ACCRS: 7.1
Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units.
Example: If a person walks ½ mile in each ¼ hour, compute the unit rate as the complex fraction ½ / ¼ miles per hour, equivalently 2 miles per hour.

Mastered:	**Present:**	**Going Forward:**
Students can compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units.	Students will use real world data to compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units.	Students will create spaces using unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units.

Present and Going Forward Vocabulary:
Ratio, fractions,

Career Connections:
Landscaper, Landscape Architect, Cartographer, Architect

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
Students will choose one activity from the list.

Activity #1
http://www.physicalgeography.net/fundamentals/8o.html
http://www.enchantedlearning.com/geography/continents/Land.shtml
Use the above sites for charts on areas of continents and oceans.
Student Instructions:
1. Pick one continent and record the land area. What percent of the world's surface area does this continent cover? Identify three bodies of water on this continent. Find the ratio of water area to land area each body represents. Pick a nation on that continent; find two bodies of water in that nation. Find the same ratios for this nation.
2. Create a continent of your own similar to the one you just used. Include three bodies of water and indicate the area of each. Draw a map; include the total area of the continent. Create a chart for the ratio of water area to land area for each body and then record the total water to land ratio.

Activity #2
http://www.infoplease.com/ipa/A0104652.html
http://en.wikipedia.org/wiki/Alabama_locations_by_per_capita_income
Student Instructions:
The average per capita income for the US is approximately $47, 284. At the Web site above, find the per capita income for four other states, including Alabama. Write a ratio comparing the state average as compared to the U.S. average. Pick four cities in Alabama and create the same ratios. How does Alabama compare to other states? How does it compare to the nation? How does your city compare to other cities in Alabama? What are some factors that may affect the average income from state to state and from city to city?

Activity # 3
Student Instructions:
*   Research sprinkler systems in order to determine the different types of sprinkler heads available, the best to use for different types of yards, and the recommended distance between sprinkler heads.
*   Create a yard based on the following criteria.
    o   The land plot is 60' x 60'. The house is 2000 square feet (one level). Include a driveway, sidewalk leading to the front door, a 10 x 10 deck on the back.
    o   Create a sprinkler system to adequately water the lawn. Explain/justify your positioning of the sprinkler heads. Use information from your research to support the positioning.

Activity #4
Student Instructions:
*   Find a blueprint or digital print for three houses on the Internet at the following Web sites:
    http://www.google.com/search?q=blue+print+examples&rls=com.microsoft:en-us:IE-

SearchBox&rlz=1I7DIUS&tbm=isch&tbo=u&source=univ&sa=X&ei=aVndUa2oJIWO9ASWvYGYDQ&ved=0CEMQsAQ&biw=1024&bih=615

http://www.google.com/imgres?q=blue+print+examples&sa=X&rls=com.microsoft:en-us:IE-SearchBox&rlz=1I7DIUS&biw=1024&bih=615&tbm=isch&tbnid=bP5iAzsQqyqfxM:&imgrefurl=http://www.carnationconstruction.com/Techniques/009-Techniques-Blueprints.html&docid=e1olErIkWAy1YM&imgurl=http://www.carnationconstruction.com/images/BlueprintsExample20MainFloor.jpg&w=489&h=363&ei=lVrdUaLUD4fM9ATG_YD4BQ&zoom=1&iact=rc&dur=172&page=1&tbnh=147&tbnw=199&start=0&ndsp=16&ved=1t:429,r:3,s:0,i:92&tx=102&ty=78

http://www.google.com/imgres?q=blue+print+examples&sa=X&rls=com.microsoft:en-us:IE-SearchBox&rlz=1I7DIUS&biw=1024&bih=615&tbm=isch&tbnid=leEA7_t26qqF0M:&imgrefurl=http://gactaern.org/curriculum_construction_occsafe.html&docid=U1NxiLNfAKCQJM&imgurl=http://gactaern.org/Unit%252520Plan/Construction/Occupational%252520Safety%252520and%252520Fundamentals/OSF_4_Blueprints%252520Example.png&w=1024&h=768&ei=HF3dUd7MBpTc9QTVyoCwDA&zoom=1&iact=hc&vpx=586&vpy=171&dur=1511&hovh=194&hovw=259&tx=160&ty=102&page=1&tbnh=143&tbnw=179&start=0&ndsp=16&ved=1t:429,r:4,s:0,i:95

http://www.carnationconstruction.com/Techniques/009-Techniques-Blueprints.html
Scroll to #3, Foundation Plans

- Based on the drawings, determine the total area of each house and the area of each room. Write a ratio of room area to house area for each room in each house. Compare the houses. What room represents the largest in each house? Is it the same for each house? Why do you think that room is the largest? Then, find the area of each room in your house. Compare the area of each room to the total area. How does your house compare to the others?

