Parallel Lines and Transversals

MATH NSPIRED

TEACHER NOTES

Math Objectives

- Students will explore the angles formed when parallel lines are cut by a transversal.
- Students will use informal arguments to establish facts about the angles created when parallel lines are cut by a transversal.

Vocabulary

- parallel
- transversal
- linear pair
- corresponding angles
- supplementary

About the Lesson

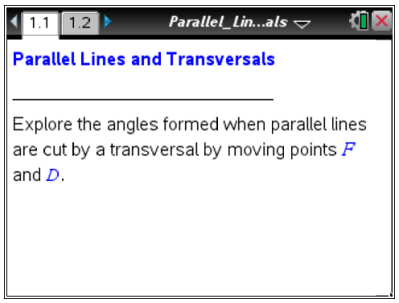
- Send the file *Parallel_Lines_and_Transversals.tns* to student devices. This is the recommended way to have students complete the activity using TI-Nspire's dynamic geometry.
- This activity is designed to be student-centered, with the teacher acting as a facilitator while students work cooperatively. The student worksheet is intended to guide students through the activity and provide a place to record their answers.

TI-Nspire™ Navigator™ System

- Send the *Parallel_Lines_and_Transversals.tns* file.
- Monitor student progress using Class Capture.
- Use Live Presenter to monitor student answers.

Activity Materials

- Compatible TI Technologies: TI-Nspire™ CX Handhelds, TI-Nspire™ Apps for iPad®, TI-Nspire™ Software



Tech Tips:

- This activity includes screen captures taken from the TI-Nspire CX handheld. It is also appropriate for use with the TI-Nspire family of products including TI-Nspire software and TI-Nspire App. Slight variations to these directions may be required if using other technologies besides the handheld.
- Watch for additional Tech Tips throughout the activity for the specific technology you are using.

Lesson Files:

Student Activity

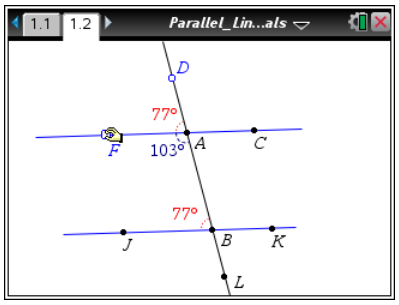
- Parallel_Lines_and_Transversals_Student.pdf
- Parallel_Lines_and_Transversals_Student.doc

TI-Nspire document

- Parallel_Lines_and_Transversals.tns

Discussion Points and Possible Answers

Move to page 1.2.



On page 1.2, students see two parallel lines cut by a transversal.

$\angle DAF$ and $\angle DAC$ form a linear pair.

1. Identify two other linear pairs.

   Answer: $\angle DAC$ and $\angle CAB$; $\angle CAB$ and $\angle BAF$; $\angle BAF$ and $\angle FAD$

2. Name at least two pairs of supplementary angles that are not linear pairs.

   Answer: $\angle JBA$ and $\angle DAC$; $\angle JBA$ and $\angle FAB$

3. Identify two other angles that have the same measure as $\angle DAF$ and explain why they must have the same measure.

   Answer: $\angle CAB$ is the vertical angle to $\angle DAF$. $\angle JBA$ has the same measure as $\angle DAF$ because it is the corresponding angle.

> **Teacher Tip:** It is important for students to name angles properly.

Have students move the cursor to point *F* until the cursor becomes a hand. Then have students grab the point and move the line. $\angle DAF$ and $\angle ABJ$ are corresponding angles.

> **Tech Tip:** If students experience difficulty dragging the point, check to make sure that they have moved the arrow until it becomes a hand (☜) getting ready to grab the point. Press ctrl ☜ to grab the point and close the hand (✊). Press esc to release the point or deselect other objects.

> **Tech Tip:** If students experience difficulty grabbing and dragging a point, have them tap and hold the desired point for a few seconds and then drag the point to the desired location. Tap empty white space to deselect objects.

4. a. What conjecture can you make about corresponding angles?
   How are corresponding angles formed?

   Answer: When two parallel lines are cut by a transversal, corresponding angles have the same angle measure.

Teacher Tip: Encourage students to give an informal reason as to why corresponding angles are congruent. Some student might recognize that if you translate line *FC* onto line *JB* by segment *AB*, the corresponding angles will map onto one another. Because a translation is a rigid motion, angle measure is preserved.

b. Identify other corresponding angles.

Answer: The other corresponding angles are $\angle FAB$ and $\angle JBL$; $\angle DAC$ and $\angle ABK$; $\angle CAB$ and $\angle KBL$.

Have students grab and move point *D* to the left and to the right. Students can confirm their answers to questions 2, 3, and 4, by using **Menu > Measurement** > **Angle**. Then select the three points that define the angle.

5. After moving point *D*, list the 8 angles created by cutting the parallel lines with the transversal and record your angle measures.

Answers will vary: Sample answer: $\angle DAF = 77^\circ$, $\angle DAC = 103^\circ$,

$\angle FAB = 103^\circ$, $\angle CAB = 77^\circ$,

$\angle ABJ = 77^\circ$, $\angle ABK = 103^\circ$,

$\angle JBL = 103^\circ$, $\angle KBL = 77^\circ$

6. For the following statements, determine if they are *always*, *sometimes* or *never* true. Explain your reasoning using what you have learned in this activity.

a. Supplementary angles form a linear pair.

Answer: Sometimes true. Two angles do not have to be adjacent to be supplementary. The supplementary angles must be adjacent if they are going to form a linear pair.

b. Angles that form a linear pair are supplementary.

Answer: Always true. By definition, angles that form a linear pair lie on a straight angle that measures 180 degrees.

c. Corresponding angles are congruent.

Answer: Sometimes true. Corresponding angles have the same angle measure only when they are formed by parallel lines and a transversal.

Wrap Up

Upon completion of the discussion, the teacher should ensure that students can explain:

- The relationship between pairs of angles when parallel lines are cut by a transversal.