**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 1)
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 consists of angles that 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 of angles using a straight edge and compass.
* Students will have learned how to use a protractor to measure angles accurately.
* Vertical Angle Theorem- vertical angles are congruent.

This is the first 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 builds on previously taught concepts and takes students’ learning one step further. Knowledge of parallel lines and the relationships between the angles formed by parallel lines cut by a transversal is a required high school Geometry SOL. In addition it is a basic building block for real-life applications in architecture, city planning, and engineering.

LEARNING OBJECTIVES and ASSESSMENT:

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| Learning Objective | Bloom | Assessment (Formative/Summative) |
| Students will complete an interactive set of notes on parallel lines and related angles. Through classroom discussion and interaction with the instructor up at the board they will recall the definition of parallel lines and a transversal. They will recall the number of angles formed by parallel lines cut by a transversal. They will recall what vertical angles are and will identify vertical angles in the figures presented to them on the board. | Remembering | Teacher observation – (1) The teacher will circle the room ensuring that each student is engaged and has a completed set of interactive notes with drawings and markings that are accurate. (2) The teacher will call upon students one at a time to define, identify, or explain (up at the Smart Board) the concepts taught in this lesson. Students will determine if presented lines appear to be parallel, intersecting, or neither. They will identify the transversal in given sets of lines and the different pairs of angles formed when parallel lines are cut by a transversal. They will state whether identified pairs of angles are congruent or supplementary. |
| Students will independently identify angle pairs given parallel lines cut by a transversal. They will practice solving problems for an unknown quantity involving taught angle pairs. | Understanding and Applying | Students will work with a pre- assigned partner to independently complete “Strebe – Pairs Check with a Switch” – GOLD and MAROON worksheets of 10 problems each. |
| Students will look for relationships between the angles formed by a pair of parallel lines cut by a transversal. | Analyzing | Students will work with their partner or independently at home (if time does not permit) to record any observations they make regarding the angles formed when a pair of parallel lines are cut by a transversal. |

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: Dan Mulligan’s Touring Washington DC By the Angles sheet, Smart Board or chalkboard, Power Point presentation titled Parallel Lines and Transversals, interactive notes, Pairs Check with a Switch worksheets, Observations About Parallel Lines sheet.

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

PROCEDURE:

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| Time | Mathematical Tasks to be Used,  Teacher Thoughts/Actions/Questions | Anticipated Student Comments, Questions, Actions, and Strategies |
| 3 min | Prior to the students entering class a copy of Dan Mulligan’s Touring Washington DC By the Angles will be placed on each student’s desk. When class begins the students will be introduced to the day’s topic of discussion: parallel lines in relation to the angles formed by them. The students will be informed that the sheets in front of them are the instructions for a game that we will be playing in class the next day. The students will be given a minute to look over the sheets prior to passing them up. I will let the students know that I played this game at the CTA this summer and had a lot of fun with it. However, in order to play the game and to enable us to develop our own version of the game we will need to do some important learning today. Once all the game sheets have been collected, the students will be handed their copies of the interactive notes and the lesson will begin. | Students will want to know what the sheets on their desks are for. Some will want to know why they can’t play the game today. It will be my job to keep the students interested and focused on the day’s learning that must take place. I plan to keep the atmosphere light and the lesson moving. I will remind the students that we will be working today with our collaborative partners in our ‘Pairs Check with a Switch’ format. The students in my class enjoy this form of independent seatwork very much. |
| 20 min | Using the Power Point presentation, Parallel Lines and Transversals teach students the properties of parallel lines, the definition of a transversal, and the angle pairs formed when parallel lines are cut by a transversal. Using the Smart Board I will have students identify angle pairs and work out sample problems with guided practice. The guided practice completed with staff assistance at the board is similar to the ‘Pairs Check with a Switch’ worksheets the students will complete. I have a small room which allows me to closely observe my students in order to make sure that they are engaged and filling in their interactive notes correctly as well as participating in the guided practice exercises. | In this phase of the lesson it is very important that the teacher be observant with regard to which students appear to be having greater difficulty with the material and might need additional instruction, possibly outside of class. It is also important for all the students to have the opportunity to demonstrate their comprehension of the various concepts taught. One of my concerns is that I might not have set aside sufficient time to complete this phase of the lesson. |
| 20 min | Once all the notes and guided practice problems have been completed the students will be told to get with their cooperative learning buddy. It will now be time for the ‘Pairs Check with a Switch’ worksheets. As students work on their independent practice exercises the teacher will walk around the room and assist students as needed. Once all the worksheets have been completed and reviewed by the student’s partner the teacher will collect the sheets to review student success with the new material prior to the next day’s lesson. | During this phase of the lesson I will serve as a facilitator. I will move about the classroom, paying attention to student’s discussions and assisting when needed: either to clarify, reinforce or reteach. |
| 3-5 min | Lastly, the teacher will hand out the Observations About Parallel Lines sheet, one for each student. Students who have completed and turned in their GOLD and MAROON ‘Pairs Check with a Switch’ worksheets may work with their partner to write down any special observations they have made about parallel lines and the angles they form. Their observations will be discussed in class the next day.  Finally, students will be instructed to log on to i-school for the link to the Khan Academy lessons (2) to watch for homework as a review of today’s lesson. All students will be required to respond to the Observations About Parallel Lines sheet and return the same to class the next day. | I may not have enough time to complete this final exercise if the ‘Pairs Check with a Switch’ worksheets take longer than planned for. If this is the case I will instruct students to take their sheets home and fill them out prior to class the next day.  Students may not log on to i-school or watch the Khan Academy videos. |

1. MEETING THE NEEDS OF ALL STUDENTS: In pairing students in this class I have taken into consideration learning strengths and styles as well as personality characteristics. Because of close teacher observation and involvement throughout the lesson I should by the end of the period have a pretty good idea of which students, if any, are struggling with the concepts. Should this be the case, I would invite them to return during their resource period or after school for additional one-on-one help. At that time I would use the Khan Academy videos with the students and then go over the concepts once again with them using diagrams on the Smart Board or chalkboard.
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.
3. CONNECTION TO CTA: This lesson is a tribute to both Dr. 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 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>