Literature Connections/Resources:
- http://www.physicalgeography.net/fundamentals/8o.html
- http://www.enchantedlearning.com/geography/continents/Land.shtml
- **C.A.D. for Kids:** http://sketchup.google.com/download.html
- http://www.infoplease.com/ipa/A0104652.html
- http://en.wikipedia.org/wiki/Alabama_locations_by_per_capita_income

ACCRS: 7.2
Recognize and represent proportional relationships between quantities.
a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. [7-RP2b]
c. Represent proportional relationships by equations. [7-RP2c]
d. Example: If total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as $t = pn$.
e. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points $(0, 0)$ and $(1, r)$ where r is the unit rate.

Mastered:	Present:	Going Forward:
Students can recognize and represent proportional relationships between quantities.	Students will use a real world problem to recognize and represent proportional relationships between quantities.	Students will consider a proportional relationship and interpret the results of an algebraic solution.

Present and Going Forward Vocabulary:
Proportional relationships

Career Connections:
    Travel Agent, Cartographer, Automotive Engineer, Architect

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
    Students will choose one activity from the list.
Activity #1
Student Instructions:
Plan a trip across the U.S. Divide the trip into three sections. Use MapQuest to find the travel time and distance for the entire trip. Compute the average speed you will travel in order to travel that distance in the estimated amount of time. Use MapQuest to find the estimated time and distance for each section. Then compute the average speed for each section of the trip. How do they compare to the estimated speed for the entire trip? How do they compare to each other? Are they proportional? What factors would affect the speed at which you travel?

Now determine the amount of money you would spend in gas if you were driving a Camry, a motorcycle, and an SUV. Find the average mpg for each vehicle online. Take into consideration the type of roads you will be traveling for each section. For example, a portion of a trip you may not be driving on an interstate or highway in which optimum mpg could be used.

Activity #2
Constant Dimensions:
http://illuminations.nctm.org/LessonDetail.aspx?id=L572
Student Instructions:
Download the rectangle sheet at http://illuminations.nctm.org/Lessons/RectRatio/RectRatio-AS1-Measure.pdf.
Measure the length and width of a rectangle using both standard and non-standard units of measure.
Nonstandard units of measure may be using paperclips, beads, pennies, etc. Create a scatterplot of your measurements. Do any patterns develop? Can you develop a rule about the length and width of rectangles?
After answering these questions compare your scatterplot to the one on the Web site above.
Students will discover that the ratio of length to width of a rectangle is constant, in spite of the units. Complete the activity under the Instructional Plan.

Activity #3:
Bagel Algebra:
http://illuminations.nctm.org/LessonDetail.aspx?id=L662
Student Instructions:
Students will solve a problem symbolically through equations and interpretation of results. Complete the activity under the **Instructional Plan**. Download activity sheet from
http://illuminations.nctm.org/Lessons/Bagel/Bagel-OVH-Chart.pdf
Then complete the questions under Instructional Plan.

Literature Connections/Resources:
- http://illuminations.nctm.org/LessonDetail.aspx?id=L572
- http://illuminations.nctm.org/LessonDetail.aspx?id=L662

ACCRS: 7.3
    Use proportional relationships to solve multistep ratio and percent problems.
    Examples: Sample problems may involve simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, and percent error.

Mastered:	Present:	Going Forward:
Students can use proportional relationships to solve multistep ratio and percent problems.	Students will use proportional relationships to solve multistep ratio and percent problems in real-world problems.	Students will use applications of percents to determine the career that would earn the most income. Students will use real applications of percents.

Career Connections:
    Real Estate Agent, Waitress, Salesman, Auctioneer, Accountant,
    Business Owner, Business Manager

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
    Choose one or more of the following activities to complete.
    Activity # 1
    Calculate Your Commission!
    Student Instructions:
    Many professions work on commission. Consider the following careers: realtor, waitress, and salesperson.
    Find the wages earned at three different locations in your area for each career. Determine which career you
    could earn the most money and decide which place you would like to be employed. Explain your reasoning.
    How would your answer be affected if you could only work during the Christmas holidays? Thinking along
    those same lines, what other factors may affect your decision? Explain times or situations in which each
    profession would be better than the others.
    What other careers have salaries paid based on commissions?
    Auctioneers, …

    Activity #2
    It's A Bargain!
    Student Instructions:
    Using online sales papers, find eight items you would like to purchase. Take 25% off three items. Determine
    the total cost, including sales tax of each item. Then find the amount of interest you would pay if you
    borrowed the money to pay for your purchases. Money would be borrowed for six months at 6% interest.

Name of Item	Newspaper Price	25% Off	New Price	Sales Tax	Cost of item
Total cost of items					

Amount of money to borrow: _____
Amount of money to pay back at six months at 6% interest: _____

Literature Connections/Resources:
    Khan Academy: http://www.khanacademy.org/math/precalculus/v/introduction-to-interest

ACCRS: 7.4-6
  7.4   Apply and extend previous understandings of addition and subtraction to add and subtract rational
       numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
       a.   Describe situations in which opposite quantities combine to make 0.
       Example: A hydrogen atom has 0 charge because its two constituents are oppositely charged.
       b.   Understand $p + q$ as the number located a distance $|q|$ from p, in the positive or negative direction
            depending on whether q is positive or negative. Show that a number and its opposite have a sum of
            0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.

c.   Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.

