CHOICE LESSON PLAN - Vocabulary Acquisition Model

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Subject(s): Geometry - Essentials of Geometry

Topic or Unit of Study (Title): Identify Points, Lines, and Planes; Use Segments and Congruence

Grade Level: 10th grade

Materials:
Prerequisite Skills
Geometry: Points, Lines, Planes: Do Now worksheet
Geometry: Points, Lines, Planes: Notes - Graphic Organizer: Points, Lines, and Planes Key Vocabulary
Geometry: Points, Lines, Planes; Segments and Congruence: Classwork and Homework
Homework with answer sheet - The Segment Addition Postulate *(Link below)*
http://kutasoftware.com/FreeWorksheets/GeoWorksheets/2-Segment%20Addition%20Postulate.pdf
Geometry: Essentials of Geometry: Unit Project - Modeling Geometric Shapes with rubric

Summary (*and Rationale*): These basic concepts of geometry are the building blocks to more challenging concepts in geometry. It is important to know the key vocabulary terms, and understand their definitions and applications, so that you will be able to connect them to real-world problems.

I. Focus and Review (Establish Prior Knowledge): [20 min.]
Pre-Assessment - "Prerequisite Skills"
Give students the "Do Now" worksheet as a starter assignment.

II. Statement of Instructional Objective(s) *and Assessments*:

Objectives	**Assessments**
1) When given the concepts related to the key vocabulary, the student will be able to identify and model points, lines, and planes. Students will also identify collinear and coplanar points and intersecting lines and planes in space. This will be demonstrated by completing the in-class portion of the Classwork and Homework with 80% accuracy.	1) Instructor will monitor student's progress during Guided Practice.
2) When given a problem requiring usage of the Ruler Postulate and the Segment Addition Postulate, the student will be able to accurately apply the postulate 80% of the time.	2) Instructor will assess through homework.

State the objective: [no additional time]
Assessment: [included in lesson time]

III. Teacher Input (Present tasks, information and guidance): [30 min.]
Vocabulary Acquisition Model: Identify Points, Lines, and Planes

1) This step is assessed through the "Do Now" worksheet during Focus and Review.
2) After students complete the worksheet, using the key vocabulary listed on the "Notes" sheet as my reference, ask students to begin to define the terms modeled by the objects in the "Do Know" exercise. Have students verbally work through this while I gather their thoughts on the board.

When the terms collinear and coplanar are discussed, guide students in their understanding of the terms by reminding them what the prefix "co-" means - "with" or "together".

3) On the white board draw representations of the key vocabulary. Ask for volunteers to come to the white board and write the names and a picture representation for the particular points, lines, planes, segments, and rays represented.
4) Give students a copy of the "Notes" graphic organizer. Have them add the names and pictures designating the points, lines, planes, segments, and rays represented on the board in Step 3.
5) Use the "Classwork and Homework" sheet in Guided Practice to assess acquired knowledge.

After Guided Practice for Points, Lines and Planes, introduce material on Segments and Congruence. - **Have students write each postulate on an index card.**

Ruler Postulate (A postulate is a rule that is accepted without proof.)

- *The points on a line can be matched one to one with the real numbers. The real number that corresponds to a point is the coordinate of the point.*
- *The distance between two points A and B, written as AB, is the absolute value of the difference of the coordinates of A and B.* $AB = |x_2 - x_1|$

Example 1: Apply the Ruler Postulate

Find the distance between point A and point B with coordinates 3 and -2 respectively.
Note: The coordinates are the numbers on the ruler or number line. The capital letters are the names of the points.
Substituting the coordinates in the formula $AB = |x_2 - x_1| = |3 - -2| = 5$
Remember : Distance is always positive.

Transition to next Postulate - Using one of the vocabulary terms we learned earlier today, what do we mean when we say "three points (A, B, and C) are collinear"? What is the relationship of the three points?

Segment Addition Postulate

- *If B is between A and C, then AB + BC = AC.*
- *If AB + BC = AC, then B is between A and C.*

Example 2: Apply the Segment Addition Postulate

Step 1: Draw a figure.
Step 2: Label figure with given information.
Step 3: Write an equation.
Step 4: Solve and find all the answers.

If Raleigh and Wilmington are 100 miles apart, and Fuquay-Varina is 25 miles from Raleigh, then how far is Fuquay-Varina from Wilmington?
Apply the formula AB + BC = AC to the example problem, WF + FR = WR. Substitute, WF + 25 = 100, and solve, WF = 75 miles.

What is another term for saying that two line segments have the same length? Answer - They are *congruent segments*. We write $AB \cong CD$, and say "AB is congruent to CD" (AB and CD should have a line drawn above them to indicate line segment). If we write AB = CD, then we are saying that "the length of AB is equal to the length of CD".

IV. Guided Practice (Elicit performance): [25 min.]
Geometry: Points, Lines, Planes; Segments and Congruence: Classwork and Homework

***V.* Closure (Plan for maintenance):** [15 min.]
Reminder of key points covered.
Introduce the culminating activity for the unit - Modeling Geometric Shapes.

