ACCRS: Geometry 1

Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

Mastered:	**Present:**	**Going Forward:**
Students know precise definitions of angle, circle, perpendicular line, parallel line, and line segment based on the undefined notions of point, line, distance along a line, and distance around a circular arc.	Students will use real world examples to define geometry terms.	Students will search the Internet for unusual photographs of geometry terms.

Present and Going Forward Vocabulary:

Angle, circle, perpendicular line, parallel line, circular arc

Career Connections:

Actuary, Computer Programmer, Mathematicians, Architect, Surveyor, Photographer

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

Say Cheese!

Student Instructions: Using a digital camera, collect pictures of geometry terms in the real world. Take pictures and create a slide show. Include an explanation of how the photograph illustrates the vocabulary word. The entire lesson plan and all needed materials are located at:
http://www.education.com/activity/article/Geometry_Scavenger_high/
Teachers may want to change or add additional vocabulary words to the list included in the lesson plan.

Literature Connections/Resources:

http://www.education.com/activity/article/Geometry_Scavenger_high/

ACCRS: Geometry 2-6

Geometry 2: Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).

Geometry 3: Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.

Geometry 4: Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.

Geometry 5: Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.

Geometry 6: Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.

Mastered:	**Present:**	**Going Forward:**
Students can • Represent transformations in the plane using, e.g., transparencies and geometry software;	Students will understand how translations, reflections and rotations work and learn what happens when more than one transformation is applied. They	Students will create an Escher type tessellation. Going forward Web site: http://library.thinkquest.org/16661/escher/tessellations.1.html

• Describe transformations as functions that take points in the plane as inputs and give other points as outputs; • Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch); • Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself; • Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments; • Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software; • Specify a sequence of transformations that will carry a given figure onto another; • Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; • Given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.	will investigate the effect of rotations through different angles and on different shapes. They will learn the properties of designs that have bilateral symmetry and also explore glide reflections.	

Present and Going Forward Vocabulary:
Bilateral symmetry

Career Connections:
Structural Engineer, Interior Designer, Landscape Designer, Architect

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.). **Java Script required to participate in interactive portion of lessons on computer.**

Student Instructions: **Go to NCTM's Illuminations Web site and complete activities 1-4.**

Will It Go 'Round in Circles?

Students will investigate various types of symmetry using various lessons from the Web pages of the National Council for Teachers of Math (NCTM):

1. **Symmetries I: Taking Stock…Rotational Symmetry**. Fix a center, turn, and you have a rotation. Many objects in nature, such as flowers, starfish, and crystals, and everyday objects, such as wheels, CDs, and drinking glasses, have rotational symmetry. Here, you will learn about the mathematical properties of rotations and have an opportunity to make your own designs. Complete the activities of all four lessons but answer the questions on Lesson 4 of "Taking Stock…Rotational Symmetry." You must have internet access or your teacher has previously downloaded the activities. http://illuminations.nctm.org/LessonDetail.aspx?ID=U138
2. **Symmetries II: Reflection, Mirror, or Bilateral Symmetry**. Many objects in real life have symmetry such as nature, human body, as well as objects we use every day. Complete the activities of all four lessons but answer the questions on Lesson 4 of "Taking Stock…Reflections." You must have internet access or your teacher has previously downloaded the activities. http://illuminations.nctm.org/LessonDetail.aspx?ID=U139
3. **Symmetries III: Think About…Translations**. What happens when two or more translations are applied one after the other? Complete the activities but answer the questions at the end of the activity of "Taking Stock….Translations." You must have internet access or your teacher has previously downloaded the activities. http://illuminations.nctm.org/LessonDetail.aspx?id=L474
4. **Symmetries IV: Think About…Glide Reflections**. This can be the most difficult to understand and identify! Complete the activities but answer the questions at the end of the activity of "Taking Stock…Glide Reflections." You must have internet access or your teacher has previously downloaded the activities. http://illuminations.nctm.org/LessonDetail.aspx?id=L475

Literature Connections/Resources:

NCTM Illuminations

- http://illuminations.nctm.org/LessonDetail.aspx?ID=U138
- http://illuminations.nctm.org/LessonDetail.aspx?ID=U139
- http://illuminations.nctm.org/LessonDetail.aspx?id=L474
- http://illuminations.nctm.org/LessonDetail.aspx?id=L475

ACCRS: Geometry 7, 8, 10, and 17

Geometry 7: Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.

Geometry 8: Explain how the criteria for triangle congruence, angle-side-angle (ASA), side-angle-side (SAS), and side-side-side (SSS), follow from the definition of congruence in terms of rigid motions.

Geometry 10: Prove theorems about triangles. *Theorems include measures of interior angles of a triangle sum to 180º, base angles of isosceles triangles are congruent, the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length, and the medians of a triangle meet at a point.*

Geometry 17: Prove theorems about triangles. *Theorems include a line parallel to one side of a triangle divides the other two proportionally, and conversely; and the Pythagorean Theorem proved using triangle similarity.*

Mastered:

- Students can use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.

Present:

Students will think logically, using inductive reasoning to formulate reasonable conjectures and using deductive reasoning for justification, formally or informally and analyze characteristics and properties of various triangles.

Going Forward:

Students will create a video to teach others how to write proofs.

