**Christine Peterson 9-12 Math**

**LESSON PLAN OUTLINE- Secondary Mathematics Version**

*(Include the title of each of the following sections in your written plan.)*

1. TITLE OF LESSON: Parallel Lines and Transversals (Chapter 3-1, Day 2)
2. CONTEXT OF LESSON: This lesson is designed for a small group class of six special education students ranging from sophomores to seniors. These students struggle with math and grasping math concepts. They receive all direct math instruction in a small group special education classroom.

Prior to this lesson the students in this class would have completed Chapters 1 and 2 involving patterns and inductive reasoning, conditional statements, biconditionals, the Law of Detachment and the Law of Syllogism, points, lines, segments, rays and planes including intersecting, perpendicular, and parallel lines (definition only). They would have learned how to measure segments and angles, including segments in the coordinate plane using the distance and the midpoint formulas. They would have completed a review of the Properties of Equality including the Distributive Property and studied the Vertical Angle Theorem (vertical angles are congruent). Prerequisite knowledge would include an understanding and mastery of the following Geometric postulates, theorems and definitions:

* Definition of a point – A location in space, it has no size and is represented by a dot. A point is named by a capital letter.
* Space is the set of all points
* A line is a series of points that extends in two opposite directions. It is named with a single lowercase letter or with any two points located on it.
* Through any two points there is exactly one line
* If two lines intersect they intersect in exactly one point
* If two planes intersect, then they intersect in exactly one line
* A line measures 180°
* A linear pair of angles are supplementary or add up to equal 180°
* Complementary angles add up to equal 90°
* A ray is a part of a line consisting of one endpoint and all the points of the line on one side of the endpoint
* Opposite rays are two collinear rays with the same endpoint. They always form a line measuring 180°
* Parallel lines are coplanar lines that do not intersect.
* Segment addition postulate
* Angle addition postulate
* ‘Congruent’ means equal
* Students will have mastered simple constructions including the construction and of angles using a straight edge and compass.
* Students will have learned how to use a protractor to measure angles accurately.
* Vertical Angle Theorem

This lesson is the second of several lessons in Chapter 3. This chapter deals with Parallel and Perpendicular Lines. It would be an appropriate lesson for the class at this time because it not only reviews the properties of parallel lines and the relationships between the angles formed when parallel lines are cut by a transversal but takes student’s learning a step further requiring each student to apply what they have learned to new situations as well as requiring them to create material that demonstrates their comprehension of the lesson’s main concepts.

LEARNING OBJECTIVES and ASSESSMENT:

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| Learning Objective | Bloom | Assessment (Formative/Summative) |
| Students will review concepts taught in the previous day’s lesson by viewing the 2 Khan Academy videos on parallel lines. (See end of lesson plan for links). | Remembering | The teacher will circle the room ensuring that each student is engaged. Following the videos the teacher will elicit feedback from the class about the videos in relation to how well/clearly the videos reviewed the previous day’s concepts.  Students will be handed back their ‘Pairs Check with a Switch’ worksheets from the previous day’s class. Any questions regarding the worksheets and/or feedback from the teacher will be delivered at this time. |
| Students will look for relationships between the angles formed by a pair of parallel lines cut by a transversal. | Understanding and Applying | Student responses to the Observations About Parallel Lines sheet assigned for home work will be recorded on the chalkboard by the teacher. A brief discussion of student’s findings and observations will take place. |
| Students will practice what they have learned about the angles formed when parallel lines are cut by a transversal and will create their own tour of Washington D.C. using what they have learned. | Applying  and Creating | Students will work in small groups of 3 to complete the “Where am I?” activities 1, 2 and 3 using the Touring Washington DC By the Angles (Dan Mulligan)  Students will complete a homework assignment independently for a homework grade. |

1. RELATED 2009 VIRGINIA STANDARDS OF LEARNING: G.3 The student will solve practical problems involving complementary, supplementary, and congruent angles that include vertical angles, angles formed when parallel lines are cut by a transversal, and angles in polygons.
2. MATERIALS NEEDED: Teacher’s computer and data projector for viewing the Khan Academy videos, adapted version of Dan Mulligan’s Touring Washington DC By the Angles sheet (one copy for each group), 2 rolls of masking tape (one for each group), 2 laminated sets of cards that contain the names of famous national monuments in Washington DC to be used by each group in the Touring Washington DC By the Angles activity/game, copies of the ‘Where am I?’ activities 1, 2 and 3, graded ‘Pairs Check with a Switch’ worksheets from the previous day’s classroom activity, Observations About Parallel Lines sheet (each student should have their own copy that was handed to them the previous day), pencils with erasers and copies of the assigned homework practice problems.