***VI.* Independent Practice:** [if there is time at the end]
Complete what was not done in class - Geometry: Points, Lines, Planes; Segments and Congruence: Classwork and Homework
Homework - The Segment Addition Postulate
Begin searching for object to model for unit project - Modeling Geometric Shapes

STANDARDS:
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.

G.MG.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).

Plans for Individual Differences: Students will be given a graphic organizer of key vocabulary, where I will have them represent the meanings of the word with a picture and name designation.

References (APA style):
Geometry Resources. (n.d.). *G.CO.1-5 Sample Lessons and Examples*. Hudson County Schools of Technology. Retrieved March 23, 2014

O'Brien. (n.d.). *Ruler Postulate and Segment Addition Postulate*. Math at the Harley School. Wikispaces. 2011. Retrieved April 14, 2014.

Infinite Geometry. (n.d.). *Free Geometry Worksheets*. Retrieved April 27, 2014, from Kuta Software LLC

Larson, R., Boswell, L., Kanold, T. D., & Stiff, L. (2007). *Essentials of Geometry*. Geometry (Teacher's Edition, p. 1-69). Evanston, Ill.: McDougal Littell.

Prerequisite Skills

VOCABULARY CHECK

Copy and complete the statement.

1. The distance around a rectangle is called its __?__, and the distance around a circle is called its __?__.
2. The number of square units covered by a figure is called its __?__.

SKILLS AND ALGEBRA CHECK

Evaluate the expression. *(Review p. 870 for 1.2, 1.3, 1.7.)*

3. $|4 - 6|$ **4.** $|3 - 11|$ **5.** $|-4 + 5|$ **6.** $|-8 - 10|$

Evaluate the expression when $x = 2$. *(Review p. 870 for 1.3–1.6.)*

7. $5x$ **8.** $20 - 8x$ **9.** $-18 + 3x$ **10.** $-5x - 4 + 2x$

Solve the equation. *(Review p. 875 for 1.2–1.7.)*

11. $274 = -2z$ **12.** $8x + 12 = 60$ **13.** $2y - 5 + 7y = -32$

14. $6p + 11 + 3p = -7$ **15.** $8m - 5 = 25 - 2m$ **16.** $-2n + 18 = 5n - 24$

Name: Date:

Geometry: Points, Lines, Planes: Do Now

State whether each is best modeled by a point, line, or plane.

1. a knot in a piece of thread
2. a piece of cloth
3. the corner of a room
4. the telecommunications beam to a satellite in space
5. the crease in a folded sheet of wrapping paper
6. an ice skating rink

List two to three real-world objects that could be modeled using a point, a line, and a plane.

Name: Date:

Geometry: Points, Lines, Planes: Notes

Points, Lines, and Planes Key Vocabulary

Undefined terms

- A point, line, and plane - these words do not have a formal definitions, but there is agreement about what they mean.

Defined terms

- Terms that can be described using known words such as point or line.

Key Vocabulary	**Name/ Representation**
Point - Undefined term A point has no size, no dimension. It is a location in space. Points are named using capital letters.	
Line - Undefined term A line is made up of an infinite number of points that go on without end in both directions. It is represented by a line with two arrowheads, but it extends without end. A line has one dimension. Through any two points, there is exactly one line. A line can be named with a single lowercase script letter, line ℓ, or by two points on the line, line AB.	
Ray - Defined term Part of a line A ray has a definite starting point and extends without end in one direction. A ray is named using the endpoint first, then another point on the ray.	

Key Vocabulary	Name/ Representation
Line Segment - Defined term A line segment is part of a line containing two endpoints and all points between them. A line segment is named using the endpoints.	
Collinear - Points that lie on the same line.	
Non-collinear - Points that do <u>not</u> lie on the same line.	
Plane - Undefined A flat surface that extends without end in all directions. A plane can be named by three non-collinear points or by a single uppercase script letter. Ex., plane $\mathcal{M}$ or plane ABC.	
Coplanar - Points that lie in the same plane.	
Non-coplanar - Points that do not lie in the same plane.	
Intersection - Two or more geometric figures intersect if they have one or more points in common. The intersection of two figures is the set of points the figures have in common. The intersection of two different lines is a point. The intersection of two different planes is a line.	

Name: Date:

Geometry: Points, Lines, Planes; Segments and Congruence: Classwork and Homework

True or False:

1. Two points determine two lines.
2. Two planes always intersect in a line.
3. If two distinct lines intersect, they always intersect at a point.
4. Three points determine a plane.
5. If two planes intersect in a line, then the line is in both planes.
6. Two planes can intersect in a point.
7. It is possible for two lines to lie in the same plane.
8. Three planes can intersect in a point.
9. Two lines are parallel if they do not intersect.
10. $\overrightarrow{KM}$ and $\overrightarrow{MK}$ name the same set of points.