- Students can explain how the criteria for triangle congruence, angle-side-angle (ASA), side-angle-side (SAS), and side-side-side (SSS), follow from the definition of congruence in terms of rigid motions.
- Students can prove theorems about triangles. *Theorems include measures of interior angles of a triangle sum to 180º, base angles of isosceles triangles are congruent, the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length, and the medians of a triangle meet at a point.*
- Students can prove theorems about triangles. *Theorems include a line parallel to one side of a triangle divides the other two proportionally, and conversely; and the Pythagorean Theorem proved using triangle similarity.*

Present and Going Forward Vocabulary:

Theorems, congruence, similarity, isosceles, angle-side-angle (ASA), side-angle-side (SAS), and side-side-side (SSS)

Career Connections:

Architect, Engineer, Computer Software designer, Computer Game Designer

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

Geometric Detective

Student Instructions: After reviewing the theorems about triangles, analyze characteristics and properties of various types of triangles through inductive and deductive reason. Use inductive reasoning to formulate reasonable conjectures and use deductive reasoning for justification, either formally or informally. What patterns do you see throughout triangles? How does this information pertain to jobs in the real-world? Choose one profession that must know this information and explain how critical it is to their career. Present your results visually through PowerPoint, Prezi, Infographic, or student choice with teacher approval.

Literature Connections/Resources:

- http://www.thefutureschannel.com/
- http://www.weusemath.com/careers

ACCRS: Geometry 9

Prove theorems about lines and angles. *Theorems include vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; and points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.*

Mastered:	Present:	Going Forward:
Students can prove theorems about lines and angles. *Theorems include vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; and points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.*	Students will investigate and make conjectures about relationships of the angles formed by two parallel lines cut by a transversal.	Students will investigate careers that use this math and present how critical this math is to the profession of their choice.

Present and Going Forward Vocabulary:

Vertical angles, congruent; transversal, parallel lines, alternate interior angles, corresponding angles, perpendicular bisector

Career Connections:

Farmer, Rancher, Agriculturalist, Agronomist, Surveyor, Computer Hardware Engineer

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

Cabri Jr. Activity

Student Instructions: Use Cabri Jr. to construct parallel lines and transversals. Make conjectures about the angles that are formed. All student handouts and teacher notes are included at the Texas Instrument Web site. http://education.ti.com/calculators/downloads/US/Activities/Detail?id=3033&ref=%2fcalulators%2fdownloads%2fUS%2fActivities%2fSearch%2fSubject%3fs%3d5022%26sa$3d5024%26d%3d9

Literature Connections/Resources:

- Texas Instrument Web site: http://education.ti.com/calculators/downloads/US/Activities/Detail?id=3033&ref=%2fcalculators%2fdownloads%2fUS%2fActivities%2fSearch%2fSubject%3fs%3d5022%26sa%3d5024%26d%3d9

ACCRS: Geometry 11

Prove theorems about parallelograms. *Theorems include opposite sides are congruent, opposite angles are congruent; the diagonals of a parallelogram bisect each other; and conversely, rectangles are parallelograms with congruent diagonals.*

Mastered:	Present:	Going Forward:
Students can prove theorems about parallelograms. *Theorems include opposite sides are congruent, opposite angles are congruent; the diagonals of a parallelogram bisect each other; and*	Students will identify the types of quadrilateral possible, based on information about the diagonals and deduce characteristics of a polygon based on relationships among components of the polygon.	Students will explore quadrilaterals inscribed in a circle, which are called cyclic quadrilaterals. Many general quadrilaterals can be inscribed in a circle. Which, if any, of the quadrilaterals

conversely, rectangles are parallelograms with congruent diagonals.		you found in this lesson (kite, parallelogram, rhombus, square, rectangle) are cyclic? Justify your choices.

Present and Going Forward Vocabulary:
Parallelograms, theorems,

Career Connections:
Surveyor, Cartographer, Photogrammetrist, Surveyor, Drafter, Engineer, Nuclear Engineer

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
Diagonals to Quadrilaterals
Student Instructions: Using NCTM Illuminations: http://illuminations.nctm.org/LessonDetail.aspx?id=L655 start with diagonals and deduce the type of quadrilateral that surrounds them. Using an applet, explore certain characteristics of diagonals and the quadrilaterals that are associated with them**.** The lesson plan and all needed information is included at the Web site.

Literature Connections/Resources:
NCTM Illuminations:
http://illuminations.nctm.org/LessonDetail.aspx?id=L655

ACCRS: Geometry 12-13

Geometry 12: Make formal geometric constructions with a variety of tools and methods such as compass and straightedge, string, reflective devices, paper folding, and dynamic geometric software. (*Constructions include copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.*)

Geometry 13: Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.

Mastered:	Present:	Going Forward:
Students can make formal geometric constructions with a variety of tools and methods such as compass and straightedge, string, reflective devices, paper folding, and dynamic geometric software. Constructions include copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line. Students can construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.	Students will make a plot plan, a floor plan, and elevations including the furniture in all stages of designing a house.	Students will complete activity three on lesson plan by constructing a model of the home that was designed in activity one and two.

Present and Going Forward Vocabulary:
Bisection, compass, straightedge, perpendicular, parallel

Career Connections:
Architect, Contractor, Carpenter, Interior Designer, Landscape Designer,

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
Design Your House
Student Instructions: Design your own homes and furniture while understanding coding and planning limitations. Complete activity one and two. Download the lesson plan at:
http://www.pbs.org/teachers/connect/resources/7860/preview/
This lesson plan explores the basic principles behind designing and building a home, including the many variations and unique qualities that go into it.

