**SED- 455**

**January 29, 2015**

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**Key Design Elements Template**

**Unit Title:** Congruence

**Grade Level:** 10th grade

**Subject:** Mathematics: Geometry

**Designed by:** Courtney Cassidy

**Time Frame:** 10 days – 4/4 block schedule

**School District:** Sumner County

**School:** White House Heritage

**Course Statement:** Geometry: This class will build upon mathematics knowledge and ready students to take trigonometry and calculus.

**Unit Statement:** In this unit students will learn, apply, and show skills required to solve congruence based problems in geometry. Students will also validate their knowledge by using the given postulates to solve real world problems. Students will be assessed through quizzes, communication journals, peer collaboration and end of unit test.

**Stage 1**

**Established Goals:**

**GOALS**

Day 1

* Students will take Learning Style Inventory, Geometry pre-test & learn how to complete reflection journals for tests taken.

Day 2

* G-CO-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.

Day 3

* G-CO 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; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment’s endpoints.*

Day 4

* G-CO-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).

Day 5

* G-CO-3) Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.

Day 6

* G-CO-4) Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.

Day 7

* G-CO-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.
* G-CO 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.

Day 8

* G-CO 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.

Day 9

* G-CO 8. Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition congruence in terms of rigid motions.

**What understandings are desired?**

**AIMS**

*Students will understand…*

Day 1

* their own personal learning styles and how they differ from their peers.
* how to complete a reflection journal for tests taken. Two entries will be made for each test. One at the immediate conclusion of the test and one after the final grade is received.
* what an action statement is and how it benefits them

Day 2

* geometric definitions and know how to properly apply them in real world applications.
* how to find the distance around a circular arc from given information.

Day 3

* what postulates and theorems are
* how to use postulates to prove theorems about lines and angles

Day 4

* how to describe and compare transformations as functions from given points
* transformations and how to draw them on paper and use geometry software to show them

Day 5

* the definition of rotation and reflection when applied to rectangles, parallelograms, trapezoids and regular polygons and how it affects shapes and their orientations in relation to their starting point.

Day 6

* how to develop definitions of rotations, reflections and translations in terms of angles, circles, perpendicular lines, parallel lines and line segments. .

Day 7

* how to draw a geometric figure with rotations, reflections and translations.
* how to draw a sequence of transformations that will carry a given figure onto another.

Day 8

* What the term rigid transformation means
* What rigid transformation looks like
* the effect of rigid transformation on a figure

Day 9

* how to determine if two triangles are congruent by using at least two different postulates
* SSS, SAS, ASA and AA postulates
* the definition of congruence as it applies to rigid motion
* How SSS, SAS, ASA and AA postulates define congruence.

**What essential questions will be considered?**

Day 1

* How does your learning style affect how you learn?
* Did you do as well as you though you would in the pre-test?
* Why should we reflect on our tests two different times?
* What is an action statement and why do we need one?

Day 2

* How does an angle differ from lines intersecting at a point?
* How do perpendicular and parallel lines differ?
* Why should we know how to find the distance around a circular arc? When would you use it in a real world application?
* Why do we need to know about points on a line?

Day 3

* How and why do we use postulates to prove theorems?
* Why can’t theorems just be accepted like postulates?
* Can you list all the numbers between 1 & 2?

Day 4

* How do we preserve distance and angles in a transformation?
* Why do we use transformations?
* How can we use geometry software to show our understanding of transformations?

Day 5

* What happens when a shape is reflected?
* What happens when a shape is rotated?
* Can a shape be both reflected and rotated?

Day 6

* How does the definition change when applied to an angle, circle, perpendicular line, parallel line or line segment?

Day 7

* How do you translate a geometric figure on the software?
* Why would we want to rotate, reflect or translate a geometric figure?
* How can a sequence of transformations carry a figure onto one another?

Day 8

How does rigid transformation affect a figure?

* What transformations are considered rigid transformation?

Day 9

* How do the triangle postulates differ?

**What key knowledge and skills will students acquire as a result of this unit?**

Students will know…

* Key terms: angle, circle, perpendicular line, parallel line, equidistant, line segment, transformation, Isometry, congruence mapping, reflection, translations, glides, rotations, Rectangle, Parallelogram, Polygon,
* their individual learning styles and how this affects their learning.
* how to complete a reflection journal and why they should complete these honestly.
* what an action statement is.
* How to apply these definitions and find the distance around a circular arc.
* how perpendicular and parallel lines differ.
* how to apply the geometric definitions to real world problems.
* what postulates and theorems are
* how to use postulates to prove theorems
* why theorems have to be proven
* what transformations are.
* how to describe and compare transformations as a function
* How reflections and rotations affect a given shape
* How to identify the original position of a shape based on the reflections and rotations given
* How the definitions change when applied to an angle, circle, perpendicular line, parallel line or line segment.
* How to rotate, reflect and translate a geometric shape on paper and on software.
* How and why we draw a sequence of transformations that would carry a figure onto another one
* What an isometry is.
* How rigid transformations affect a given figure.
* what transformations are considered rigid transformations.
* Specific postulates used to identify congruency in triangles
* how to identify which postulate is being used to prove two triangles are congruent.

