operations.
3	2: Equivalent Expressions	3 days	<ul style="list-style-type: none"> ◦ Informally articulate the distributive property. ◦ Apply the distributive property to simplify and compare expressions. ◦ Further articulate what it means for two expressions to be equivalent. ◦ Judge the equivalency of two or more expressions by examining the reasoning that each presents. ◦ Determine the equivalency of two or more expressions by examining tables and graphs.
3	3: Some Important Properties	3 days	<ul style="list-style-type: none"> ◦ Determine the impact of a negative quantity as a factor. ◦ Use the distributive and commutative properties to show equivalence of expressions. ◦ Use contextual clues to interpret symbolic expressions. ◦ Solve a variety of problems using the distributive and commutative properties.
3		1 day	Administer Open Response Examination
End Term Three: 46 Days – April 13, 2007			
33 Instructional Days 1 End Module/ Chapter Test Day 9 Discretionary Days 2 Mid Year Examination 1 Open Response Exam Day			

T E R M	Investigation	Days	Learning Outcomes After completing each section, students will be able to:
4	4: Solving Equations	4 days	<ul style="list-style-type: none"> ◦ Apply the properties for manipulating expressions to solving linear equations. ◦ Solve simple quadratic equations symbolically. ◦ Connect the solutions of an equation to information about its table and graph.
4	Reflections	1 day	
4	End Module/ Chapter Test	1 day	
	End Say It With Symbols	16 days	
4	MCAS - Review	10 days	<ul style="list-style-type: none"> ◦ Five day review of data. The district will provide materials. ◦ Five discretionary instructional days for teacher to provide individualized review.

Clever Counting

	Investigation		
4	1: Counting Possibilities	3 days	<ul style="list-style-type: none"> ◦ To analyze counting problems involving choices in different contexts ◦ To analyze the usefulness of counting trees ◦ To use counting trees ◦ To begin to see a connection between some counting situations and the operations of multiplication
4	2: Opening Locks	3 days	<ul style="list-style-type: none"> ◦ To further explore counting situations in which multiplication provides an answer ◦ To construct systematic lists of outcomes for complex processes ◦ To uncover patterns that help in counting the outcomes of complex processes ◦ To recognize that one problem has the same structure as another problem
4	3: Networks	3 days	<ul style="list-style-type: none"> ◦ To explore network applications ◦ To analyze the number of paths in a network ◦ To compare the structures of networks and problems involving combinations ◦ To create networks that satisfy given constraints
4	4: Deciding Whether Order is Important	3 days	<ul style="list-style-type: none"> ◦ To identify the difference in the structure of problems in which order is not important from those in which it is. ◦ To create a model to clarify a situation ◦ To generalize a pattern
4	5: Wrapping Things Up	2 days	<ul style="list-style-type: none"> ◦ To recognize situations in which counting techniques apply ◦ To differentiate among situations in which order does and does not matter and in which repeats are and are not allowed ◦ To use a variety of models to clarify a solution ◦ To consider situations in which counting techniques would not apply ◦ To apply thinking and reasoning skills to an open-ended situation in which assumptions must be made and to create persuasive argument to support a conjecture
4	Reflections	1 day	
4	End Module/ Chapter Test	1 day	

T E R M	Investigation	Days	Learning Outcomes After completing each section, students will be able to:
	End Clever Counting	16 days	
End of Term Four: 42 Days – June 21, 2007 30 Instructional Days 2 End Module/ Chapter Test Days 9 Discretionary Days 1 Final Examination Day			
<u>Totals For the Year: 180 Days</u> 138 Instructional Days 6 End Module/ Chapter Test Days 31 Discretionary Days 5 District Assessments			