Literature Connections/Resources:
PBS: http://www.pbs.org/teachers/connect/resources/7860/preview/

ACCRS: Geometry 14
Verify experimentally the properties of dilations given by a center and a scale factor.
a. A dilation takes a line not passing through the center of the dilation to a parallel line and leaves a line passing through the center unchanged. (G-SRT1a)
b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.

Mastered:	**Present:**	**Going Forward:**
Students can verify experimentally the properties of dilations given by a center and a scale factor. a. A dilation takes a line not passing through the center of the dilation to a parallel line and leaves a line passing through the center unchanged. (G-SRT1a) b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.	Students will dilate polygons and find the perimeter and area of both the pre-image and image.	Students will deepen their understanding of dilations.

Present and Going Forward Vocabulary:
Dilation, scale factor,

Career Connections:
Construction and Building Inspectors, Architect, Surveyor

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
Geometry: Scale Factor
Student Instructions: Using Cabri, Jr. on the TI-84 graphing calculator, use the slider command to dilate a figure. Working with ratios compute the area and perimeter of the pre-image and the image. Download and complete the student activity at:
http://education.ti.com/calculators/timath/US/Activities/Detail?sa=5024&id=10233

Literature Connections/Resources:

Texas Instruments, Educator's Page:

http://education.ti.com/calculators/timath/US/Activities/Detail?sa=5024&id=10233

ACCRS: Geometry 15

Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.

Mastered:	**Present:**	**Going Forward:**
Given two figures, students can use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.	Student will use proportions and similar figures to adjust the size of the New York City Subway Map so that it is drawn to scale. Students are asked to evaluate whether these changes are necessary improvements.	Students will create a map that is to scale on the best route to get from a major football game that is being played in a remote part of the state to their school.

Present and Going Forward Vocabulary:

Transformation, proportionality

Career Connections:

Aerospace Engineer, Computer Software Engineer, Architect, Surveyor, Cartographers

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

Using NCTM Illuminations:

http://illuminations.nctm.org/LessonDetail.aspx?id=L848

Student Instructions: Think about how to determine mathematically whether the New York City subway map is drawn to scale and why it would be important to know whether it is to scale. The lesson plan and all needed information is included at the Web site. Remember to complete the extension because it asks you to analyze the map scale using SAS or AA similarity and to make needed adjustments to the distances on the map using angle measurements as guidelines.

Literature Connections/Resources:

NCTM Illuminations:

http://illuminations.nctm.org/LessonDetail.aspx?id=L848

ACCRS: Geometry 16

Use the properties of similarity transformations to establish the angle-angle (AA) criterion for two triangles to be similar.

Mastered:	**Present:**	**Going Forward:**
Students can use the properties of similarity transformations to establish the angle-angle (AA)	Students will apply matrix multiplication skills and explore connections between geometric	Students will research computer animation. What sort of math is involved in making objects

criterion for two triangles to be similar.	transformations and matrix multiplication. Students will discover the 2x2 identity matrix.	appear to be smooth? What kind of math makes the images appear to be in three dimensions?

Present and Going Forward Vocabulary:
Angle-angle (AA), similarity transformations

Career Connections:
Engineers-Aerospace, Chemical, Environmental, and Computer Software, Construction and Building Inspectors, Glazier

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
Using NCTM Illuminations:
http://illuminations.nctm.org/LessonDetail.aspx?id=L841
Student Instructions: Using simple figures and coordinate grid, explore cartoon animation using matrix multiplication. The lesson plan and all needed information are included at the Web site.
If students need a refresher on matrix multiplication, have them review this video:
http://www.brightstorm.com/math/algebra-2/matrices/matrix-multiplication

Literature Connections/Resources:
- NCTM Illuminations: http://illuminations.nctm.org/LessonDetail.aspx?id=L841
- Matrix Multiplication Video http://www.brightstorm.com/math/algebra-2/matrices/matrix-multiplication

ACCRS: Geometry 18
Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

Mastered:	**Present:**	**Going**
Students can use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	Students will use problem solving skills, and theorems related to triangles to determine the least number of smaller acute triangles into which a single triangle may be dissected.	Students will create an interesting design using triangles.

Present and Going Forward Vocabulary:
Congruence, similarity, relationships

Career Connections:
Computer and Information Systems Managers, Construction Managers, Contractors, Engineering and Natural Science Managers, Farmer, Rancher, Agricultural Manager

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
How Many Can You Make?
Student Instructions: Using problem solving skills, and theorems related to triangles, determine the least number of smaller acute triangles into which a single triangle may be dissected. Take an acute triangle and an obtuse triangle and dissect them into the smallest number of smaller acute triangles as possible.
Lesson Plan and all needed materials are at:
http://www.curriki.org/xwiki/bin/view/Coll_IsaacNewton/ACuteTriangle?bc=;Coll_IsaacNewton.Geometry

Literature Connections/Resources:
http://www.curriki.org/xwiki/bin/view/Coll_IsaacNewton/ACuteTriangle?bc=;Coll_IsaacNewton.Geometry

ACCRS: Geometry 19
Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle leading to definitions of trigonometric ratios for acute angles.