All materials will be furnished by the teacher for this lesson.

PROCEDURE:

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| Time | Mathematical Tasks to be Used,  Teacher Thoughts/Actions/Questions | Anticipated Student Comments, Questions, Actions, and Strategies |
| 20 min | At the beginning of class students will be instructed by the teacher to take out their Observations About Parallel Lines sheet that was handed to them the previous day and assigned for homework. They will be instructed to watch the Khan Academy videos carefully and to be ready to discuss briefly the following about the videos:  How well did the videos cover the concepts/material to be learned?  Were the videos easy to understand?  Did you find them interesting/helpful?  Did the videos help reinforce what we learned yesterday?  Was there anything presented in the videos that we did not cover in class yesterday?  Would you use these videos to review parallel lines prior to a quiz or test? | I anticipate that my students will attend more closely to the videos because they have been given the responsibility to critique them after the presentation. Because the videos are brief sustained student attention should not be a problem. |
| 10 min | Following the videos and brief discussion the students will be asked to share with the teacher/class what other observations they might have made about parallel lines, transversals and the eight angles formed. | Some observations students might have made on their own or gathered from watching the videos include:  - All eight angles are one of two measures.  - Adjacent angles sum to 180° or form linear pairs.  - Once you know the measure of one angle you can figure out the measures of all the other angles.  One problem I might face during the video presentation is disinterested students who do not care to watch or participate. I will assign a participation grade for attending (5 points), contributing to the discussion (10 points) and having the Observations About Parallel Lines sheet completed (10 points). |
| 5 min | Students will be handed back their ‘Pairs Check with a Switch’ worksheets that were completed the previous day in class. The teacher will answer any student questions about the problems on the worksheets. | Unless students evidenced a lot of difficulty with these practice exercises there should not be a lot of questions. If students performed extremely poorly on this worksheet then the teacher would need to reteach the concept following the Khan Academy videos and provide additional guided and independent practice. |
| 20 min | Students will be placed in one of 2 groups of 3 students each. Each group will be handed a copy of the adapted version of Dr. Dan Mulligan’s Touring Washington DC By the Angles activity/game, copies of the ‘Where am I?’ activities 1, 2 and 3 will also be handed to each group. Groups will be instructed to take with them the roll of masking tape, laminated cards and a pencil. The groups will move into the commons area to complete all three activities. Teacher assistance will be provided as needed. | As this activity will be taking place towards the end of the period I would need to closely monitor student transition time moving from the classroom to the commons area as well as time-on-task. I will also need to make sure that the commons area is quiet and available. It might also be a good idea to enlist the assistance of another teacher or teacher’s aide so that an adult supervisor is available to assist each group as they move through the 3 activities ensuring that all students are participating and learning. |

1. MEETING THE NEEDS OF ALL STUDENTS: In pre-determining student groups in this class I have taken into consideration learning strengths and styles as well as personality characteristics. Because the tasks involved in today’s learning are multisensory I feel that with the right supervision all my students will be able to participate and succeed.
2. WHAT COULD GO WRONG WITH THIS LESSON AND WHAT WILL YOU DO ABOUT IT? The students may not be interested in the game. Hence it may not serve as a motivator. I may have not scheduled enough time for the students to practice and master the skills covered and may need to add a day of additional practice to my lesson plan. We may end up running out of time in which case I would permit the students to begin their assigned homework in class and move the activity to the next day’s lesson.
3. CONNECTION TO CTA: This lesson like the first is a tribute to both Mr. Dan Mulligan and Mr. Strebe. I enjoyed playing the Touring Washington DC By the Angles and decided that I would incorporate the game into my Parallel Lines lesson at PHS. I love the cooperative learning strategies developed by Mr. Strebe and have used them in my classroom at PHS with much success since I was introduced to them five years ago.

Khan Academy Links:

<http://www.khanacademy.org/video/angles-formed-between-transversals-and-parallel-lines?playlist=Geometry>

<http://www.khanacademy.org/video/angles-of-parallel-lines-2?playlist=Geometry>







