

Pushing the Envelope			
2003 Mathematics			
Academic Content Standards			
Ohio Mathematics			
Grade 5			
Activity/Lesson	State	Standards	
Types of Engines (pgs. 11-23)	OH	MA.5.4.J	Use formulas in problem-solving situations.
Chemistry (pgs. 25-41)	OH	MA.5.2.F.3	Demonstrate and describe the differences between covering the faces (surface area) and filling the interior (volume) of three-dimensional objects.
Chemistry (pgs. 25-41)	OH	MA.5.2.F.4	Demonstrate understanding of the differences among linear units, square units and cubic units.
Chemistry (pgs. 25-41)	OH	MA.5.2.G.3	Demonstrate and describe the differences between covering the faces (surface area) and filling the interior (volume) of three-dimensional objects.
Chemistry (pgs. 25-41)	OH	MA.5.2.G.4	Demonstrate understanding of the differences among linear units, square units and cubic units.
Chemistry (pgs. 25-41)	OH	MA.5.4.J	Use representations, such as tables, graphs and equations, to model situations and to solve problems, especially those that involve linear relationships. Use formulas in problem-solving situations.
Physics and Math (pgs. 43-63)	OH	MA.5.1.B.1	Use models and visual representation to develop the concept of ratio as part-to-part and part-to-whole, and the concept of percent as part-to-whole.
Physics and Math (pgs. 43-63)	OH	MA.5.1.D.1	Use models and visual representation to develop the concept of ratio as part-to-part and part-to-whole, and the concept of percent as part-to-whole.
Physics and Math (pgs. 43-63)	OH	MA.5.4.A.1	Justify a general rule for a pattern or a function by using physical materials, visual representations, words, tables or graphs.
Physics and Math (pgs. 43-63)	OH	MA.5.4.B.3	Use variables as unknown quantities in general rules when describing patterns and other relationships.
Physics and Math (pgs. 43-63)	OH	MA.5.4.E.3	Use variables as unknown quantities in general rules when describing patterns and other relationships.
Physics and Math (pgs. 43-63)	OH	MA.5.4.G.3	Use variables as unknown quantities in general rules when describing patterns and other relationships.
Physics and Math (pgs. 43-63)	OH	MA.5.4.J	Use representations, such as tables, graphs and equations, to model situations and to solve problems, especially those that involve linear relationships. Use formulas in problem-solving situations.

Physics and Math (pgs. 43-63)	OH	MA.5.4.M	Approximate and interpret rates of change from graphical and numerical data.
Rocket Activity (pgs. 69-75)	OH	MA.5.4.J	Use representations, such as tables, graphs and equations, to model situations and to solve problems, especially those that involve linear relationships. Use formulas in problem-solving situations.
Pushing the Envelope			
2003 Mathematics			
Academic Content Standards			
Ohio Mathematics			
Grade 6			
Activity/Lesson	State	Standards	
History of Aviation Propulsion (pgs. 5-9)	OH	MA.6.2.B	Convert units of length, area, volume, mass and time within the same measurement system.
Types of Engines (pgs. 11-23)	OH	MA.6.2.A	Select appropriate units to measure angles, circumference, surface area, mass and volume, using:
Types of Engines (pgs. 11-23)	OH	MA.6.2.B	Convert units of length, area, volume, mass and time within the same measurement system.
Types of Engines (pgs. 11-23)	OH	MA.6.4.C.6	Evaluate simple expressions by replacing variables with given values, and use formulas in problem-solving situations.
Types of Engines (pgs. 11-23)	OH	MA.6.4.G.6	Evaluate simple expressions by replacing variables with given values, and use formulas in problem-solving situations.
Types of Engines (pgs. 11-23)	OH	MA.6.4.J.6	Evaluate simple expressions by replacing variables with given values, and use formulas in problem-solving situations.
Chemistry (pgs. 25-41)	OH	MA.6.2.A	Select appropriate units to measure angles, circumference, surface area, mass and volume, using:
Chemistry (pgs. 25-41)	OH	MA.6.2.B	Convert units of length, area, volume, mass and time within the same measurement system.
Chemistry (pgs. 25-41)	OH	MA.6.2.E.4	Determine which measure (perimeter, area, surface area, volume) matches the context for a problem situation; e.g., perimeter is the context for fencing a garden, surface area is the context for painting a room.
Chemistry (pgs. 25-41)	OH	MA.6.2.F.1	Understand and describe the difference between surface area and volume.
Chemistry (pgs. 25-41)	OH	MA.6.2.G.1	Understand and describe the difference between surface area and volume.
Chemistry (pgs. 25-41)	OH	MA.6.4.C.6	Evaluate simple expressions by replacing variables with given values, and use formulas in problem-solving situations.
Chemistry (pgs. 25-41)	OH	MA.6.4.G.6	Evaluate simple expressions by replacing variables with given values, and use formulas in problem-solving situations.