Mastered:	Present:	Going Forward:
Students will understand that by similarity, side ratios in right triangles are properties of the angles in the triangle leading to definitions of trigonometric ratios for acute angles.	Students will analyze situations, check for limitations, and examine appropriate methods of solutions using trigonometry. Students will practice manipulating trigonometric functions and substituting equivalent expressions.	Students will investigate other concepts involving trigonometry at http://www.clarku.edu/~djoyce/trig/

Present and Going Forward Vocabulary:
Right triangle, trigonometric ratios

Career Connections:
Forest, Conservation, and Logging Workers, Industrial Production Managers, Engineering and Natural Science Managers

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.).
Using NCTM Illuminations:
Student Instructions: Go to http://illuminations.nctm.org/LessonDetail.aspx?id=L383
Using a pair of puzzles to enforce the skills of identifying equivalent trigonometric expressions, use trigonometry as a tool in problem solving. The lesson plan and all needed information is included in the Web site.

Literature Connections/Resources:
http://illuminations.nctm.org/LessonDetail.aspx?id=L383

ACCRS: Geometry 20
Explain and use the relationship between the sine and cosine of complementary angles.

Mastered:	Present:	Going Forward:
Students can explain and use the relationship between the sine and cosine of complementary angles.	Students will use right triangle trig to solve real world problems.	Students will research other real-world problems that would use trigonometry.

Present and Going Forward Vocabulary:
Sine, cosine, complementary angles

Career Connections:
Forest Ranger, Conservation Manager, Surveyors, Surveying Technicians

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
Launch of a Space Shuttle
Student Instructions: Use right triangle trigonometry to solve real-world problems involving the space shuttle, a crater on the moon and the Menkaure Pyramid. This is an interactive lesson including a video of a space shuttle taking off. Everything needed for the lesson is at this Web site:
http://enlvm.usu.edu/ma/nav/activity.jsp?sid=__shared&cid=emready@right_triangles&lid=1&aid=1040302585

Literature Connections/Resources:
http://enlvm.usu.edu/ma/nav/activity.jsp?sid=__shared&cid=emready@right_triangles&lid=1&aid=1040302585

ACCRS: Geometry 19 & 22

Geometry 19:	Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle leading to definitions of trigonometric ratios for acute angles.
Geometry 22:	(+) Derive the formula $A = (1/2)ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.

Mastered:
Students can understand that by similarity, side ratios in right triangles are properties of the angles in the triangle leading to definitions of trigonometric ratios for acute angles.
Students can derive the formula $A = (1/2)ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.

Present:
Students will use the Law of Sines and Law of Cosines to develop their knowledge of trigonometry.

Going Forward:
Students will create a presentation to teach others about trigonometry.

Present and Going Forward Vocabulary:
Trigonometric ratios

Career Connections:
Building Construction, Surveyor, Engineer

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
Laws of Sines and Cosines
Student Instructions: Construct a triangle trigonometry tool that will be used to help visualize the trig laws and examine these laws working with triangles. The entire lesson plans and needed handouts are located at:
http://www.uen.org/Lessonplan/preview.cgi?LPid=19845

Literature Connections/Resources:
http://www.uen.org/Lessonplan/preview.cgi?LPid=19845

ACCRS: Geometry 21&28

Geometry 21: Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.*

Geometry 28: (+) Construct a tangent line from a point outside a given circle to the circle.

Mastered: Students can:	**Present: Students will:**	**Going Forward:**
Students can use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.* Students can construct a tangent line from a point outside a given circle to the circle.	Students will generate a formula that can be used to predict the distance to the horizon from a given height above sea level.	Students will calculate the distance to the horizon was an important question for early sailors. What other formulas could they have used to calculate the distance to the horizon?

Present and Going Forward Vocabulary:

Trigonometric ratios, Pythagorean Theorem, tangent line

Career Connections:

Insurance Underwriter, Chemical and Civil Engineers, Actuaries

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

Using the NCTM Illuminations Web site Lesson Plan On Top of the World:

Student Instructions: If you were standing on the top of Mount Everest, how far would you be able to see to the horizon? Consider two different strategies for finding an answer to this question. The first strategy is algebraic—You will use data about the distance to the horizon from various heights to generate a rule. The second strategy is geometric—This time, you will use the radius of the Earth and right triangle relationships to construct a formula. Then, compare the two different rules based on ease of use as well as accuracy. Which method o you prefer? Justify your answer.

http://illuminations.nctm.org/LessonDetail.aspx?id=L711

Literature Connections/Resources:

- http://illuminations.nctm.org/LessonDetail.aspx?id=L711

ACCRS: Geometry 23-24

Geometry 23: (+)Prove the Law of Sines and the Law of Cosines and use them to solve problems.

Geometry 24: (+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).

Mastered:	**Present:**	**Going Forward:**
Students can prove the Law of Sines and the Law of Cosines and use them to solve problems. 24. Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).	Students will use right triangle trigonometry to develop the law of sines and cosines Students will use the law of sines and cosines to solve problems.	Students will think like land surveyors to use the law of sines and cosines. They will take a plot of land and divide it into many different size triangular lots using the law of sines and cosine.

Present and Going Forward Vocabulary:

Law of Sines, Law of Cosines,

Career Connections:

Architects, Mechanical Engineers, Surveyors

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

NCTM Illuminations Web site

Student Instructions: Use right triangle trigonometry to develop the Law of Sines. Determine when to use right triangle trigonometry and the Pythagorean theorem to develop the law of cosines. Use the Law of Sines and the Law of Cosines and determine when each can be used to find a side length or angle of a triangle. All instructions and student handouts are included at this Web site.

