



About the Lesson

In this activity, students investigate an exterior angle and its two remote interior angles using the Cabri Jr. application. They extend a side of a triangle to discover that an exterior angle is greater than the measures of the two interior angles. Students also discover that the measure of an exterior angle is equal to the sum of the measures of the two remote interior angles. As a result, students will:

- Verify the Triangle Exterior Angle Theorem.
- Verify the Corollary to the Triangle Exterior Angle Theorem.

Vocabulary

- exterior angle
- remote interior angle

Teacher Preparation and Notes

- Students do not need to know the definition of an exterior angle or a remote interior angle to complete this activity. They will be introduced to these concepts at the end.
- Before beginning the activity, the Cabri Jr. file EXTINT.8xv needs to be transferred to the students' calculators via handheld-to-handheld transfer or transferred from the computer to the calculator via TI-Connect CE.

Activity Materials

- Compatible TI Technologies:

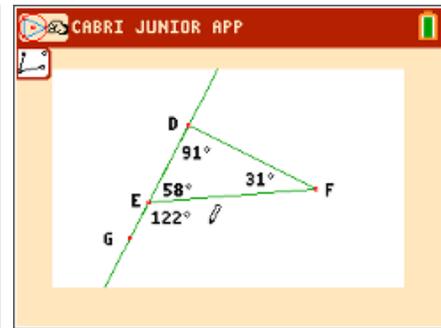
TI-84 Plus*

TI-84 Plus Silver Edition*

 TI-84 Plus C Silver Edition

 TI-84 Plus CE

* with the latest operating system (2.55MP) featuring MathPrint™ functionality.



Tech Tips:

- This activity includes screen captures taken from the TI-84 Plus CE. It is also appropriate for use with the rest of the TI-84 Plus family. Slight variations to these directions may be required if using other calculator models.
- Watch for additional Tech Tips throughout the activity for the specific technology you are using.
- Access free tutorials at <http://education.ti.com/calculators/pd/US/Online-Learning/Tutorials>
- Any required calculator files can be distributed to students via handheld-to-handheld transfer.

Lesson Files:

- Exterior_Interior_Angles_Student.doc
- Exterior_Interior_Angles_Student.pdf
- EXTINT.8xv

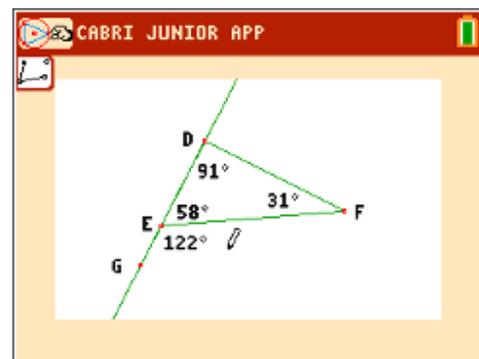
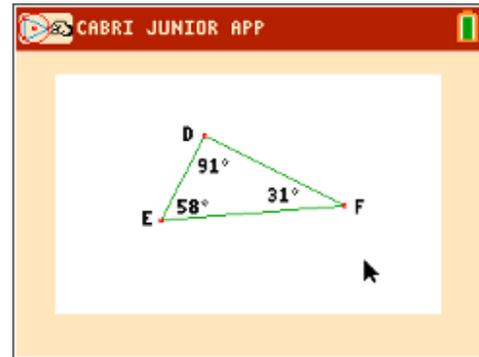


Tech Tip: Before beginning the activity, the Cabri Jr. file, EXTINT.8xv needs to be transferred to the students' calculators via handheld-to-handheld transfer or transferred from the computer to the calculator via TI-Connect™ CE software.

When students open the Cabri Jr. file **EXTINT**, students will see $\triangle DEF$ with all three measures of the interior angles.

Step 1: Students construct line DE by selecting the **Line** tool (`(window)` > **Line**) and then selecting points D and E .

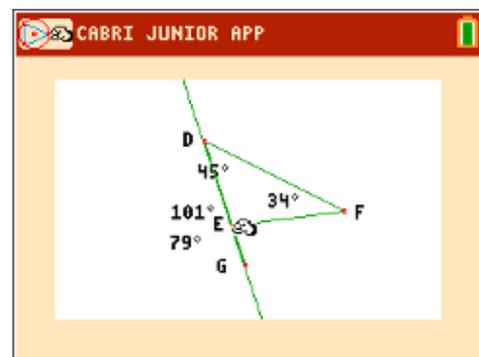
Step 2: Now students place point G on line DE by selecting the **Point On** tool (`(window)` > **Point** > **Point on**). To name the point, they need to select the **Alpha-Num** tool (`(graph)` > **Alpha-Num**), select the point, and press `[tan][enter]` for the letter G .



