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Parallel and Perpendicular Lines

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Parallel and Perpendicular Lines

Stage 1 – Desired Results

Established Goals (e.g., standards)

G.2.B make conjectures about angles, lines, polygons, circles, and 3D figures and determine the validity of the conjectures, choosing from a variety of approaches such as coordinate, transformational, or axiomatic.

G.9.A formulate and test conjectures about the properties of parallel and perpendicular lines based on explorations and concrete models.

G.2.A use constructions to explore attributes of geometric figures and to make conjectures about geometric relationships.

G.9.B formulate and test conjectures about the properties and attributes of polygons and their component parts based on explorations and concrete models.

G.1.B develop an awareness of the structure of a mathematical system, connecting definitions, postulates, logical reasoning, and theorems.

G.1.C compare and contrast the structures and implications of Euclidean and non-Euclidean geometries.

G.7.B use slopes and equations of lines to investigate geometric relationships, including parallel lines, perpendicular lines, and special segments of triangles and other polygons.

Transfer

Students will independently use their learning to…design a city (map) using parallel, perpendicular, and intersecting lines. They will be able to identify special angle pairs using buildings.

Meaning

Understandings

Students will understand that….

-Rules, postulates, and theorems allow us to make assumptions about future behavior and to draw conclusions based on these assumptions.

-Angles and parallel and perpendicular lines are used in real world settings.

Essential Questions

- Why are properties, postulates, and theorems important in mathematics?
- How are angles and parallel and perpendicular lines used in real world settings.

Acquisition

Knowledge

Students will know…

-Euclid's 5th postulate is assumed and not proven

-different geometries have different parallel postulates and that determines whether special angle relationships are valid.

Vocabulary:

Parallel
Perpendicular
Negative reciprocal
Opposite reciprocal
Alternate interior angles
Alternate exterior angles
Same side interior angles
Same side exterior angles
Corresponding angles
Slope
y-intercept
Point slope form
Standard form
Slope- Intercept form
Linear equation
Transversal

Skills

Students will be able to…

-find the negative reciprocal of a given slope
-find the slope of a line from a graph, table, and written description.
- write linear equations in point slope, slope, intercept, and standard form.
- set up and solve linear equations using special angle pairs.
-find the equation of a line given a line parallel or perpendicular and a point.
- identify alternate interior, corresponding, alternate exterior, same side interior, and same side exterior angles.

Stage 2 – Evidence

CODE (M or T)	**Evaluative Criteria** (for rubric)	

T		Performance Task(s) *Students will demonstrate meaning-making and transfer by…*building a city following specific guidelines. Their cities will be constructed with angles, intersections, parallel, perpendicular, intersecting, and transversal streets. They design the city so that buildings are located at particular points within alternate interior or exterior angles, corresponding angles, etc. They will make an algebraically accurate blueprint of their city on graph paper and write the equations of the lines that form their street using the three different forms of linear equations. Students will also record the locations of all traffic lights (the intersection of two lines) in their city. Other Evidence (e.g., formative) Linear Equations Quiz Parallel and Perpendicular Lines Quiz Constructions Quiz Parallel and Perpendicular Lines Exam Homework, Exit Tickets, and Do Nows

Stage 3 – Learning Plan

CODE (A, M, T)	Pre-Assessment *How will you check students' prior knowledge, skill levels, and potential misconceptions?* To check students' prior knowledge and mastery of algebra I skills (writing equations of lines and using slope to determine whether lines are parallel, perpendicular or neither.) students will take the Quiz- Writing Equations Version B. The quiz asks students to write, graph, and manipulate linear equations. Student performance on the pre-assessment will determine how much whole group algebra remediation is required.	
A/M	**Learning Activities** **Day 1:** Unit Hook: (10-15 minutes) Students will come into the classroom and see that it is decorated with road maps. Maps of cities will include: San Antonio, Houston, Mexico City, Boston, etc. We will discuss how city planners/architects decide the optimal layouts for cities. We will examine cities like Boston that don't quite follow a grid system. We will decide how efficient that is or isn't. I will then introduce the Design a City Project. Students will be assigned groups based on the triads I have assigned them to sit in. We will review the project guidelines and discuss what information we need to learn/review in order to complete the project. Lesson: (30 minutes) The actual lesson for the day will consist of a review of slope intercept form of a linear equation. Students will attach the guided notes sheet in their INBs. We will complete the interactive notes together as a class. After the notes students will be given a set of problems to practice independently. Exit Ticket: (10 minutes) 5 question Illuminate Quick Quiz. When students finish their exit ticket they will scan it in to the system. Students earning a score of 80% (4/5) or better will not be assigned LW. Those scoring lower will take the Slope Intercept Form Practice Assignment home and will redo the exit ticket during the following class period.	Progress Monitoring (e.g., formative data) Exit Ticket 3-1