Students will be able to…

* adjust their learning and studying habits based off of their learning style inventories
* complete a reflection journal entry on their own, and be honest about creating the next action statement.
* Find the distance around a circular arc
* apply geometric definitions to real world problems.
* define postulate and theorem
* use postulates to solve simple theorems
* explain why theorems use postulates to solve them.
* represent transformations using paper and geometric 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
* Interpret reflections and rotations of shapes.
* Analyze reflections and rotations of shapes and be able to state the original starting position.
* Draw a shape with reflections and rotations and identify the movement.
* Define a rotation, reflection and translation in terms of an angle, circle, perpendicular line, parallel line or line segment.
* Understand how the definitions change when applied to an angle, circle, perpendicular line, parallel line or line segment.
* Rotate, reflect and translate geometric figures on paper & on software.
* Fully understand why and how to draw a sequence of transformations that would carry a figure onto another one
* Identify and draw rigid transformations
* Identify which rigid transformations have affected a given set of figures
* Define the SSS, SAS, ASA and AA similarity postulates.
* Identify triangles as being congruent and identify by which postulate.
* List the transformations that are rigid transformations

**Assessment Evidence**

**Stage 2**

**Performance Task(s):**

* Geometry Pre-test
* Learning Style Inventory
* Communication Journals
* Quizzes
* Pair observations
* Real world applications
* Entrapment Game
* Computer aided design
* Paper drawings of rotations, reflections and translations.

**Other Evidence:**

* Essential Questions- to ensure students grasp concepts
* Observations- Ensuring students are on track and staying on track during cooperative learning
* Math Games – Entrapment – Following directions
* Homework- drawing and labeling reflections, rotations and translations of various geometric figures.
* Worksheet- Complete the Postulate, definitions, transformations
* Quiz-
* Communication Journal – A safe place for students to voice concerns in class.
* Summative assessment

**Learning Plan**

**Stage 3**

Learning Activities:

**W**= Students will take learning inventory to help them learn how they learn, they will then take the geometry pre-test, two part self-evaluation explained and directions given, action statements introduced, essential questions introduced.

**H**= Hands on activities, bell work, treasure hunt, number line activity, mirror activity, entrapment game

**E**= Learning style inventory, following directions activity, mirror activity, present real world problems that will be solved with transformations, hands-on transformations activities, essential questions.

**R**= Essential questions, communications journals, test journals, cooperative groups, 2 before me questioning (Must ask 2 peers before coming to the teacher & bring the two peers with), 5 minutes with peers before homework is turned in.

**E**= Test journals (An immediate journal entry as soon as test is over and another after they receive their test grade), communication journals, bell ringers (taken from most missed quiz/test questions), group observation.

**T**= Examples, learning inventory groups, communication journals, pre-printed note outlines, aide assistance as needed.

**O**= Begin with hands-on activity to gain interest, proceed with teacher guided examples, provide time in class for individual/peer work, ask essential questions, quizzes to check on knowledge.

Reflection

After a rough couple of weeks and an even rougher start to this assignment, I can finally sit back and reflect on it. I had written a summary for each lesson that was created, arriving at lesson eight before realizing and reaching out to our instructor about the assignment. Creating this assignment then was pulling information and condensing it into one overall summary. I kept the daily divisions for easier lesson planning off of the unit model. My strengths, I believe, are my use of hands-on activities that teach the students before they realize what they are learning. My weakness is going to lie in developing creative homework for each lesson from scratch. The standards I used for my lesson are Tennessee State Standards, these are fairly new as the state dropped the common core curriculum pretty quickly. While I tried to use a variety of different techniques for student engagement and learning, I think there is always room to grow and learn new techniques that will offer my students the best chance at academic success. I had some trouble coming up with creative essential questions, but I think overall they are on the right track. The WHERETO also gave me a bit of trouble, but after reviewing the meaning of the acronym, I felt more comfortable in it. The overall pacing of the lesson is built around a 4/4 block schedule. My goal was to have time for the students to begin homework in class, that way if there are any questions, they have the teacher or their peers easily accessible. Overall, I like how this lesson flows, starting with the learning style inventory, teaching students how to write a test journal response, action statements and then jumping into the geometry lesson on points, lines and ending in transformations. It was neat to see how textbooks differ from what I think the flow should be, as one textbook had transformations as a last chapter, but I believe that it should be one of the first things taught in geometry due to its wonderful hands-on availability of teaching input and output.