ALCOSS: 6.1-2

6.1: Understand the concept of a ratio, and use ratio language to describe a ratio relationship between two quantities.
Examples: "The ratio of wings to beaks in the bird house at the zoo was 2:1 because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."

6.2: Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship.
Examples: "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is ¾ cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger." (Expectations for unit rates in this grade are limited to non-complex fractions.)

Mastered:	**Present:**	**Going Forward:**
Students can understand the concept of a ratio, and use ratio language to describe a ratio relationship between two quantities; understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship.	Students will use a sampling of marked beans to unmarked beans to generate equivalent ratios.	Students will use simulation to generate equivalent ratios.

Present and Going Forward Vocabulary:
Unit rate, ratio, proportion, decimals

Career Connections:
Culinary Arts, Automotive Engineer, Insurance Salesman, Pharmacist, Doctor, Research Scientist, Horticulturist

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)

NCTM Illuminations Activity: Cool Beans

In this activity, the students will use a sampling of marked beans to unmarked beans to generate equivalent ratios. The teacher will need to go to the NCTM Illuminations Web site, http://illuminations.nctm.org/LessonDetail.aspx?id=L722, to get a description of the activities. The activity suggests doing this as a class. Instead of it being a class activity, the student should simulate the trials multiple times alone. The teacher or student will need to print Activity sheet A and Activity sheet B. After these two activities, the teacher can have the students further explore rates and ratios by using the extension activity number three at the bottom of the Web page.

Literature Connections/Resources:
http://illuminations.nctm.org/LessonDetail.aspx?id=L722

ALCOSS: 6.3

Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

a. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.

b. Solve unit rate problems including those involving unit pricing and constant speed.
Example: If it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?

c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.

d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

Mastered:	**Present:**	**Going Forward:**
Students can use ratio and unit rate reasoning to solve real-world and mathematical problems.	Students will create their own real-world scenario using ratio and unit rate reasoning to solve the mathematical problems.	Students will create their own clues to use in a situation involving rates, ratios, and proportions.

Present and Going Forward Vocabulary:
Rate, ratio, proportion, percent

Career Connections:
Investigator, Detective, Insurance Salesman, Doctor, Pharmacist, Horticulturist

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
NCTM Illuminations Web site : Math Mystery Detective
Students will create their own scenario and share it with others. The Assessment Option and Extensions from the NCTM Illuminations Web site, http://illuminations.nctm.org/LessonDetail.aspx?id=L838, will be used for this activity. The teacher will need to download the Clue Sheet Activity Sheet and the Suspect List Activity Sheet in order for students to complete the activity. The teacher will have the students use these sheets to be able to do the assessment option and the extension activity at the bottom of this Web page.

Literature Connections/Resources:
http://illuminations.nctm.org/LessonDetail.aspx?id=L838

ALCOSS: 6.4

Interpret and compute quotients of fractions, and solve word problems involving division of fractions, e.g., by using visual fraction models and equations to represent the problem.

Examples: Create a story context for (2/3) ÷ (3/4), and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that 2/3÷3/4=8/9 because 3/4 of 8/9 is 2/3. (In general, $(a/b) \div (b/d) = ad/bc$.) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4 cup servings are in 2/3 of a cup of yogurt?

How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?

Mastered:	**Present:**	**Going Forward:**
Students can interpret and compute quotients of fractions, and solve word problems involving division of fractions, e.g., by using visual fraction models and equations to represent the problem.	Students will create five real-world mathematical situations in which division of fractions is used to solve the problems.	Students will create situations where the operation of division with fractions would be necessary.

Present and Going Forward Vocabulary:

Division, quotient, multiplication, common denominator, invert-and-multiply, reciprocal

Career Connections:

Baker, Chef, Seamstress, Surveyor, Engineer, Research Scientist

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)

When Will I Ever Use Fractions?

Students will create five real-world mathematical situations in which division of fractions is used to solve the problems. They should explain their reasoning using models. Graph paper may be used to show division models. Explore the Futures Channels (http://www.thefutureschannel.com/) or research careers of your interest to find real world math applications.

Literature Connections/Resources:

- Graph paper
- http://www.thefutureschannel.com/

ALCOSS: 6.5
Fluently divide multi-digit numbers using the standard algorithm.

Mastered:	**Present:**	**Going Forward:**
Students can fluently divide multi-digit numbers using the standard algorithm.	Students will complete division problems using modular arithmetic and complete division problems using modular arithmetic.	Students will complete problems using modular arithmetic.