Using the Illuminations Web site:

http://illuminations.nctm.org/LessonDetail.aspx?ID=U177

Literature Connections/Resources:

http://illuminations.nctm.org/LessonDetail.aspx?ID=U177

ACCRS: Geometry 25

Prove that all circles are similar.

Mastered:	**Present:**	**Going Forward:**
Students can prove that all circles are similar.	Students will apply the formula of a circle to circular designs.	Students will apply the formula to real world problems.

Present and Going Forward Vocabulary:

Ratio, transformations, similarity

Career Connections:

Computer and Information Managers, Police Officers, Detectives, Aerospace Engineers, Industrial Production Managers

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

Round and Round We Go!

Student Instructions: Using Cabri, Jr. on the TI-84 graphing calculator, you will explore the equation of a circle. Make the connection with the coordinates of the center of the circle and length of the radius to the corresponding parts of the equation. Then, apply what you have learned to find the equation of the circles in several circular designs. The entire lesson, student handouts and teacher notes are included at TI's Web site at: http://education.ti.com/calculators/timath/US/Activities/Detail?sa=5024&id=12554

Literature Connections/Resources:

- http://education.ti.com/calculators/timath/US/Activities/Detail?sa=5024&id=12554

ACCRS: Geometry 26

Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.

Mastered:	**Present:**	**Going Forward:**
Students can identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed	Students will articulate the relationship among the three cases that constitute the Power of Points theorem and use the Power of Points theorem to solve	Students will research the following questions: What is the power of the center of the circle? Explain how to determine this value without

angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.	numerical problems. Calculate the power of a point.	moving any points in the applet.

Present and Going Forward Vocabulary:
Power of Point Theorem, central angles , inscribed angles, circumscribed angles

Career Connections:
Farmers, Ranchers, Agricultural Managers, Police Officers, Detectives

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
Using NCTM Illuminations:
Student Instructions: Go to http://illuminations.nctm.org/LessonDetail.aspx?id=L700.
The Power of Points Theorem is often taught as three separate theorems: the Chord-Chord Power Theorem, the Secant-Secant Power Theorem, and the Tangent-Secant Power Theorem. Using a dynamic geometry applet, you will discover that these three theorems are related applications of the Power of Point Theorem. Use your discoveries to solve numerical problems. The lesson plan and all needed information is included in the lesson plan.

Literature Connections/Resources:
http://illuminations.nctm.org/LessonDetail.aspx?id=L700

ACCRS: Geometry 27
Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.

Mastered: Students can:	**Present: Students will:**	**Going Forward:**
Students can construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.	Students will calculate the areas of regular polygons using the formula ½(*ap*). Write explicit functions for the areas of inscribed and circumscribed regular *n*-gons. Use trigonometric functions to find side lengths of triangles.	Students will write a calculator program to display the results that were calculated during the lesson.

Present and Going Forward Vocabulary:
Inscribed circles, circumscribed circles

Career Connections:
Computer Software Engineers, Computer Hardware Engineers, Statisticians, Industrial Production Managers

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
Using the NCTM Illuminations Web site: http://illuminations.nctm.org/LessonDetail.aspx?ID=U179
Student Instructions: By calculating the areas of regular polygons inscribed and circumscribed about a unit circle create an algorithm that generates the never-ending digits of π, a common curiosity among high school students. Investigate an improvement to Archimedes' method that generates the infinite digits of π more efficiently and accurately. Lesson plan and all needed are included on the Web site.

Literature Connections/Resources:
http://illuminations.nctm.org/LessonDetail.aspx?ID=U179

ACCRS: Geometry 29
Derive, using similarity, the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.

Mastered:	Present:	Going Forward:
Students can derive, using similarity, the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.	Students will use area of a sector formula, geometric area formulas, and Pythagorean theorem to find the area of a portion of a circle.	Students will explore other shapes that may be found within a circle.

Present and Going Forward Vocabulary:
Arc, proportionality, angle, radian measure

Career Connections:
Actuaries, Computer Software Engineer, Mathematician, Statistician, Architect, Surveyor

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
Halfway There!
Student Instructions: Solve the puzzle at http://zenoferox.blogspot.com/2008/02/circle-puzzle.html
Explain how you solved the problem.

Literature Connections/Resources:
- http://zenoferox.blogspot.com/2008/02/circle-puzzle.html

ACCRS: Geometry.30
Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.

Mastered:	Present:	Going Forward:
Students can derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.	Students will explore and discover conic sections by cutting a cone with a plane	Students will explore the relationship between circles and ellipses, recognizing that circles are a specific example of an ellipse whose semi-major axis is equal to its semi-minor axis.

Present and Going Forward Vocabulary:
Pythagorean Theorem

Career Connections:
Aerospace Engineer, Environmental Engineer, Mechanical Engineer, Nuclear Engineer

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
NCTM Illuminations Web site: Cutting Conics
Student Instructions: 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 clay or dough, can be used as well. The lesson plan and all needed materials and links are included at the NCTM Illuminations Web site at: http://illuminations.nctm.org/LessonDetail.aspx?id=L792

Literature Connections/Resources:
http://illuminations.nctm.org/LessonDetail.aspx?id=L792

ACCRS: Geometry 31
Use coordinates to prove simple geometric theorems algebraically. [G-GPE4]
Example: Prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2).