Step 3: Students can find the measure of $\angle GEF$ by selecting the **Angle** tool (`(graph)` > **Measure** > **Angle**), select the three points in the order of letters of the name (i.e., select point G , then point E , then point F).

Note: If time is limited, set up the Cabri Jr. file to this point before sending to students. Have students carry out the activity from here.

Dragging point E will allow students to change the shape of the triangle and consequently the measure of the exterior angle. (They should be aware that the angle measures will not travel with the points as the triangle changes.) To change a point, students need to hover their cursor over the point until it flashes and then press `[alpha]`.





- Students are to complete the **first** table on the worksheet. Encourage them to move the point so $\angle GEF$ is obtuse, right, and acute.

Sample Answers:

Position	$m\angle GEF$	$m\angle EDF$	$m\angle DFE$
1	117°	87°	29°
2	105°	76°	29°
3	90°	61°	29°
4	65°	33°	32°

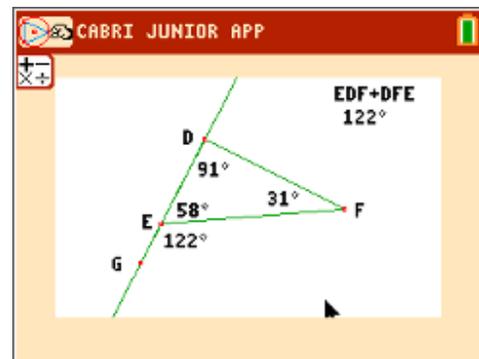
How is the measure of $\angle GEF$ related to the measures of $\angle EDF$ and $\angle DFE$?

Answer: $m\angle GEF$ is greater than $m\angle EDF$ and $m\angle GEF$ is greater than $m\angle DFE$.

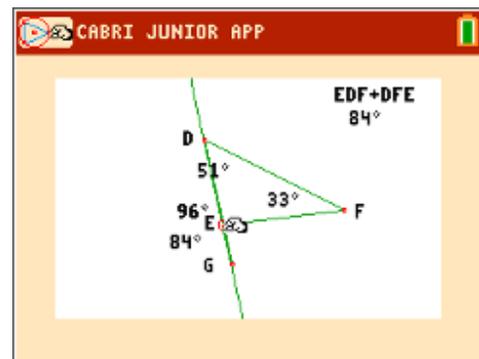
Now students will find the sum of the measures of the two remote interior angles.

Step 1: Students set up a formula to find the sum by selecting the **Alph-Num** tool, pressing `enter` to place a text box on the screen, and then typing **EDF + DFE**. To type +, press `alpha` to change from Alpha mode to Number mode.

Step 2: Now students calculate the sum by selecting the **Calculate** tool (`graph` > **Calculate**), selecting the first angle measure, pressing `+`, and then selecting the other angle measure. Then move the measurement to a clear area in the screen and press `enter`.



Again, dragging point E will allow students to change the shape of the triangle and consequently the measure of the exterior angle.





2. Students are to complete the **second** table on the worksheet. Encourage students to move the point so $\angle GEF$ is obtuse, right, and acute.

Measures in the table will vary. Sample measures:

Position	$m\angle GEF$	$m\angle EDF + m\angle DFE$
1	117°	117°
2	90°	90°
3	88°	88°
4	55°	55°

How is the measure of $\angle GEF$ related to the measures of $\angle EDF$ and $\angle DFE$?

Answer: $m\angle GEF$ is equal to the sum of $m\angle EDF$ and $m\angle DFE$.

Students are introduced to the concept of an exterior angle and its two remote interior angles. Help students generalize their conclusions from the first and second tables to make a conjecture about the relationship between the angles.

3. Angle GEF is an exterior angle. Angles EDF and DFE are its remote interior angles. What conjectures can you make about an exterior angle and its remote interior angles?

Answers: Conjecture 1: The measure of the exterior angle is always greater than either of the measures of its two interior angles.

Conjecture 2: The measure of the exterior angle is always equal to the sum of the measures of its two interior angles.