Present and Going Forward Vocabulary:
Algorithm, division, modular arithmetic

Career Connections:
Insurance Salesman, Marketing Director, Telemarketing Survey Researcher, Insurance Adjustors, Contractor

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
NCTM Illuminations Web site : Mod Mystery
Students will complete division problems using modular arithmetic. The teacher will need to go to the NCTM Illuminations Web site listed below to get a description of the activities. This activity is found in the extension section at the bottom of the webpage, and the teacher will need to print the *Mod Mysteries* activity sheet for this activity.

Literature Connections/Resources:
http://illuminations.nctm.org/LessonDetail.aspx?id=L818

ALCOSS: 6.6

Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Mastered:	**Present:**	**Going Forward:**
Students can fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.	Students will fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.	Students will create problems for other students to solve. In creating this maze, students will be using their problem solving skills.

Present and Going Forward Vocabulary:

Decimals

Career Connections:

Insurance Salesman, Marketing Director, Telemarketing Survey Researcher, Contractor, Insurance Adjustor

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)

NCTM Illuminations Web site : A-MAZE-ing Math

Students will create their own maze for other students. The teacher or student will need to go to the NCTM Illuminations Web site listed below to get a description of the activities. Students will need the activity three worksheet Maze Playing board activity sheet as an example. Students may use a calculator for this activity. The activity is found in the extension section at the bottom of the Web page. The teacher will need to print a copy of the blank maze page. Students will use this to create their own maze. They will use the maze playing board activity sheet as a model.

Literature Connections/Resources:

http://illuminations.nctm.org/LessonDetail.aspx?id=L252

ALCOSS: 6.8

Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts explaining the meaning of 0 in each situation.

Mastered:	**Present:**	**Going Forward:**
Students can understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts explaining the meaning of 0 in each situation.	Students will apply their knowledge of positive and negative numbers as they relate to a number line.	Students will add integers using a football field and gains and losses.

Present and Going Forward Vocabulary:

Integers, positive and negative

Career Connections:

Statistician, Military Strategist, Oceanographer, Cartographer, Electrical Engineers

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)

Web Site Activity: Integer Football Game 1

This activity will require students to apply their knowledge of positive and negative numbers as they relate to a number line. The teacher will need to download Game 1 worksheet *Rules and Plays* and the *Playing Field Worksheet* at http://www.mathgoodies.com/cd/ifl_demo.html.

Literature Connections/Resources:

- **http://www.mathgoodies.com/cd/ifl_demo.html**

ALCOSS: 6.9, 6.11, 6.23

6.9: Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.

a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., – (–3) = 3, and that 0 is its own opposite.
b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

6.11: Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

6.23: Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.

Mastered:	**Present:**	**Going Forward:**
Students can understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. Students can solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate. Students can draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.	Students will create a visual arts advertisement using a coordinate grid.	Students will create their own images on a coordinate grid.

Present and Going Forward Vocabulary:
Coordinate grid, polygon, quadrants, absolute value, coordinate

Career Connections:
Advertising Director, Marketing Director, Graphic Designer, Web Site Designer, Architect, Engineer, Sports Game Field Designer

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)

Graphing Advertisements

Students will create their own visual arts advertisement by plotting their project on a coordinate grid (graph paper). The advertisement may be for a company of their choice. Students should plot their picture on a coordinate grid. They should use at least five polygons in their advertisement. The visual should be drawn in all four quadrants of the coordinate grid. They will name the coordinates used to create their visual. Students will answer the question: Why do graphic designers use coordinate grids when developing advertisements, magazine pages, or web pages? (Use free graph paper on-line at the Web address below.)

Literature Connections/Resources:

http://incompetech.com/graphpaper/

ALCOSS: 6.12
Write and evaluate numerical expressions involving whole-number exponents.

Mastered:	**Present:**	**Going Forward:**
Students can write and evaluate numerical expressions involving whole-number exponents.	Students will write and evaluate numerical expressions involving whole number exponents.	Students will explore Armstrong numbers.

Present and Going Forward Vocabulary:
Base, exponent, Armstrong Number, squared, cube

Career Connections:
Scientist, Contractor, Architecture, Engineer

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
NCTM Illuminations Web site: Armstrong Numbers:
Students will explore Armstrong numbers through the NCTM Illuminations Web site, http://illuminations.nctm.org/LessonDetail.aspx?id=L648. Teacher or student will need to download the *Armstrong Numbers Spreadsheet*, *Armstrong Iteration Spreadsheet*, and the *Strong Arm Iteration Activity Sheet* for students to complete. Detailed information can be read at the Web site.