Mastered:	**Present:**	**Going Forward:**
Students will use coordinates to prove simple geometric theorems algebraically. (G-GPE4) Example: Prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2).	Students will represent and analyze 2- and 3-dimensional figures using tools and technology when appropriate. The student will identify and/or verify properties of geometric figures using the coordinate plane and concepts from algebra.	Students will use a two column proof to justify their answers.

Present and Going Forward Vocabulary:
Coordinates

Career Connections:
Carpenter, Construction and Building Inspectors, Electrician, Glazier, Roofer

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
Geometry, Measurement, & Reasoning
Student Instructions: Apply the slope formula, the midpoint formula, and the distance formula to justify that a given quadrilateral is a parallelogram. The lesson plan and all needed materials can be located at:
http://mdk12.org/instruction/clg/lesson_plans/geometry/Quadrilaterals_212.html

Literature Connections/Resources:
http://mdk12.org/instruction/clg/lesson_plans/geometry/Quadrilaterals_212.html

ACCRS: Geometry 32
Prove the slope criteria for parallel and perpendicular lines, and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).

Mastered:	**Present:**	**Going Forward:**
Students will prove the slope criteria for parallel and perpendicular lines, and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).	• Students will create a polygon on a graphing calculator using the LIST function. • Students will graph linear equations to overlap lines on the sides of the polygon. • Students will record observations about how different values affect the slope and the *y*-intercept • Students will draw conclusions about the behavior of *m* and *b* in the equation $y = mx + b$	Students will bring in pictures in which lines are clearly visible. Have them draw a grid over the image and find the linear equations for those lines.

Present and Going Forward Vocabulary:
Slope criteria

Career Connections:
Correctional Officer, Surveyor, Architect

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
NCTM Illuminations Web site
Student Instructions: Explore linear equations and the effects of changing the slope and *y*-intercept on a line using graphing calculators. This lesson plan and all needed materials are found on the NCTM Illuminations Web site at: http://illuminations.nctm.org/LessonDetail.aspx?id=L771

Literature Connections/Resources:
NCTM Illuminations: http://illuminations.nctm.org/LessonDetail.aspx?id=L771

ACCRS: Geometry 33
Find the point on a directed line segment between two given points that partitions the segment in a given ratio.

Mastered:	Present:	**Going Forward:**
Students can find the point on a directed line segment between two given points that partitions the segment in a given ratio.	Students will collect and graph data. Use slopes of tangent lines to create graphs of instantaneous velocities and instantaneous accelerations. Use the area under a graph line to calculate velocities and displacements at specific moments in time	Students will calculate the area under the graph for the acceleration vs. time graph to confirm that it does, in fact, generate similar numbers to those found on the velocity vs. time graph.

Present and Going Forward Vocabulary:
Partitions, instantaneous velocities, instantaneous accelerations

Career Connections:
Actuaries, Computer Programmers, Computer Software Engineer, Mathematician, Statistician

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
NCTM Illuminations Web site
Student Instructions: Explore movement and plot it onto a displacement vs. time graph. Then develop a velocity vs. time graph from the first graph. The next step will be to create an acceleration vs. time graph. This activity is an introduction of calculus. Complete two activity sheets and explain what you have learned. The lesson plan and all needed materials are included on the NCTM Illuminations Web site at:
http://illuminations.nctm.org/LessonDetail.aspx?id=L801

Literature Connections/Resources:
http://illuminations.nctm.org/LessonDetail.aspx?id=L801

ACCRS: Geometry 34
Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.*

Mastered:	Present:	Going Forward:
Students can use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.*	Students will determine the property relating area and an arbitrary point on a triangle's interior.	Students will extend this idea/property extend to a quadrilateral.

Present and Going Forward Vocabulary:
Coordinates, perimeter, distance formula

Career Connections:
Firefighter, Chef, Cook, Food Preparation Technicians, Landscaper, Grounds Maintenance Worker, Animal Care Technicians, Service Workers

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
Arbitrary Points
Student Instructions: Using area formulas, geometric formulas, and problem solving skills determine the relationship of an arbitrary point placed anywhere inside the triangles interior.
The lesson plan and all needed materials are at:
http://www.curriki.org/xwiki/bin/view/Coll_IsaacNewton/PointPWhereYouLike?bc=;Coll_IsaacNewton.Geometry

Literature Connections/Resources:
http://www.curriki.org/xwiki/bin/view/Coll_IsaacNewton/PointPWhereYouLike?bc=;Coll_IsaacNewton.Geometry

ACCRS: Geometry 35
Determine areas and perimeters of regular polygons, including inscribed or circumscribed polygons, given the coordinates of vertices or other characteristics.

Mastered:	Present:	Going Forward:
Students can determine areas and perimeters of regular polygons, including inscribed or	Students will use area and perimeter formulas for regular polygons so solve problems.	Students will choose a professions that uses these formulas and present a real-

circumscribed polygons, given the coordinates of vertices or other characteristics.		world problem from your chosen career.

Present and Going Forward Vocabulary:
Area, perimeter, inscribed polygons, circumscribed polygons

Career Connections:
Architect, Landscape Architect, Surveyor, Cartographer, Photogrammetrist, Aerospace Engineer

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
Which Fits Better?
Student Instructions: Using area and perimeter formulas for regular polygons, investigate which would fit better a square peg in a round hole or a round peg in a square hole. The questions and answer can be found at http://plus.maths.org/content/round-peg-square-hole-or-square-peg-round-hole.