Multiple Choice:

1. The intersection of 2 line segments can be

   I. a point II. a line segment
   III. a ray IV. a line

   A. I only B. I and II C. I and IV D. all of the above

2. The intersection of 2 distinct rays can be

   I. a point II. a line segment
   III. a ray IV. a line

   A. I only B. IV only C. I, II and III D. all of the above

3. The intersection of 2 distinct lines can be

   I. a point II. a line segment
   III. a ray IV. a line

   A. I only B. IV only C. I, III and IV D. all of the above

Questions:

1. What is the difference between: a line and a ray?

   a line and a line segment?

2. How many points are on a line?

3. Can a plane and a line ever intersect in two points?

4. If points A, B, & C determine plane D, what do you know about points A, B, & C?

Draw:

1. Line segment AB

2. Line l and point P such that P is not on line l

3. Points A, B, & C such that they are collinear.

4. Lines r and t such that they have no points in common.

5. Points A, B, & C such that they determine a plane

Draw:

1. Plane *Q* with a line *m* intersecting *Q* at point E.

2. Plane *Q* contains lines *r* and *s* that intersect in point P.

3. Line *t* lies in planes *P, Q* and *R*.

Name: Date:

Geometry: Essentials of Geometry: Unit Project

Mathematics Project:	Modeling Geometric Shapes
Due Date:	
Late Fee:	One letter grade drop for each day late.
Point Value:	40 points
Grading Criteria:	1. Neat and clear drawing, with object modeled identified. 2. Points, lines, planes, and angles represented - including names and measurements. 3. Proper notation used. 4. Probing questions and accurate answers.

Description of Project: On graph paper, draw a model of a real world geometric figure that represents the basic elements of geometry we have studied in the Essentials of Geometry unit. You will probably need <u>at least</u> 1 plane, 3 lines and 5 points.

Write <u>at least</u> 4 questions that ask about specific elements and relationships in your model. They can range from basic to complex. At least one question should represent angle measure/relationship concepts, and one question should represent perimeter, circumference and area. Include answers to your questions on a separate piece of paper.

Math - Problem Solving : Essentials of Geometry Unit Project: Modeling Geometric Shapes

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Teacher Name: **Ms. Lewis**

Student Name: _____

CATEGORY	4	3	2	1
Neat and clear drawing, with object modeled identified	The work is presented in a neat, clear, organized fashion that is easy to read.	The work is presented in a neat and organized fashion that is usually easy to read.	The work is presented in an organized fashion but may be hard to read at times.	The work appears sloppy and unorganized. It is hard to know what information goes together.
Mathematical Terminology and Notation	Correct terminology and notation are always used, making it easy to understand what was done.	Correct terminology and notation are usually used, making it fairly easy to understand what was done.	Correct terminology and notation are used, but it is sometimes not easy to understand what was done.	There is little use, or a lot of inappropriate use, of terminology and notation.
Points, lines, planes, and angles represented - including names and measurements	Explanation shows complete understanding of the mathematical concepts used to solve the problem(s). Shape represented is more complex than what is required.	Explanation shows substantial understanding of the mathematical concepts used to solve the problem(s). Shape includes at least 1 plane, 3 lines and 5 points.	Explanation shows some understanding of the mathematical concepts needed to solve the problem(s).	Explanation shows very limited understanding of the underlying concepts needed to solve the problem(s) OR is not written. Shape represented does not meet minimum requirements.
Probing questions and accurate answers	Uses complex and refined mathematical reasoning. Must include 4 questions. All questions are of a more complex nature.	Uses effective mathematical reasoning. Must include 4 questions. They include basic and complex questions.	Some evidence of mathematical reasoning. Must include 4 questions, including basic and complex questions.	Little evidence of mathematical reasoning. Must include 4 questions. All questions are of a basic nature.

Answers:

"Prerequisite Skills" -

1. perimeter, circumference
2. area
3. 2
4. 8
5. 1
6. 18
7. 10
8. 4
9. -12
10. -10
11. z = -137
12. x = 6
13. y = -3
14. p = -2
15. m = 3
16. n = 6

"Geometry: Points, Lines, Planes: Do Now worksheet" -

1. point
2. plane
3. point
4. line
5. line
6. plane

Ex. point - marble, line - power line, plane - basketball court

"Geometry: Points, Lines, Planes; Segments and Congruence: Classwork and Homework" -

True or False:

1. F
2. T
3. T
4. T
5. T
6. F
7. T
8. T
9. T
10. T

Multiple Choice:

1. A
2. D
3. A

Questions:

1. A line extends without end in two directions, and a ray consists of an endpoint and all points of a line extending in one direction. A line extends without end in two directions, and a line segment of a line includes all points that lie on a line between 2 endpoints.
2. An infinite number of points.
3. Yes, 2 points of a line can lie on a plane and are colinear and coplaner.
4. They are coplaner.

Draw: Student drawings will look different but should model the key concepts.