Literature Connections/Resources:
http://illuminations.nctm.org/LessonDetail.aspx?id=L648

ALCOSS: 6.13

Write, read, and evaluate expressions in which letters stand for numbers.

a. Write expressions that record operations with numbers and with letters standing for numbers.
Example: Express the calculation, "Subtract y from 5," as $5 - y$.

b. Identify parts of an expression using mathematical terms (*sum, term, product, factor, quotient, coefficient*); view one or more parts of an expression as a single entity.
Example: Describe the expression $2(8 + 7)$ as a product of two factors; View $(8 + 7)$ as both a single entity and a sum of two terms.

c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).
Example: Use the formulas $V = s^3$ and $A = 6s^2$ to find the volume and surface area of a cube with sides of length $s = ½$.

Mastered:	**Present:**	**Going Forward:**
Students can write, read, and evaluate expressions in which letters stand for numbers.	Students will apply their knowledge of working with whole number exponents and performing the order of operations while finding the surface area and volume of figures	Students will compare the volume and surface area of a cylinder and a rectangular prism.

Present and Going Forward Vocabulary:
Expressions, exponents, sum, term, product, factor, quotient, coefficient, volume, and surface area, order of operations

Career Connections:
Marketing Manager, Marketing Director, Architect, Engineer

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)

NCTM Illuminations Web site:

The students will apply their knowledge of working with whole number exponents and performing the order of operations while finding the surface area and volume of figures. The teacher will need to go to the NCTM Illuminations Web site, http://illuminations.nctm.org/LessonDetail.aspx?id=L791 to get a description of the activity. The teacher will need to print off the Cubed Cans Activity Sheet. The teacher will need to tell the students that *pi* equals 3.14 or 22/7. They may also leave their answer in terms of *pi*.

Literature Connections/Resources:
http://illuminations.nctm.org/LessonDetail.aspx?id=L791

ALCOSS: 6.7, 6.14-15

6.7: Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor. Example: Express 36 + 8 as 4(9 + 2).

6.14: Apply the properties of operations to generate expressions.

6.15: Identify when two expressions are equivalent (i.e. when two expressions name the same number regardless of which value is substituted into them).

Mastered:	**Present:**	**Going Forward:**
Students can find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor. Example: Express 36 + 8 as 4(9 + 2). Students can apply the properties of operations to generate expressions. Students can identify when two expressions are equivalent.	Students will apply the distributive property to find the area of rectangles.	Students will design a blueprint for a house, shed, or other structure and determine the square footage of their structure using the distributive property.

Present and Going Forward Vocabulary:

Distributive property, commutative property, associative property, area, rectangle, expression, greatest common factor, least common multiple

Career Connections:

General Contractor, Flooring Installation Specialist, Landscaper, Landscape Architect, Architect, Engineer

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)

NCTM Illuminations Web site: Distributing and Factoring Using Area

Students will apply the distributive property to the area of rectangles. The teacher will need to go to the NCTM Illuminations Web site, http://illuminations.nctm.org/LessonDetail.aspx?id=L744, to get a description of the activities. The teacher or student will need the area for distributive property *Activity Sheets* from this site for this activity.

Literature Connections/Resources:

http://illuminations.nctm.org/LessonDetail.aspx?id=L744

ALCOSS: 6.16-18

6.16: Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.

6:17: Use variables to represent numbers, and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number or, depending on the purpose at hand, any number in a specified set.

6:18: Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q, and x are all nonnegative rational numbers.

Mastered:	**Present:**	**Going Forward:**
Students can understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Students can use substitution to determine whether a given number in a specified set makes an equation or inequality true. Students can use variables to represent numbers, and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number or, depending on the purpose at hand, any number in a specified set. Students can solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px + q$ for cases in which p, q, and x are all nonnegative rational numbers.	Students will collect data, compare movement, create slope-intercept equations and use an equation to make predictions.	Students will begin to look at number patterns and begin to explore slope. They will explore finding the equations of lines.

Present and Going Forward Vocabulary:

Inequality, equation, substitution, expression, slope, y-intercept

Career Connections:

Statistician, Engineer, Architect, Sport (Football, Basketball, etc.) Coach

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)

NCTM Illuminations Web site: Movement with Functions

In this activity, students will start making some conjectures about slope and equations of a line. The teacher will need to go to the NCTM Illuminations Web site, http://illuminations.nctm.org/LessonDetail.aspx?ID=L769, to get a description of the activities. The teacher or students will need to download the activity sheets, *How Did I Move? Activity Sheet*, *Coleman's Touchdown Activity Sheet* and *The Winning Goal Activity Sheet.* The teacher may also include item number three from the Extensions section for a third activity.