7.5:   Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

a.   Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.

b.   Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with nonzero divisor) is a rational number. If p and q are integers, then $-(p/q) = $ $= -(p/q) = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.

7.6:   Solve real-world and mathematical problems involving the four operations with rational numbers. (Computations with rational numbers extend the rules for manipulating fractions to complex fractions.)

Mastered:	**Present:**	**Going Forward:**
Students can apply and extend previous understandings of addition, subtraction, multiplication, and division to add, subtract, multiply and divide rational numbers.	Students will apply and extend previous understandings of addition, subtraction, multiplication, and division to add, subtract, multiply and divide rational numbers in real-world problems.	Students will solve problems with negative exponents; apply rules for integers to simplify algebraic expressions containing integers.

Present and Going Forward Vocabulary:
  Rational number, integers, fractions

Career Connections:
    Physicist, Economist

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
   Choose one or more of the following activities to complete.
   Activity #1: A Rational Presentation
   Student Instructions:
   Create a presentation with the following requirements.
   1.   Explain rational numbers.
      a.   Give examples
      b.   Show how to convert from fractions to decimals
      c.   Explain the difference between rational and irrational numbers
      d.   Explain terminating and non-terminating numbers
   2.   Explain or demonstrate how to add and subtract rational numbers using a number line.
      a.   Explain using a number line both horizontal and vertical number lines
      b.   Explain additive inverses and give examples—magnets, spending money, charges of atoms, etc.
   3.   Demonstrate how to add and subtract rational numbers.
            Include examples with decimals and mixed numbers.
   4.   Demonstrate or explain how to multiply rational numbers
      a.   Give examples –include decimals, fraction times whole number, fraction times mixed number, and whole number times mixed number
      b.   When you multiply a whole number times a mixed number, you can also use the distributive property—give an example using both methods
   5.   Demonstrate or explain how to divide rational numbers.
      a.   Give examples and include decimals, fractions divided by whole numbers, and dividing mixed numbers
      b.   Explain why you can't divide by zero
   6.   Create and solve two real world examples for each operation using decimal numbers. Convert each answer to fractions.
   7.   Create and solve two real world examples for each operation using fractions and whole numbers.
   Choose one of the following programs to present your information. You may include pictures, videos, and models.

- Museum Box - (http://museumbox.e2bn.org/)
- Prezi - http://prezi.com/
- Slide show presentation - http://my.brainshark.com/home.aspx
- Brochure using Microsoft Publisher or compatible software
- A soundtrack writing your own song and then creating a video for it

Activity #2: Rational Purple Math
Student Instructions:
Go to http://www.purplemath.com/modules/rtnladd.htm to review obtaining common denominators for rational expressions. Then complete the worksheet on adding and subtracting rational expressions.

Activity #3: Keep it Simple Silly!
Student Instructions:
Apply integer rules to simplify algebraic expressions containing integers. You can download the lesson at http://math.about.com/od/algebraworksheets/ss/Algebra-_2.htm and the worksheet at http://0.tqn.com/d/math/1/0/j/S/Simplify-the-Expressions-Worksheet-2.jpg.

Activity #4: Negative Exponents
Student Instructions:
Solve problems with negative exponents. They can go through the tutorial and then complete the worksheet. http://www.algebrahelp.com/lessons/simplifying/negativeexponents /.
http://www.algebrahelp.com/worksheets/view/simplifying/negativeexponents.quiz

Activity #5: Flipping Rectangles
Student Instructions:
Explore the concepts of identity, inverse, commutativity, and associativity of the four basic operations (+, −, ×, and ÷) with integers using a geometric model. Moves are performed with a rectangle, and the results of an operation that combines two moves are analyzed. Students determine if the operation is commutative or associative; if an identity element exists; or if there are inverses for any of the moves. Download the activity at http://illuminations.nctm.org/LessonDetail.aspx?ID=L566.

Literature Connections/Resources:
- http://math.about.com/od/algebraworksheets/ss/Algebra-_2.htm
  worksheet on combining like terms with integers
- http://www.purplemath.com/modules/rtnladd.htm
- negative exponents-- http://www.algebrahelp.com/lessons/simplifying/negativeexponents/
- http://www.algebrahelp.com/worksheets/view/simplifying/negativeexponents.quiz
- http://illuminations.nctm.org/LessonDetail.aspx?ID=L566

ACCRS: 7.7
Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients

Mastered:	Present:	Going Forward:
Students can apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	Students will apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients in real-world problems.	Students can simplify polynomials by combining like terms and using the distributive property.

Present and Going Forward Vocabulary:
Properties of operations, rational coefficients, linear expressions

Career Connections:
Horticulturist, Forester, Economist, Engineer

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
Choose one or more of the following activities to complete.
Activity #1: An Infomercial Strategy
Student Instructions:
Create an infomercial for a strategy or property. For example, you may choose the distributive property, inverse operations, addition property of equality, subtraction property of equality, multiplication property of equality, or subtraction property of equality.

