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I2T2 Project
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Parallel and Perpendicular Lines
Grade 10, Geometry AB
5 Days
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**Unit Objectives**

Students should understand properties of parallel lines
Students should understand the relationship of angles of parallel lines cut by a transversal.
Students should be able to create notes on GSP.
Students should understand some differences between angle relationships. Alternate interior, alternate exterior, corresponding, consecutive interior and linear pair

**Standards**

New York State Standards  
G.CM.11  
G.G.35

**Resources and Materials**

Cabri Junior loaded on graphing calculators  
Computer Lab with Geometer’s Sketchpad.  
Overhead with calculator hookup  
Computer projector  
Student Handouts  
Classroom set of TI-84 Graphing Calculators  
Classroom set of Rulers

**Unit Outline**

Day 1 – Introduction to Parallel Lines cut by a transversal

  Students will be reintroduced to parallel lines.  
  Students will explore the properties of parallel lines cut by a transversal for class notes  
  Students will compare measurements of angles formed by parallel lines cut by a transversal.

Day 2 – Parallel Lines cut by a transversal Activity
Students will experiment with Cabri Junior on the Ti-84 graphing calculator. Students will learn how to draw parallel line using the calculator and find missing angles.

Day 3 – Parallel lines cut by transversal Activity
   Students will work with a partner and complete Cabri lab activity.
   Students will observe how to find the missing angles.
   Students will experiment with different lines to find the relationships between parallel lines and a transversal using the graphing calculator.
   Students will make conjectures about parallel lines.

Day 4- Construction of Parallel Lines cut by a transversal using GSP
   Students will set an example note sheet showing angle relationships using Geometer’s Sketchpad.
   Students will learn to construct parallel lines using a GSP.
   Students will Show alternate interior angles alternate exterior angles, Vertical and Linear Pair.
   Students will copy GSP files into word and create organized notes.

Day 5 - Construction of Parallel Lines cut by a transversal using GSP continued
   Students will continue to show angle relationships.
   Students will create and show corresponding angles, consecutive interior angles and linear pair angles.
   Students will each create a separate note diagram for each angle relationship

Introduction to Parallel Lines

Objectives:
   Students should understand the concept of a parallel line.
   Students should understand the relationship of angles formed by parallel lines cut by a transversal.
   Students should be able to use those relationships to find missing angles of a problem.
   Students should learn the names of angles formed by parallel lines cut by a transversal.

Materials:
Geometry Textbook
Notebook

New York State Standards
   G.CM.11
   G.G.35

Opening Activity:
Most students should have learned a little about parallel lines in Middle School so the first lesson will have the students teaching each other what they know while learning some new vocabulary that will be useful later in the unit.

“What are parallel lines?”
“Can you draw me two parallel lines?”

You can get all kinds of answers but the main idea is for them to see that parallel lines never intersect with each other. Then have the students take a minute and try to think of some things in real life that are parallel lines. There is no predicting what answers you might get but some could be railroad track, curbs on a street, and rows of desks…what else around the room is parallel?

“What can you name two parallel streets in the city of Buffalo?”

Developmental Activity:

Have the students work in pairs or small groups. Next have all of the students construct two parallel lines. This should be done by using a ruler.

Next student should add a transversal to their diagram. Can you think of a street that acts a transversal?

Label The Streets. Add Street signs to make more real life

How many angles do we see?

Label all eight angles with different student’s names so they can act as neighbors.

Closing Activity:
Have three pairs of students show their drawings on the white boards and have the student compare their drawings and streets to see if they are actually parallel streets in buffalo as a class.
Parallel Lines cut by a transversal Activity

2 days

Objectives:
Students should understand the concept of a parallel line.
Students should understand the relationship of angles formed by parallel lines cut by a transversal.
Students should be able to use those relationships to find missing angles of a problem.
Students should learn the names of angles formed by parallel lines cut by a transversal.

Materials:
Ti-84 graphing calculators for students
Lab Handout
Laptop computer and projector for teacher
Ti-84 smart view

New York State Standards
G.CM.11
G.G.35

Opening Activity:
Getting used to The Calculator

Powering up the Ti-84 loading Cabri Student will open Cabri and Explore the menus with teacher guidance through the menus

Developmental Activity:
Arrange the students in pairs or small groups.
Pass out the student lab and have them work on it as team but each individual has their own sheet.
Record results and make conjectures answer all questions.
Student will have to follow directions on lab.

Make Sure students save drawings on the calculators with their names. So they can continue to work on the lab for tomorrow.
Lab–Angles Formed By Parallel Lines

WARMUP:
Define transversal in your own words.

PROCEDURE:
1. Choose the **Line** tool ([F2] menu, [WINDOW] button) and draw a line by pressing [ENTER] in three places.

2. Choose the **Point** tool ([F2] menu, [WINDOW] button) and press [ENTER] to create a point not on the line.

3. Choose the **Parallel** tool ([F3] menu, [ZOOM] button) and construct a line parallel to the given line through the point not on the line. Press [ENTER] on the point and press [ENTER] again on the line.