Literature Connections/Resources:
http://plus.maths.org/content/round-peg-square-hole-or-square-peg-round-hole

ACCRS: Geometry 36
Give an informal argument for the formulas for the circumference of a circle; area of a circle; and volume of a cylinder, pyramid, and cone. *Use dissection arguments, Cavalieri's principle, and informal limit arguments.*

Mastered:	Present:	Going Forward:
Students can give an informal argument for the formulas for the circumference of a circle; area of a circle; and volume of a cylinder, pyramid, and cone. Students can use dissection arguments, Cavalieri's principle, and informal limit arguments.	Students will perform an experiment based on a conjecture, create objects with varying volumes from sheets of paper, compare the volume of similar shaped objects, compare the volume of different shaped objects and discover which dimensions have the largest impact on volume.	Students will create triangular prisms and look for volume impacts based on rotating the side used for the base.

Present and Going Forward Vocabulary:
Cavalieri's principle, dissection arguments

Career Connections:
Industrial Production Manager, Medical and Health Services Managers, Property, Real Estate, and Community Association Managers

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
NCTM Illuminations Activity
Student Instructions: Construct objects and determine the resulting volume. Substitute values into formulas in an experiment based on your own conjectures. This activity is uses two shapes, rectangles and cylinders. The entire lesson and all materials needed can be found on the NCTM Illuminations Web site at: http://illuminations.nctm.org/LessonDetail.aspx?id=L797

Literature Connections/Resources:
NCTM Illuminations: http://illuminations.nctm.org/LessonDetail.aspx?id=L797

ACCRS: Geometry 37-38

Geometry 37: Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.*

Geometry 38: Determine the relationship between surface areas of similar figures and volumes of similar figures.

Mastered:	**Present:**	**Going Forward:**
Students can use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.* Students can determine the relationship between surface areas of similar figures and volumes of similar figures.	Students will use real-world problem to calculate volume and estimate cost for an excavation company.	Students will design another shape basement and compute the same calculations.

Present and Going Forward Vocabulary:

Mathematical relationships, formulas, surface areas

Career Connections:

Construction Manager, Architect, Surveyor, Cartographer

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

Excavation Calculations

Student Instructions: An excavation company needs help determining the volume of a basement for a large building. As an employee of this company, help them to find the pit dimensions, calculate the volume, convert the units of measure, find the bid price per cubic foot, estimate the cost and write an explanation. This Web site includes a video and all the resources needed to work this problem.
http://enlvm.usu.edu/ma/nav/activity.jsp?sid=__shared&cid=emready@application_volume&lid=1

Literature Connections/Resources:

http://enlvm.usu.edu/ma/nav/activity.jsp?sid=__shared&cid=emready@application_volume&lid=1

ACCRS: Geometry 39

Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.

Mastered:	**Present:**	**Going Forward:**
Students will identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.	Students will construct a tetrahedral puzzle using straws, thread and tissue paper, then combine four tetrahedral to make a larger tetrahedron. Calculate the surface area and volume of three-dimensional shapes and discover the relationship between linear, area, and volume measures of similar polyhedral.	Students will explore the relationships between the formulas for finding the volumes of prisms and pyramids.

Present and Going Forward Vocabulary:

Two dimensional, three-dimensional, tetrahedral, polyhedral

Career Connections:

Forest Ranger, Conservation Manager Firefighter, Correctional Officer, Landscape Architect

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

Using NCTM Illuminations:

Student Instructions: Construct a tetrahedron and describe the linear, area and volume using non-traditional units of measure. Four tetrahedra are combined to form a similar tetrahedron whose linear dimensions are twice the original tetrahedron. Explore the area and volume relationships between the first and second tetrahedra, and make generalizations for the relationships are developed. The lesson plan and all needed information is included at the Web site. http://illuminations.nctm.org/LessonDetail.aspx?id=L639

Literature Connections/Resources:

NCTM Illuminations: http://illuminations.nctm.org/LessonDetail.aspx?id=L639

ACCRS: Geometry 40-41

Geometry 40: Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).*

Geometry 41: Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, British Thermal Units (BTUs) per cubic foot).*

Mastered:	**Present:**	**Going Forward:**
Students can use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).* Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, British Thermal Units (BTUs) per cubic foot).*	Students will demonstrate the ability to apply geometry, areas, ratios, and square roots to understand important principles in photography.	Students will create a slide show of photographs and discuss how the different types of lens affect the pictures.

Present and Going Forward Vocabulary:

British Thermal Units (BTUs), density

Career Connections:

Cinematographer, Photographer

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

Camera Lenses are Geometric

One of the most important parts of a camera is the lens. This activity shows how geometry determines which lens does what.

Student Instructions: Download and complete the activities at:
http://www.pbs.org/teachers/mathline/concepts/movies/activity3.shtm

Literature Connections/Resources:

PBS: http://www.pbs.org/teachers/mathline/concepts/movies/activity3.shtm

ACCRS: Geometry 42
Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost, working with typographic grid systems based on ratios).*

Mastered:	**Present:**	**Going Forward:**
Students can apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost, working with typographic grid systems based on ratios).*	Students will explore characteristics of polygons **and** make a connection between the number of vertices in a polygon and the number of cameras needed to monitor an area. Discover the formula for the maximum number of cameras needed to cover an *n*-gon and apply their understanding to more complicated polygons.	Students will give work within a budget to design a security plan for your school or another building within the specified budget. Allow them to research security options on the Internet.