Infomercial example: No matter how hard I tried, I could not simplify $2(x + 3) + 5x$. Since the order of operations tells me I can't multiply until I add what is in parentheses, I was stuck. Finally, someone introduced me to the Distributive Property. It changed my life!! I was able to simplify algebraic expressions with ease from then on. Before we go any further, let me explain the distributive property and how it can be yours to use as well.

Students may write the script and then film or create a podcast.

Activity #2: Color this Polynomial Simplified
Student Instructions:
In order to visualize the process of polynomial simplification and replication, complete the activities at
http://alex.state.al.us/lesson_view.php?id=23833.

Literature Connections/Resources:
- http://alex.state.al.us/lesson_view.php?id=23833

ACCRS: 7.8
Understand that rewriting an expression in different forms in a problem context can shed light on the problem, and how the quantities in it are related.
Example: $a + 0.05a = 1.05a$ means that "increase by 5%" is the same as "multiply by 1.05."

Mastered:	Present:	Going Forward:
Students can understand that rewriting an expression in different forms in a problem context can shed light on the problem, and how the quantities in it are related. Example: $a + 0.05a = 1.05a$ means that "increase by 5%" is the same as "multiply by 1.05."	Students will deepen their understanding through the rewriting an expression in different forms in order to shed light on the problem, and showing how the quantities in it are related.	Students will apply rates and conversions of yearly salary to hourly rate of pay for careers they are interested in choosing as a profession.

Present and Going Forward Vocabulary:
Mathematical expressions, converting rates of pay, coefficient, simplifying, distributive property

Career Connections:
All Careers

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
Choose one or more of the following activities to complete.
Activity #1: Math Superhero or Villain
Student Instructions:
Create a superhero or villain for a mathematical term. Include three special powers, a drawing of the figure, and who his/her archenemy is. You may choose to assign students to create a comic strip with those characters or have students work with a classmate to develop a comic strip using both characters.
Possible terms related to this standard include coefficient, variable, algebraic expression, equation, simplifying, distributive property, percent, or decimal.

An example
Pi Girl—
I am irrational—so my digits never end, I help find circumference and area of circles, I was created when circumference was divided by the diameter. My archenemy is the rectangle because he refuses to let me help him compute area or perimeter.

Activity #2: Career Choices
Student Instructions:
Research two technology-related careers that you might be interested in pursuing. Convert the average yearly salary of each career into an hourly wage and record their findings in a spreadsheet. Calculate your weekly gross and net pay for each career choice. Download the activity at:
http://alex.state.al.us/lesson_view.php?id=8043.

Literature Connections/Resources:
    http://alex.state.al.us/lesson_view.php?id=8043

ACCRS: 7.9
    Solve multistep real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form, convert between forms as appropriate, and assess the reasonableness of answers using mental computation and estimation strategies.
    Examples: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 ¾ inches long in the center of a door that is 27 ½ inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.

Mastered:	Present:	Going Forward:
Students can solve multistep real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form, convert between forms as appropriate, and assess the reasonableness of answers using mental computation and estimation strategies.	Students will apply problem-solving skills in real world problem.	Students will present a career that uses this math to solve problems. Students will explain how the math is used and why it is important to this profession.

Present and Going Forward Vocabulary:
    Estimation, rational numbers

Career Connections:
    All Careers

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
    NCTM Illuminations Web site: Remodeling Floors
    Tile floors are common in many homes and businesses but they can be costly.
    Student Instructions:
    Create and estimate the cost of a tile floor design using geometric shapes, ratios, proportions, and percents. You must consider the purchases of full boxes of tiles considering their cost estimates and designs. To add more real world application to this activity, include labor and taxes for the installation of the tile floor. To download the activity go to http://illuminations.nctm.org/LessonDetail.aspx?id=L788. Download the activity

sheets under Materials. Once you complete the activity, go to the Extensions section of the NCTM Web site to http://illuminations.nctm.org/LessonDetail.aspx?id=L788 and answer questions #1-4.
http://www.sascurriculumpathways.com/portal/# This is a tutorial for students to work ahead in all Alabama standards.

Literature Connections/Resources:
- http://illuminations.nctm.org/LessonDetail.aspx?id=L788
- http://floorplanner.com/
- http://www.sascurriculumpathways.com/portal/#

ACCRS: 7.10
Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.
   Example: The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?
b. Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality, and interpret it in the context of the problem.
   Example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.

Mastered:	Present:	Going Forward:
Students can use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.	Students will use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.	Students will create a presentation of real world examples of solving equations and inequalities.

Present and Going Forward Vocabulary:
Variables, simple equations and inequalities

Career Connections:
Landscape Designer, Architect, Salesperson, Business Owner, Purchasing Manager

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
The Futures Channel
Student Instructions:
Explore the futures channel at **http://www.thefutureschannel.com/**. Find three videos that demonstrate real world applications of equations and inequalities. Write a summary of all three and create a presentation of the information learned. You may find a presentation web site of your choice at http://cooltoolsforschools.wikispaces.com/Presentation+Tools. Be creative with your presentation.

http://www.sascurriculumpathways.com/portal/# This is a tutorial for students to work ahead in all Alabama standards.