4. Choose the **Point On Object** tool from the Point submenu ([F2] menu, [WINDOW] button) and create three new points:
   - Create two more points on the parallel line.
   - Create a new point between the defining points on the original line.

5. Choose the **Line** tool ([F2] menu, [WINDOW] button) and construct a transversal that intersects the two parallel lines. Define it by pressing [ENTER] on the **middle** point that exists on each line.

6. Choose the **Point On Object** tool from the Point submenu ([F2] menu, [WINDOW] button) and create two new points on the transversal. Place one **above** the upper line and one **below** the lower line.

7. If necessary, use the **Hand Cursor** tool ([ALPHA] button) to drag the points farther apart on the lines. The diagram should look like this:

8. Measure all eight angles with the **Angle Measure** tool ([F3] menu, [GRAPH] button). To measure an angle, press [ENTER] on 3 points, with the vertex of the angle 2nd. Use the eight points that already exist, and wait for them to blink before pressing [ENTER].
COLLECT THE DATA:
9. Refer to this diagram. Fill in the angle measures from the calculator according to the numbers in this diagram.

Classify each angle by type (acute, obtuse, or right).

<table>
<thead>
<tr>
<th>Measure</th>
<th>Angle 1</th>
<th>Angle 2</th>
<th>Angle 3</th>
<th>Angle 4</th>
<th>Angle 5</th>
<th>Angle 6</th>
<th>Angle 7</th>
<th>Angle 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. Choose the **Hand Cursor** tool (*ALPHA* button) and move your transversal by dragging on one of the points where the transversal intersects the parallel lines. Complete a new table.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Angle 1</th>
<th>Angle 2</th>
<th>Angle 3</th>
<th>Angle 4</th>
<th>Angle 5</th>
<th>Angle 6</th>
<th>Angle 7</th>
<th>Angle 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MAKE CONJECTURES:
11. Make some observations about the angles in your tables.

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12. What kind of angles are the following? (alternate interior, alternate exterior, same-side interior, corresponding, vertical, or linear pair)

<table>
<thead>
<tr>
<th>Angles 1 and 2</th>
<th>Angles 1 and 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angles 1 and 5</td>
<td>Angles 1 and 8</td>
</tr>
<tr>
<td>Angles 3 and 5</td>
<td>Angles 3 and 6</td>
</tr>
<tr>
<td>Angles 4 and 8</td>
<td>Angles 5 and 8</td>
</tr>
</tbody>
</table>

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

14. Do your rules hold true if you move the parallel lines farther apart or closer together? Try it.

____________________________________________________________________________________

APPLY THE MATH:
15. Fill in the missing angle measures in each diagram based on your rules.
   A.    B.    C. 

   

EXTENSION:
16. Do you think your rules will hold true if the original lines weren’t parallel? Try it in a new Cabri figure and see what happens.

____________________________________________________________________________________

____________________________________________________________________________________

17. Are there any pairs of angles that keep the same relationship (congruent, supplementary) even if the original lines aren’t parallel?

____________________________________________________________________________________

____________________________________________________________________________________

Construction of Parallel Lines cut by a transversal using GSP
Objectives:
Students should understand the concept of a parallel line.
Students should understand the relationship of angles formed by parallel lines cut by a transversal.
Students should be able to use those relationships to find missing angles of a problem.
Students should learn the names of angles formed by parallel lines cut by a transversal.

Materials:
GSP
Computer Lab
New York State Standards
G.CM.11
G.G.35

Opening Activity:
Students will be given verbal Directions on how to construct two parallel lines cut by a transversal.
The main purpose is to refresh the students with the program

Developmental Activity:
Student will have their books in front of them and asked to use GSP and constructed a note sheet that can be printed in word format. So it can be used as a study guide. Students will be looking at pg 128 the key concept chart in their geometry textbook.

Student handout (attached)

Name __________ Date
Geometry Ch 3

Transversals and Angles
Using GSP your task is to create a key concept chart like on pg 128 of your geometry textbook.

You must copy and paste your work from GSP into Microsoft Word so it can be easily printed for your notebook.

Your mission is to make this as neat and organized as possible.

I need to see the angle relationships for the following:

Vertical Angles
Corresponding angles
Interior angles
Alternate exterior angles
Alternate interior angles
Linear Pair angles
Consecutive interior angles

You must show all 8 angles with degree measures

Example Below  Make sure you have all 7 relationships shown and labeled at the top of the page

$$$$ When Finished Use a Highlighter and Highlight Angles with the same Degree Measures $$$$$

Example Showing Angle Measures
Vertical Angles
Interior Angles
Corresponding Angles
Alternate Interior
Alternate Exterior
Consecutive Interior
Linear Pair
\[ \angle DAB = 14.46^\circ \]

\[ \angle BAC = 65.54^\circ \]