Literature Connections/Resources:

http://illuminations.nctm.org/LessonDetail.aspx?ID=L769

ALCOSS: 6.10, 19

6.10: Understand ordering and absolute value of rational numbers.

a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram.
Example: Interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right.

b. Write, interpret, and explain statements of order for rational numbers in real-world contexts.
Example: Write –3°C > –7°C to express the fact that –3°C is warmer than –7°C.

c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation.
Example: For an account balance of –30 dollars, write $|-30| = 30$ to describe the size of the debt in dollars.

d. Distinguish comparisons of absolute value from statements about order.
Example: Recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.

6.19: Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

Mastered:	**Present:**	**Going Forward:**
Students can understand ordering and absolute value of rational numbers. Students can write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem; recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.	Students will investigate the relationship between the sides and angles in a triangle	Students will investigate the relationship between sides and angles in a triangle.

Present and Going Forward Vocabulary:
Inequality, number line, solution

Career Connections:
Engineer, Construction Manager

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
NCTM Illuminations Web site: Triangle Equality or Inequality
In this activity, the students will investigate the relationship between the sides and angles in a triangle. The teacher will need to go to the NCTM Illuminations Web site, http://illuminations.nctm.org/LessonDetail.aspx?id=L681, to get a description of the activities. The Triangle Inequality Activity Sheet will be needed for this activity. The extension activity at the bottom of the webpage will also be needed.

Literature Connections/Resources:
http://illuminations.nctm.org/LessonDetail.aspx?id=L681

ALCOSS: 6.20

Use variables to represent two quantities in a real-world problem that change in relationship to one another: write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.

Mastered:	**Present:**	**Going Forward:**
Students can use variables to represent two quantities in a real-world problem that change in relationship to one another: write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.	Students will analyze the relationship of independent and dependent variables. They will analyze the relationship between the variables using graphs and tables, and relate these to the equation.	Students will look at a regression and compare profits with a closing bid. They may also plot points for a nonlinear equation and look for the line of best fit.

Present and Going Forward Vocabulary:

Regression, table, equation, graph, independent variable, dependent variable

Career Connections:

Marketing Director, Architect, Engineer, Research Scientist

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)

NCTM Illuminations Web site: Amazing Profit

The student will compare profits with a closing bid. The teacher will need to go to the NCTM Illuminations Web site, http://illuminations.nctm.org/LessonDetail.aspx?id=L799, to get a description of the activities. The teacher will need the amazing profit activity sheet for this activity. The answers are also included on this site. The extension at the bottom of the Web page may also be explored so that students can look for the line of best fit.

Literature Connections/Resources:

http://illuminations.nctm.org/LessonDetail.aspx?id=L799

ALCOSS: 6.22

Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V=lwh$ and $V=Bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.

Mastered:	**Present:**	**Going Forward:**
Students can find the volume of a right rectangular prism with fractional lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V=lwh$ and $V=Bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.	Students will explore the volume of a right rectangular prism, and apply the formulas for the volume of a right rectangular prism using fractional edge lengths in the context of solving real-world and mathematical problems.	Students will explore right rectangular prisms with the same volume, and determine that certain configurations minimize surface area.

Present and Going Forward Vocabulary:

Surface area, area, volume, net, square, edge, cube, triangles, hexagons, rhombi, rectangular prism

Career Connections:

Manufacturing Manager and Director**,** Marketing Manager and Director, Amusement Park Designers, Oceanographic Display Designers

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)

NCTM Illuminations Web site: Net Relationships

Students will use manipulatives to explore relationships between nets. The teacher will need to go to the NCTM Illuminations Web site, http://illuminations.nctm.org/LessonDetail.aspx?ID=L793 to get a description of the activities. Download the *Cube Nets Tool* and *Fishing for the Best Prism Activity Sheet*. If polyhedron manipulatives are not available, download the *Building Blocks Activity Sheet*. Students may choose to complete the activities found under the Extension section of the Web site.

Literature Connections/Resources:

- **http://illuminations.nctm.org/LessonDetail.aspx?ID=L793**

ALCOSS: 6.21, 6.24

6.21: Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

6.24: Represent three-dimensional figures using nets made up of rectangles and triangles, use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

Mastered:	**Present:**	**Going Forward:**
Students can find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems, and students will represent three-dimensional figures using nets to find the surface area of figures while applying them in the context of solving real-world and mathematical problems.	Students will design and create nets for three-dimensional objects.	Students will create nets for three-dimensional objects using polygons. They will find the surface area and volume of these nets.