A	**Day 2:** Do Now: (10 minutes) Students who need to retake exit tickets will do so. All others will get their INBs ready for the day (writing down CFS/objective, title etc.) Lesson: (40 minutes) We will complete several guided practice problems in our INBs as a class. After 4-5 examples students will work in the cooperative learning groups on the Packet Linear Equations. Exit Ticket: (5 minutes) Revisit CFS. Did we meet our goal? What do you need from Mrs. Kendrick to meet the CFS?	CFS: Check in and work time
A	**Day 3:** Do Now (10 minutes) Students will get their INBs ready for the day (writing down CFS/objective, title etc.) Lesson: (35 minutes) The lesson for the day will consist of a review of point slope form of a linear equation. Students will attach the guided notes sheet in their INBs. We will complete the interactive notes together as a class. After the notes students will be given a set of problems to practice independently. Exit Ticket: (10 minutes) 5 question Illuminate Quick Quiz. When students finish their exit ticket they will scan it in to the system. Students earning a score of 80% (4/5) or better will not be assigned LW. Those scoring lower will take the Point Slope Form Practice Assignment home and will redo the exit ticket during the following class period.	Exit Ticket 3-2
A	**Day 4:** Do Now: (10 minutes) Students who need to retake exit tickets will do so. All others will get their INBs ready for the day (writing down CFS/objective, title etc.) Lesson: (35 minutes) The lesson for the day will consist of a review of the slopes of parallel and perpendicular lines. Students will attach the guided notes sheet in their INBs. We will complete the interactive notes together as a class. After the notes students will be given a set of problems to practice independently. Exit Ticket: (10 minutes) 5 question Illuminate Quick Quiz. When students finish their exit ticket they will scan it in to the system. Students earning a score of 80% (4/5) or better will not be assigned LW. Those scoring lower will take the Parallel and Perpendicular Slopes Practice Assignment home and will redo the exit ticket during the following class period.	Exit Ticket 3-3
	Day 5: Do Now: (10 minutes) Students who need to retake exit tickets will do so. All others will get their INBs ready for the day (writing down CFS/objective, title etc.) Lesson: (35 minutes) The lesson for the day will consist of a review of	Exit Ticket 3-4

A/M	the standard form of linear equations. Students will attach the guided notes sheet in their INBs. We will complete the interactive notes together as a class. After the notes students will be given a set of problems to practice independently. Students will begin working on their final project. (I will show an example during class. Students will have an extended class period one of these days we will work on projects then) Exit Ticket: (10 minutes) 5 question Illuminate Quick Quiz. When students finish their exit ticket they will scan it in to the system. Students earning a score of 80% (4/5) or better will not be assigned LW. Those scoring lower will take the Standard Form Practice Assignment home and will redo the exit ticket during the following class period. **Day 6:** Do Now: (10 minutes) Students who need to retake exit tickets will do so. All others will get their INBs ready for the day (writing down CFS/objective, title etc.) Lesson: (30 minutes) We will play a review game to get ready for our quiz! Maybe Numbered Heads or Around the World.	Writing Equations Quiz Version B
A/M	Exit Ticket: (15 minutes) Students will take the Writing Equations Quiz Version B. If time continue project work. **Day 7:** Do Now (10 minutes) Students will get their INBs ready for the day (writing down CFS/objective, title etc.) Pass back/ Discuss quizzes.	
A	Lesson: (35 minutes) On the whiteboard, there will be a pair of parallel lines cut by a transversal using painters tape. In addition, there will be laminated cards that say corresponding angles, alternate interior/exterior angles, same side interior/exterior angles, vertical angles, and linear pairs. I will have several students try and position the cards where they belong. After several attempts and with some guidance the students should have all of the cards in the right place. We will discuss the positions and fill in the interactive notes in our INBs. The notes include which special angle pairs are congruent and which are supplementary. Exit Ticket: (10 minutes) 10 question Illuminate Quick Quiz. When students finish their exit ticket they will scan it in to the system. Students earning a score of 80% (4/5) or better will not be assigned LW. Those scoring lower will take the Special Angle Pairs Practice Assignment home and will redo the exit ticket during the following class period. **Day 8:** Do Now: (10 minutes) Students who need to retake exit tickets will do so. All others will get their INBs ready for the day (writing down CFS/objective, title etc.)	Exit Ticket 3-5