Literature Connections/Resources:
- http://www.thefutureschannel.com/
- http://www.sascurriculumpathways.com/portal/#

ACCRS: 7.11
Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

Mastered:	Present:	Going Forward:
Students can solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.	Students will create scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.	Students will build a three dimensional model to scale.

Present and Going Forward Vocabulary:
Plaza, scale drawing

Career Connections:
Architect, Engineer, City Planner, Advertiser, Graphic Artist

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

Choose one or more of the following activities to complete.

Activity #1: City Plaza
Student Instructions:
Research plazas. What is a plaza? Why did they originate? How have they changed over time? What are modern day plazas like?
Create a plaza for your city. Create a scale drawing of a plaza you would like in your area. Explain each feature, its uses and why you incorporated it into your plaza.

Activity #2: Scale Models
Student Instructions:
Research different uses for scale models and scale drawings. Create a scale drawing and then create a scale model of an item you think would be useful based on your research. Why would this object be useful as a scale model?

Activity #3: Digital Ads
Student Instructions:
Create an ad for a digital billboard. Develop a scale drawing of the ad on graph paper. You must include the details of area used by each element in the ad on the scale drawing and on the actual billboard. Don't forget to include a logo.

Literature Connections/Resources:
http://floorplanner.com/

ACCRS: 7.12
Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.

Mastered:	Present:	Going Forward:
Students can draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions; focus on constructing triangles from three measures of angles or	Students will develop a deeper understanding of geometric shapes.	Students will create three-dimensional models using digital software.

sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.

Present and Going Forward Vocabulary:
   Protractor, 3-d models

Career Connections:
   Computer or Video Game Designer, Animator, Architect, Cartoonist

Advanced Understanding & Activity (Alternate activity):   (Student page is located in Appendix A.)
   Choose one or more of the following activities to complete.
   Activity #1: Triangle Confusion: Is it possible……
    Student Instructions:
   Answer the following questions below. After you mark yes or no, justify your answer by giving examples with specific angle measures. The first one is done for you.

1.   Is it possible to create a right scalene triangle   _____yes   _____no

Since a scalene triangle doesn't have any congruent angles, the triangle created would simply be a right triangle. An example would be a 90°, 50°, and 40° triangle.
2.   Is it possible to draw a right triangle with an acute angle?   _____yes   _____no
3.   Is it possible to draw an isosceles triangle with a right angle?   _____yes   _____no
4.   Is it possible to draw an equilateral triangle with a 90° angle?   _____yes   _____no
5.   Is it possible to create an isosceles triangle with two obtuse angles?   _____yes   _____no
6.   Is it possible to draw an equilateral triangle with an obtuse angle?   _____yes   _____no
7.   Is it possible to draw a right triangle with an obtuse angle?   _____yes   _____no
8.   Is it possible to create an isosceles triangle with an obtuse angle?   _____yes   _____no
9.   Is it possible to create an equilateral triangle with an acute angle?   _____yes   _____no
10. Is it possible to draw a scalene triangle with an acute angle?   _____yes   _____no

Sketch a quadrilateral to fit each description. If no quadrilateral can be drawn, write not possible and your reasoning behind your answer.
11.   A rhombus that is also a square
12.   A rectangle that is not a parallelogram
13.   A quadrilateral that is not a trapezoid or a parallelogram
14.   A square that is not a rhombus
15.   A rectangle that is not a square
16.   A trapezoid that is also a square
17.   A parallelogram that is a rhombus and a rectangle

Activity #2: Triangular Models
 Student Instructions:
Create a three-dimensional model or video game using three-dimensional software found at
http://computerkiddoswiki.pbworks.com/w/page/16304684/Cool%20Tools%20for%20Cool%20Kids

Use all types of triangles in your model. If you want to print using blender, you must also download Pepakura at http://www.tamasoft.co.jp/pepakura-en/.

C.A.D. for Kids
http://sketchup.google.com/download.html

Google SketchUp (http://www.sketchup.com/intl/en/product/index.html) is a 3-d modeling software tool that's easy to learn, simple to use, and lets you place your models in Google Earth. Once you've built your models, you can place them in Google Earth (http://earth.google.com/), post them to the 3-d Warehouse (http://sketchup.google.com/3dwarehouse/).

LDraw™ (http://www.ldraw.org/) is an open standard for LEGO CAD programs that allow the user to create virtual LEGO models and scenes. You can use it to document models you have physically built, create building instructions just like LEGO, render three dimensional photo realistic images of your virtual models and even make animations. The possibilities are endless. Unlike real LEGO bricks where you are limited by the number of parts and colors, in LDraw nothing is impossible.
http://www.ldraw.org/
http://www.blender.org/
http://sketchup.google.com/download/

Literature Connections/Resources:
- http://alex.state.al.us/lesson_view.php?id=23750
- http://illuminations.nctm.org/LessonDetail.aspx?ID=L613

ACCRS: 7.13
Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.