Present and Going Forward Vocabulary:
Surface area, area, volume, net, square, edge, cube, triangles, hexagons, rhombi, rectangular prism

Career Connections:
Manufacturing Manager and Director**,** Marketing Manager and Director

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
NCTM Illuminations Web site: Building A Box
Students will have the opportunity to create nets of three dimensional objects. The teacher will need to go to the NCTM Illuminations Web site, http://illuminations.nctm.org/LessonDetail.aspx?id=L570, to get a description of the activities. The activities are listed at the bottom of the Illuminations page under extension.

Literature Connections/Resources:
http://illuminations.nctm.org/LessonDetail.aspx?id=L570

ALCOSS: 6.25-27

6.25: Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. [6-SP1]

6.26: Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. [6-AP2]

6.27: Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number. [6-SP3]

Mastered:	**Present:**	**Going Forward:**
Students can recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. Students can understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. Students can recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.	Students will use the activity, "How Weird is Your Class?" to compare the survey results from their class with those from Canadian students.	Students will explore different methods of comparing the class data with the national data to answer questions: • using frequency tables • using various graphing techniques such as bar charts, pictographs, pie charts, histograms, scatter plots and box and whisker plots • comparing different measures of central tendency (mean, median, mode).

Present and Going Forward Vocabulary:
Measure of center, mean, median, mode, range, variability in data, distribution

Career Connections:
Prepress Technicians, Computer Control Programmers and Operators, Forest, Conservation, and Logging Manager

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)

How Weird is Our Class?

Students will create a survey and collect data about their class. The questions for students to answer comparing the results are given or the teacher can go to the Web site and download the questions. The activity is called, "*How weird is our class?"* The downloadable versions of this activity are on the Web site http://www19.statcan.gc.ca/02/02_022-eng.htm

This activity will allow you to compare the survey results from your class with those from Canadian students. First go to www.censusatschool.ca and click on Data and results. Go to the most recent Canadian summary results. You could also retrieve a large random sample of Canadian results using the international random data sampler).

Literature Connections/Resources

How weird is our class?: http://www19.statcan.gc.ca/02/02_022-eng.htm

ALCOSS: 6.28, 6.29

6.28: Display numerical data in plots on a number line, including dot plots, histograms, and box plots. [6-SP3]

6.29: Summarize numerical data sets in relation to their context, such as by : [6-SP5]

a. Reporting the number of observations. [6-SP5a]
b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. [6-SP5b]
c. Giving quantitative measures of center (median and/or mean) and variability (interquartile striking deviations from the overall pattern with reference to the contest in which the data were gathered. [6-SP5c]
d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered. [6-SP5d]

Mastered:

Students can display numerical data in plots on a number line, including dot plots, histograms, and box plots. Students can summarize numerical data sets in relation to their context.

Present:

Students will create aluminum foil boats that are tested by filling them with plastic bears until they sink. Students will use data from two attempts to make two box-and-whisker plots to summarize their numerical data.

Going Forward:

1. Students in your class can be paired with students in a calculus class. Working together, can they create a better boat design? Or perhaps a middle or high school student with some knowledge of science and physics could talk to the entire class about factors to consider when designing a boat.
2. Students will identify the maximum volume that could be held by the folded piece of aluminum foil. This question is equivalent to the famous calculus question, "What is the maximum volume of an open-top box created by cutting small squares from the corner of a larger square and then folding up the sides?" Although it is difficult to fold the sides of the aluminum foil precisely, it is certainly possible to make a close approximation to this optimal design.

Present and Going Forward Vocabulary:

Box- and Whisker Plot, First Quartile, Mean, Range, Third Quartile, Median

Career Connections:

Business, Research Scientist

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)

NCTM Illuminations Web site: Bears in a Boat

Students are challenged to create aluminum foil boats that are tested by filling them with plastic bears until they sink. If one student is performing the experiment then he or she will need to make four or five boats. The teacher will need to go the NCTM Illuminations Web site given below and prepare the lesson as described. Students will use the mean and median tool that is described in the activity. The teacher will need to adjust the student page to fit the number of students that will be performing the experiment. The Advanced Data Grapher on the NCTM Illuminations Web site will allow the student to create a graph.

Lesson: http://illuminations.nctm.org/LessonDetail.aspx?id=L856

The Advanced Data Grapher: http://illuminations.nctm.org/ActivityDetail.aspx?ID=220

Literature Connections/Resources:

- The Advanced Data Grapher from the NCTM Illuminations Web site http://illuminations.nctm.org/ActivityDetail.aspx?ID=220
- NCTM Illuminations: http://illuminations.nctm.org/LessonDetail.aspx?id=L856
- Graphing calculator: http://www.coolmath.com/graphit/