Chemistry (pgs. 25-41)	OH	MA.6.4.J.6	Evaluate simple expressions by replacing variables with given values, and use formulas in problem-solving situations.
Physics and Math (pgs. 43-63)	OH	MA.6.1.C.5	Use models and pictures to relate concepts of ratio, proportion and percent, including percents less than 1 and greater than 100.
Physics and Math (pgs. 43-63)	OH	MA.6.1.D.3	Explain why a number is referred to as being "rational," and recognize that the expression a/b can mean a parts of size $1/b$ each, a divided by b , or the ratio of a to b .
Physics and Math (pgs. 43-63)	OH	MA.6.1.D.5	Use models and pictures to relate concepts of ratio, proportion and percent, including percents less than 1 and greater than 100.
Physics and Math (pgs. 43-63)	OH	MA.6.1.D.9	Give examples of how ratios are used to represent comparisons; e.g., part-to-part, part-to-whole, whole-to-part.
Physics and Math (pgs. 43-63)	OH	MA.6.1.I.14	Use proportional reasoning, ratios and percents to represent problem situations and determine the reasonableness of solutions.
Physics and Math (pgs. 43-63)	OH	MA.6.4.A.1	Represent and analyze patterns, rules and functions, using physical materials, tables and graphs.
Physics and Math (pgs. 43-63)	OH	MA.6.4.B	Represent, analyze and generalize a variety of patterns and functions with tables, graphs, words and symbolic rules.
Physics and Math (pgs. 43-63)	OH	MA.6.4.C.5	Produce and interpret graphs that represent the relationship between two variables.
Physics and Math (pgs. 43-63)	OH	MA.6.4.C.6	Evaluate simple expressions by replacing variables with given values, and use formulas in problem-solving situations.
Physics and Math (pgs. 43-63)	OH	MA.6.4.F	Use representations, such as tables, graphs and equations, to model situations and to solve problems, especially those that involve linear relationships.
Physics and Math (pgs. 43-63)	OH	MA.6.4.G.6	Evaluate simple expressions by replacing variables with given values, and use formulas in problem-solving situations.
Physics and Math (pgs. 43-63)	OH	MA.6.4.J.6	Evaluate simple expressions by replacing variables with given values, and use formulas in problem-solving situations.
Physics and Math (pgs. 43-63)	OH	MA.6.4.K.5	Produce and interpret graphs that represent the relationship between two variables.
Physics and Math (pgs. 43-63)	OH	MA.6.4.L.7	Identify and describe situations with constant or varying rates of change, and compare them.
Physics and Math (pgs. 43-63)	OH	MA.6.4.M.8	Use technology to analyze change; e.g., use computer applications or graphing calculators to display and interpret rate of change.
Rocket Activity (pgs. 69-75)	OH	MA.6.4.C.6	Evaluate simple expressions by replacing variables with given values, and use formulas in problem-solving situations.
Rocket Activity (pgs. 69-75)	OH	MA.6.4.G.6	Evaluate simple expressions by replacing variables with given values, and use formulas in problem-solving situations.

Rocket Activity (pgs. 69-75)	OH	MA.6.4.J.6	Evaluate simple expressions by replacing variables with given values, and use formulas in problem-solving situations.
Pushing the Envelope			
2003 Mathematics			
Academic Content Standards			
Ohio Mathematics			
Grade 7			
Activity/Lesson	State	Standards	
Types of Engines (pgs. 11-23)	OH	MA.7.4.J.8	Use formulas in problem-solving situations.
Chemistry (pgs. 25-41)	OH	MA.7.4.J.8	Use formulas in problem-solving situations.
Physics and Math (pgs. 43-63)	OH	MA.7.1.D	Use models and pictures to relate concepts of ratio, proportion and percent.
Physics and Math (pgs. 43-63)	OH	MA.7.4.B.1	Represent and analyze patterns, rules and functions with words, tables, graphs and simple variable expressions.
Physics and Math (pgs. 43-63)	OH	MA.7.4.C	Use variables to create and solve equations and inequalities representing problem situations.
Physics and Math (pgs. 43-63)	OH	MA.7.4.D.9	Recognize a variety of uses for variables; e.g., placeholder for an unknown quantity in an equation, generalization for a pattern, formula.
Physics and Math (pgs. 43-63)	OH	MA.7.4.G.1	Represent and analyze patterns, rules and functions with words, tables, graphs and simple variable expressions.
Physics and Math (pgs. 43-63)	OH	MA.7.4.J.8	Use representations, such as tables, graphs and equations, to model situations and to solve problems, especially those that involve linear relationships. Use formulas in problem-solving situations.
Physics and Math (pgs. 43-63)	OH	MA.7.4.L.10	Analyze linear and simple nonlinear relationships to explain how a change in one variable results in the change of another.
Rocket Activity (pgs. 69-75)	OH	MA.7.4.J.8	Use representations, such as tables, graphs and equations, to model situations and to solve problems, especially those that involve linear relationships. Use formulas in problem-solving situations.
Pushing the Envelope			
2003 Mathematics			
Academic Content Standards			
Ohio Mathematics			
Grade 8			
Activity/Lesson	State	Standards	
Types of Engines (pgs. 11-23)	OH	MA.8.2.A.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.