Mastered:	Present:	Going Forward:
Students can describe the two-dimensional figures that result from slicing thre3-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.	Students will develop a deeper understanding of two-dimensional figures that result from slicing 3-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.	Students will explore and discover conic sections by cutting a cone with a plane.

Present and Going Forward Vocabulary:
Ellipse, conic section, hyperbola, parabola

Career Connections:
Engineer, Designer, Tool/Part Manufacturer, Draftsman, Architect

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
Choose one or more activities to complete.

Activity #1 Geometric Avatar
Student Instructions:
Father Time, Uncle Sam, Mother Nature, Jack Frost are all fictional figures that represent a concept. Research Geometry and some of the leading mathematicians and symbols related to this branch of mathematics. Create a figure or avatar to represent Geometry. Tell what this character represents and explain your design of this character. You may hand draw or create this character online using the Web sites below. You may change this to mathematics or any other branch to use as an activity for other standards.
Create your Avatar at one of the following Web sites:
- http://computerkiddoswiki.pbworks.com/w/page/16304684/Cool%20Tools%20for%20Cool%20Kids
- http://www.shrinkpictures.com/create-avatar/
- http://www.tektek.org/dream/
- http://www.meez.com/home.dm

Activity #2 Geometry Thinker Keys
Student Instructions:
Complete four or more of the following:
1. **What if?** What if there were only rectangles—no other shapes?
2. **Alphabet** List A-Z all terms connected to geometry (or be more specific-surface area, volume).
3. **Variations** How many ways can you find each—perimeter, area, volume, surface area, and

circumference?
4. **Different Uses** List two different uses for area, perimeter, surface area, circumference and volume.
5. **Question** Write a problem that has the following answers—12cm, 24 cm^2, 32 cm^3, 5 in, 23 in^2, and 4 in^3.
6. **Ridiculous** Construct a house without rectangles.
7. **Disadvantages** List the disadvantages of building a house without measurements.

Activity #3 Web Site Activity: Exploring Conic Sections
Student Instructions:
Research the moving ahead vocabulary before starting the lesson. To access the activity go to
http://illuminations.nctm.org/LessonDetail.aspx?id=L792
Explore and discover conic sections by cutting a cone with a plane. Circles, ellipses, parabolas, and hyperbolas are examined using the Conic Section Explorer tool. Physical manipulatives such as dough can optionally be used as well.
Then complete the activity under the Instructional Plan. Download the Cutting Cones activity sheet. For an additional challenge, students may choose to complete the questions under the Extension section of the Web site.

Literature Connections/Resources:
- http://computerkiddoswiki.pbworks.com/w/page/16304684/Cool%20Tools%20 for%20Cool%20Kids
- http://www.shrinkpictures.com/create-avatar/
- http://www.tektek.org/dream/
- http://www.meez.com/home.dm
- http://illuminations.nctm.org/LessonDetail.aspx?id=L792

ACCRS: 7.14 & 7.16
7.14:   Know the formulas for the area and circumference of a circle, and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
7.16:   Solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

Mastered:	Present:	Going Forward:
Students can solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	Students will solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	Students will compare volume of similar and different shaped objects.

Present and Going Forward Vocabulary:
   Area, volume, 2-d and 3-d objects, prisms

Career Connections:
   Architect, City Planner, Landscape Architect

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

Choose one or more activities to complete.
Activity #1: It's All Hay to Me!
In this lesson, students will use dimensions of round and square hay bales to calculate and compare volumes. They also calculate unit prices to determine which hay bale is the better value. Finally, students explore how to fit round and square bales into a barn to maximize volume, and decide which type of hale bale is the best choice.

Activity #2: Cans
In this lesson, students will use formulas they have explored for the volume of a cylinder and convert them into the same volume for rectangular prisms while trying to minimize the surface area. Various real world cylindrical objects will be measured and converted into a prism to hold the same volume. As an extension, students may design and create a rectangular prism container according to their dimensions to compare and contrast with the cylinder.

Activity#3: Dimension + Volume = Relationship
This extension lesson can be used for students to discover the relationship between dimension and volume. Students create two rectangular prisms and two cylinders to determine which holds more popcorn. Students then justify their observation by analyzing the formulas and identifying the dimension(s) with the largest impact on the volume. Discover which dimensions have the largest impact on volume. The link to this activity is: http://illuminations.nctm.org/Lesson.aspx?id=2927

Literature Connections/Resources:
- http://illuminations.nctm.org/LessonDetail.aspx?id=L783
- http://illuminations.nctm.org/LessonDetail.aspx?id=L791
- http://illuminations.nctm.org/LessonDetail.aspx?id=L797

ACCRS: 7.15
Use facts about supplementary, complementary, vertical, and adjacent angles in a multistep problem to write and solve simple equations for an unknown angle in a figure.