A/M	Lesson: (40 minutes) As a class we will work together to solve a parallel lines puzzle on the board. We will determine the measure of every angle in the puzzle using our special angle pair relationships. After we have finished students will complete several puzzles of their own. One of the puzzles will be an overlay on a map. (ties in to our final project) Exit Ticket: (5 minutes) Revisit CFS. Did we meet our goal? What do you need from Mrs. Kendrick to meet the CFS? **Day 9:** Do Now (10 minutes) Students will get their INBs ready for the day (writing down CFS/objective, title etc.) Lesson: (40 minutes) Students will complete the guided notes in their INBs. We will be using special angle pairs to solve problems using algebraic expressions. After several examples, students will work independently on the scavenger hunt practice activity.	Parallel Lines Puzzles
A	Exit Ticket: 5 question Illuminate Quick Quiz. When students finish their exit ticket they will scan it in to the system. Students earning a score of 80% (4/5) or better will not be assigned LW. Those scoring lower will take the Special Angle Pairs Practice Assignment home and will redo the exit ticket during the following class period. **Day 10:** Do Now: (10 minutes) Students who need to retake exit tickets will do so. All others will get their INBs ready for the day (writing down CFS/objective, title etc.) Lesson: (20 minutes) Students will take the Parallel lines and Special Angle Pairs Quiz	Exit Ticket 3-6 Parallel Lines and Special Angle Pairs Quiz
A/M	Project Work time: Students will work with their groups to get a sketch of their map. Position their streets and buildings and begin finding their equations. **Day 11:** Do Now (5 minutes) Students will get their INBs ready for the day (writing down CFS/objective, title etc.) Lesson: Students will attach the constructions of parallel and perpendicular lines guided notes into their INBs. We will complete several constructions together. They will then spend several minutes practicing before completing their exit ticket.	
A	Exit ticket: Students must construct one parallel and one perpendicular line on their own. I will check their exit tickets. There will be no HW assigned since I cannot send supplies home.	Exit Ticket 3-7

A/M	**Day 12:** Do Now: (10 minutes) Students who need to retake exit tickets will do so. All others will get their INBs ready for the day (writing down CFS/objective, title etc.) Lesson: Constructions Quiz. Project work day. Projects will be due the day after the exam.	Constructions Quiz
A	**Day 13:** Do Now (5 minutes) Students will get their INBs ready for the day (writing down CFS/objective, title etc.) Lesson: We will play a review game to get ready for the unit exam. Exit Ticket: (5 minutes) Revisit CFS. Did we meet our goal? What do you need from Mrs. Kendrick to meet the CFS?	Review Game responses
M	**Day 14:** **Parallel and Perpendicular Lines Exam** **-AND-** **Project Work Day**	Parallel and Perpendicular Lines Exam
T	**Day 15: Projects Due/ Exhibition** **Students with completed projects will present them to the class and visitors in a gallery walk.**	Design a City Project

Name: _____ Date:_____

CITY PROJECT

You will work in groups of three. Please remember that every group member is a part of the architectural design team and should actively participate in the every phase of the project! Students who choose not to participate will be removed from their group and receive a **ZERO** for the assignment.

Part I (30 points):

You and your group are to design your own city and include the following:

1. City name and population at the top of the project
2. Three parallel streets (each street must be named)
3. Two transversal streets (each street must be named)
4. One perpendicular street (each street must be named)
5. Traffic light/stop sign at each intersection. (Marked with a red point).

Part II (30 points):

***To demonstrate your knowledge of special angle pairs, you will place buildings to mark the specified special angle pairs. In the spaces provided below, please name the buildings that you have used. ***

I. Alternate Exterior Angles:
- _____ and _____.

II. Alternate Interior Angles:
- _____ and _____.

III. Same Side Exterior Angles:
- _____ and _____.

IV. Same Side Interior Angles:
- _____ and _____.

V. Corresponding Angles:
- _____ and _____.

To demonstrate your knowledge of writing linear equations, complete the chart on the back!

Part III (10 points):

A. Include the city name and population
B. Label each building.
C. Label each street.
D. Mark each intersection with a stop sign/light.
E. Color/ Decorate. BE CREATIVE!!!!!

Part II cont. (30 points):

Parallel Streets				
	Name of Street	Equation (Slope Intercept)	Equation (Point-Slope)	Equation (Standard Form)
1.				
2.				
3.				

Transversal Streets				
	Name of Street	Equation (Slope Intercept)	Equation (Point-Slope)	Equation (Standard Form)
1.				
2.				

Perpendicular Street				
	Name of Street	Equation (Slope Intercept)	Equation (Point-Slope)	Equation (Standard Form)
1.				
Which street(s) is this street perpendicular to?				

Locations of Stop Signs/ Traffic Lights				