Types of Engines (pgs. 11-23)	OH	MA.8.2.F.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.
Types of Engines (pgs. 11-23)	OH	MA.8.4.D.8	Write, simplify and evaluate algebraic expressions (including formulas) to generalize situations and solve problems.
Chemistry (pgs. 25-41)	OH	MA.8.2.C.9	Demonstrate understanding of the concepts of perimeter, circumference and area by using established formulas 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.)
Chemistry (pgs. 25-41)	OH	MA.8.2.E.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.
Chemistry (pgs. 25-41)	OH	MA.8.4.D.8	Write, simplify and evaluate algebraic expressions (including formulas) to generalize situations and solve problems.
Physics and Math (pgs. 43-63)	OH	MA.8.1.G.6	Estimate, compute and solve problems involving rational numbers, including ratio, proportion and percent, and judge the reasonableness of solutions.
Physics and Math (pgs. 43-63)	OH	MA.8.4.D.8	Write, simplify and evaluate algebraic expressions (including formulas) to generalize situations and solve problems.
Physics and Math (pgs. 43-63)	OH	MA.8.4.E.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.
Rocket Activity (pgs. 69-75)	OH	MA.8.4.D.8	Write, simplify and evaluate algebraic expressions (including formulas) to generalize situations and solve problems.

Pushing the Envelope

2003 Mathematics

Academic Content Standards

Ohio Mathematics			
Grade 9			
Activity/Lesson	State	Standards	
History of Aviation Propulsion (pgs. 5-9)	OH	MA.9.2.F	Write and solve real-world, multi-step problems involving money, elapsed time and temperature, and verify reasonableness of solutions.
Types of Engines (pgs. 11-23)	OH	MA.9.4.D.7	Use formulas to solve problems involving exponential growth and decay.
Chemistry (pgs. 25-41)	OH	MA.9.2.B	Use formulas to find surface area and volume for specified three-dimensional objects accurate to a specified level of precision.

Chemistry (pgs. 25-41)	OH	MA.9.2.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.
Chemistry (pgs. 25-41)	OH	MA.9.2.D.3	Use the ratio of lengths in similar two-dimensional figures or three-dimensional objects to calculate the ratio of their areas or volumes respectively.
Chemistry (pgs. 25-41)	OH	MA.9.2.D.5	Solve problems involving unit conversion for situations involving distances, areas, volumes and rates within the same measurement system.
Chemistry (pgs. 25-41)	OH	MA.9.2.E	Estimate and compute various attributes, including length, angle measure, area, surface area and volume, to a specified level of precision.
Chemistry (pgs. 25-41)	OH	MA.9.2.F	Write and solve real-world, multi-step problems involving money, elapsed time and temperature, and verify reasonableness of solutions.
Chemistry (pgs. 25-41)	OH	MA.9.4.D.7	Use formulas to solve problems involving exponential growth and decay.
Physics and Math (pgs. 43-63)	OH	MA.9.4.D.7	Use formulas to solve problems involving exponential growth and decay.
Rocket Activity (pgs. 69-75)	OH	MA.9.4.D.7	Use formulas to solve problems involving exponential growth and decay.

Pushing the Envelope

2003 Mathematics

Academic Content Standards

Ohio Mathematics			
Grade 10			
Activity/Lesson	State	Standards	
History of Aviation Propulsion (pgs. 5-9)	OH	MA.10.2.F	Write and solve real-world, multi-step problems involving money, elapsed time and temperature, and verify reasonableness of solutions.
Types of Engines (pgs. 11-23)	OH	MA.10.4.D.3	Solve equations and formulas for a specified variable; e.g., express the base of a triangle in terms of the area and height.
Chemistry (pgs. 25-41)	OH	MA.10.2.F	Write and solve real-world, multi-step problems involving money, elapsed time and temperature, and verify reasonableness of solutions.
Chemistry (pgs. 25-41)	OH	MA.10.4.D.3	Solve equations and formulas for a specified variable; e.g., express the base of a triangle in terms of the area and height.
Physics and Math (pgs. 43-63)	OH	MA.10.1.G	Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions.

Physics and Math (pgs. 43-63)	OH	MA.10.4.C	Translate information from one representation (words, table, graph or equation) to another representation of a relation or function.
Physics and Math (pgs. 43-63)	OH	MA.10.4.D.3	Solve equations and formulas for a specified variable; e.g., express the base of a triangle in terms of the area and height.
Rocket Activity (pgs. 69-75)	OH	MA.10.4.D.3	Solve equations and formulas for a specified variable; e.g., express the base of a triangle in terms of the area and height.
Pushing the Envelope			
2003 Mathematics			
Academic Content Standards			
Ohio Mathematics			
Grade 11			
Activity/Lesson	State	Standards	
Physics and Math (pgs. 43-63)	OH	MA.11.3.B.2	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. Represent translations using vectors.
Pushing the Envelope			
2003 Mathematics			
Academic Content Standards			
Ohio Mathematics			
Grade 12			
Activity/Lesson	State	Standards	
Chemistry (pgs. 25-41)	OH	MA.12.2.D.1	Solve problems involving derived measurements; e.g., acceleration and pressure.