Mastered:	**Present:**	**Going Forward:**
Students can use facts about supplementary, complementary, vertical, and adjacent angles in a multistep problem to write and solve simple equations for an unknown angle in a figure.	Students will develop a deeper understanding of write and solve simple equations for an unknown angle in a figure.	Students will apply comprehension of special angles to create a city.

Present and Going Forward Vocabulary:
Supplementary angles, complementary angles, vertical angles, parallel lines, perpendicular lines, alternate interior angles, alternate exterior angles, corresponding angles, adjacent angles, interior angles, exterior angles

Career Connections:
City Planner, Architect, Civil Engineer

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

Choose one or more activities to complete.
I Can……
Student Instructions: Choose one or more activities to complete
1. Create a shape poem for one of the vocabulary terms. You may go to http://www.readwritethink.org/classroom-resources/student-interactives/theme-poems-30044.html to learn about shape poems.
2. Create a brochure of special angles. Include pictures and uses. This may be hand drawn or completed digitally.
3. Create a FaceBook page for a special angle. Include bio info, friends, photos of this angle and its friends as they appear in everyday life. Include and four wallposts from friends. You may organize this info digitally in a PPT, as a poster, or on the Web site http://www.classtools.net/fb/home/page.
4. Create a crossword puzzle for the vocabulary terms. Many Web sites are available online to create this puzzle digitally.
5. Create a comic strip using two of the special angles. This should illustrate what a typical day would be like for them.

6.   Research the different types of cities. Use this info to create your own using the lesson below. This is written as a group project, but students can do this individually. If you prefer, students can do this 2-d using a poster to create a map of the city. Create a virtual city at http://www.zanpo.com/.

Literature Connections/Resources:
- http://alex.state.al.us/lesson_view.php?id=24081
- http://mainada.net/comics
  Create your own comics, add captions, dialogue, backgrounds, characters and props.
- http://www.comicmaster.org.uk/
  Create a drawing, save and play back as a movie of the drawing being created. Embed into any Web page.

ACCRS: 7.17-18
7.17: Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences. [7-SP1]
7.18: Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. [7-SP2]

Mastered:	Present:	Going Forward:
Students can understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population; understand that random sampling tends to produce representative samples and support valid inferences. Students can use data from a random sample to draw inferences about a population with an unknown characteristic of interest; generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.	Students will use a RAFT activity to collect, analyze, and display data from a random sample.	Students will further explore how the data compares with data from the internet.

Present and Going Forward Vocabulary:
Random Sample, inference

Career Connections:
Construction Manager, Advertising Agent, Marketing Director, Promotional Agent, Public Relation Agent, Sales Manager, Computer Systems Analyst

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

Choose one or more activities to complete.
RAFT (Student Page)
Student Instructions: Research sampling and population as they pertain to empirical research. Then complete

the RAFT. Choose one row. Derive a question that pertains to the TOPIC. Survey the class about the TOPIC from the perspective of the ROLE to the AUDIENCE using the FORMAT. Display data along with the information gained and share any valid generalizations.

ROLE	AUDIENCE	FORMAT	TOPIC
Sampling (their math class)	Population (whole school)	Brochure	It's What's for Dinner.
Sampling (their math class)	Population (whole school)	Movie Poster	I'll Be Back.
Sampling (their math class)	Population (whole school)	Comic Strip	Talk, text, internet, and more…..

Literature Connections/Resources
    Khan Academy: http://www.khanacademy.org

ACCRS: 7.19-20
   7.19:   Informally assess the degree of visual overlap of two numerical data distributions with similar variability. [7-SP3]
   7.20:   Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. [7-SP4]

Mastered:	Present:	Going Forward:
Students can informally assess the degree of visual overlap of two numerical data distributions with similar variability. Students can use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.	Students will use information from NBA statistics to make and compare box and whisker plots.	Students will create two box-and-whisker plots of his or her choosing and answer the questions that are provided in the activity.

Present and Going Forward Vocabulary:
    Measures of central tendency, mean, median, mode. range

Career Connections:
    Prepress Technicians, Computer Control Programmers and Operators, Computer Support Specialists and Systems Administrators

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

Choose one or more activities to complete.
NCTM Illuminations Activity: Using NBA Statistics for Box and Whisker Plots
Students will use data from NBA statistics to make and compare box and whisker plots. Although data is from the NBA, data from any other sports teams or leagues for which player statistics are available may be used.   The teacher will access the lesson on the NCTM Illuminations Web site.