Present and Going Forward Vocabulary:
Typographic grid systems

Career Connections:
Aerospace Engineer, Industrial Engineer, Materials Engineer, Nuclear Engineer, Computer Software Engineer, Carpenter, Construction and Building Inspectors

Advanced Understanding & Activity (Alternate activity): (Student page is located in Appendix A.)
Using NCTM Illuminations:
Student Instructions: Explore properties of polygons by trying to place the minimum number of security cameras in a room such that the full area can be monitored. The lesson plan and all needed information is included at the Web site. http://illuminations.nctm.org/LessonDetail.aspx?id=L767

Literature Connections/Resources:
NCTM Illuminations: http://illuminations.nctm.org/LessonDetail.aspx?id=L767

ACCRS: Geometry 43-45

Geometry 43: Understand the conditional probability of *A* given *B* as *P*(*A* and *B*)/*P*(*B*), and interpret independence of *A* and *B* as saying that the conditional probability of *A* given *B* is the same as the probability of *A*, and the conditional probability of *B* given *A* is the same as the probability of *B*.

Geometry 44: Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities.
Example: Collect data from a random sample of students in your school on their favorite subject

Geometry 45: Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.
Example: Compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.

Mastered:	**Present:**	**Going Forward:**
• Students can understand the conditional probability of A given B as P(A and	Students will use knowledge of probability to analyze information found in the media.	Students will review newspapers or advertisements to compare how numbers are

B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B. • Students can construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. Example: Collect data from a random sample of students in your school on their favorite subject • Students can recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. Example: Compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.		used. Students will explain how the use of numbers in those advertisements persuade potential consumers to purchase the items.

Present and Going Forward Vocabulary:
Probability, conditional probability, independence

Career Connections:
Mathematician, Statistician, Insurance Underwriter

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

Persuasive Numbers

Student Instructions: Look at newspapers, magazines, or the Internet for examples of how politicians, educators, environmentalists, or others use data such as statistics and probability. Then analyze the use of the information.

- Why did the person use data?
- What points were effectively made? Were the data useful?
- Did the data strengthen the argument?

Present your findings in a presentation and provide evidence to support your ideas.

Literature Connections/Resources:
Various print and electronic media.

ACCRS: Geometry 46-49

Geometry 46: Find the conditional probability of *A* given *B* as the fraction of *B*'s outcomes that also belong to *A*, and interpret the answer in terms of the model.

Geometry 47: Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model.

Geometry 48: (+) Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B|A) = P(B)P(A|B)$, and interpret the answer in terms of the model.

Geometry 49: (+) Use permutations and combinations to compute probabilities of compound events and solve problems.

Mastered:

- Students can find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.
- Students can apply the Addition Rule, P(A or B) = P(A) + P(B) - P(A and B), and interpret the answer in terms of the model.
- Students can apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in terms of the model.
- Students can use permutations and combinations to compute probabilities of compound events and solve problems.

Present:

Students will use proportionality and a basic understanding of probability to make and test conjectures about the results of experiments and simulations Students will compute probabilities for simple compound events, using such methods as tree diagrams and area models.

Going Forward:

Students will determine the probability of winning a sweepstakes. Suppose that you enter a sweepstakes and subsequently receive an announcement that after a random drawing out of a million entries, the winning ticket number is one of six listed numbers and your entry is among the six. What is the probability that you hold the winning ticket?

Present and Going Forward Vocabulary:

Probability, permutations, tree diagram, Multiplication Rule, Addition Rule, uniform probability model

Career Connections:

Mathematician, Statistician

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

NCTM Illuminations Web site: Stick or Switch?

Student Instructions: This lesson plan presents a classic game-show scenario. Pick one of three doors to win the prize. The host, who knows what is hidden behind the door, opens one of the two remaining doors. When no prize is revealed, the host asks if the contestant wishes to "stick or switch." Which choice gives you the best chance to win? The approach in this activity runs from guesses to experiments to computer simulations to theoretical models. The entire lesson and all materials can be found on the NCTM Illuminations Web site at: http://illuminations.nctm.org/LessonDetail.aspx?id=L377

Literature Connections/Resources:

NCTM Illuminations: http://illuminations.nctm.org/LessonDetail.aspx?id=L377

ACCRS: Geometry 50-51

Geometry.50: (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).

Geometry.51: (+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).

Mastered:	**Present:**	**Going Forward:**
Students will use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator). Students will analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).	Students will analyze the fairness of certain games by examining the probabilities of the outcomes.	Students will create a game that is based on probability and fairness.

Present and Going Forward Vocabulary:

Probability, random,

Career Connections:

Stock clerk, Purchasing Manager, Computer Operator, Data Entry and Information Processing Technicians, Game Designer

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

NCTM Illuminations Web site: Explorations With Chance

Student Instructions: Make predictions, play the games and calculate the probability. The complete lesson plan and all needed materials are included at: http://illuminations.nctm.org/LessonDetail.aspx?ID=L290

Literature Connections/Resources:

NCTM Illuminations: http://illuminations.nctm.org/LessonDetail.aspx?ID=L290