Student Instructions: Read the lesson, access the data and then answer the questions.
Lesson: http://illuminations.nctm.org/LessonDetail.aspx?id=L737

Box and Whisker Activity Sheet: http://illuminations.nctm.org/lessons/NBAStats/NBAStats-AS-SportsPlot.pdf

Internet Option for data: http://www.nba.com/rockets/index_main.html

Non-Internet Option that teacher will need to print out for data:
http://illuminations.nctm.org/lessons/NBAStats/NBAStats-AS-Players.pdf

The student(s) can use the Advanced Data Grapher on the NCTM Web site to graph.
http://illuminations.nctm.org/ActivityDetail.aspx?ID=220

Literature Connections/Resources
- Advanced Data Grapher on the NCTM Illuminations Web site:
  http://illuminations.nctm.org/ActivityDetail.aspx?ID=220
- NCTM Illuminations Web site:
  http://illuminations.nctm.org/LessonDetail.aspx?id=L737

ACCRS: 7.21-23

7.21: Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around ½ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. [7-SP5]

7.22: Approximate the probability of a chance event by collecting data on the chance process that a produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. [7-SP6]

7.23: Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. [7-SP7]
  a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. [7-SP7a]
  b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. [7-SPb]

Mastered:	Present:	Going Forward:
Students can understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring; larger numbers indicate greater likelihood; a probability near 0 indicates an unlikely event, a probability around ½ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. Students can approximate the probability of a chance event by collecting data on the chance process that a produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. Students can develop a probability model and use it to find probabilities of events; and	Students will explore probability through two lessons. In lesson one, students will conduct five experiments to compare theoretical and experimental probability. If possible combine data with other students' to compare with previously established theoretical probability. In lesson two, students will conduct a coin tossing experiment for 30 trials. Their results will be graphed and will show a line graph that progresses toward the theoretical probability. The graph will also allow for a representation of heads or tails throughout the experiment. Students will use the Advanced Data Grapher from the NCTM Illuminations Web site to graph	Students will explore the Birthday paradox.

compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.	any data.	

Present and Going Forward Vocabulary:
Probability, Monte Carlo Simulation, theoretical probability, experimental probability, outcomes

Career Connections:
Engineering and Natural Sciences Managers, Computer Programmer

Advanced Understanding & Activity (Alternate activity):   (Student page is located in Appendix A.)
Student Instructions: Choose one or more activities to complete
NCTM Illuminations Activity: Probability Explorations:
http://illuminations.nctm.org/LessonDetail.aspx?id=U190
Explore theoretical and experimental probability, including the relationship between them. Complete two activities through this lesson.

Lesson 1 - What Are My Chances?
Conduct five experiments to compare theoretical and experimental probability. If possible, combine data to compare with previously established theoretical probability.

Lesson 2 - Probably Graphing
Conduct a coin tossing experiment for 30 trials. Graph your results and use a line graph that progresses toward the theoretical probability. The graph will also allow for a representation of heads or tails throughout the experiment.

Your teacher will need to go to the NCTM Illuminations Web site to download the activities. The Advanced Data Grapher can be used to graph the data.

Literature Connections/Resources:
- Advanced Data Grapher from the NCTM Web site
  http://illuminations.nctm.org/activityDetail.aspx?ID=220
- NCTM Web site. Illuminations. Probability Explorations.
  http://illuminations.nctm.org/LessonDetail.aspx?id=U190
- Pappas, Theoni. The Joy of Mathematics. CA:Wide World Publishing/Tetra.2006. Pages 184 – 185.
- Bruce, Colin. Conned Again, Watson. MA, Perseus Books. 2001

ACCRS: 7.24
Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.. [7-SP8]
- **a.** Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound events occurs. [7-SP8a]
- **b.** Represent sample spaces for compound events using methods such as organized lists, tables, and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event. [7-SP8b]
- **c.** Design and use a simulation to generate frequencies for compound events. [7-SP8c]

Mastered:	Present:	Going Forward:
Students can find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.	Students will play the game Stick or Switch. The game is based on the television game show, "Let's Make a Deal. Students will use the strategy button which leads to a series of questions that the students will use to explore the probability of winning.	Students will create their own probability game for others to play.

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

Career Connections:
        Nurse, Psychiatrist, Home Health Aides, Medical Assistants,
        Stock Clerks, Computer Programmers, Mechanics

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

Choose one or more activities to complete.
Stick or Switch
Student Instructions: To access the activity go to http://nlvm.usu.edu/en/nav/frames_asid_117_g_4_t_5.html
Play Stick or Switch which is based on the television game show, "Let's Make a Deal." The "contestant" has to choose one of three doors. One of the unselected doors is revealed and the contestant has the option of sticking with the original choice or switching to the third door in order to win a "prize". The task is to devise a strategy; should one stick with the original choice or switch to the other door? This game can be played repeatedly with the results recorded on a scoreboard, or multiple games can be played all at once. The strategy button leads to a series of questions to explain the probability of winning with each strategy. The answer may surprise you!

Once on this Web site, click on the "?" to read the directions. Play the game many times to explore the probability of winning. Click on the strategy button to answer questions about the probability. Play the game many times again to verify your results. Design a poster to explain how you win or lose and why this occurs.

Literature Connections/Resources
- Web site with game:
  http://nlvm.usu.edu/en/nav/frames_asid_117_g_4_t_5.html
- NCTM Illuminations Web site:
  http://illuminations.nctm.org/WebResourceReview.aspx?ID=3205