Exterior and Remote Interior Angles
ID: 13378

Time required
15 minutes

Activity Overview
In this activity, students investigate an exterior angle and its two remote interior angles using a Graphs & Geometry page. 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.

Topic: Angles in Triangles
- *Triangle Exterior Angle Theorem*
- *Corollary to the Triangle Exterior Angle Theorem*

Teacher Preparation
- *This activity is designed to be used in high school geometry classroom and it intended to be* **student-centered** *with a teacher discussion after the activity is completed.*
- *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.*
- ***To download the student and solution TI-Nspire documents (.tns files) and student worksheet, go to education.ti.com/exchange and enter "13378" in the keyword search box.***

Associated Materials
- *ExteriorandRemoteInteriorAngles_Student.doc*
- *ExteriorandRemoteInteriorAngles.tns*

Suggested Related Activities
To download any activity listed, go to education.ti.com/exchange and enter the number in the keyword search box.
- *Interior & Exterior Angles of a Triangle (TI-Nspire technology) — 8771*
- *Triangle Inequalities (TI-Nspire technology) — 9425*
- *Angles in Polygons (TI-Nspire technology) — 9055*

On page 1.2, students will see △*DEF* with all three measures of the interior angles. Students are asked to click through the slider to work through the questions on their worksheets.

After clicking on the slider to **Step 1**, an exterior angle (∠***GED***) is created. Students are expected to answer the first two questions on their worksheet.

For **Step 2**, dragging point *D* will allow students to change the shape of the triangle and consequently the measure of the exterior angle. They are to complete the **first** table on the worksheet. Encourage students to move the point so ∠*GED* is obtuse, right, and acute.

In **Step 3**, students are to determine how *m*∠*GED* is related to *m*∠*EDF* and *m*∠*DFE*.

During **Step 4**, dragging point *D* will allow students to change the shape of the triangle and consequently the measure of the exterior angle. They are to complete the **second** table on the worksheet. Encourage students to move the point so ∠*GED* is obtuse, right, and acute.

In **Step 5**, students are to determine how *m*∠*GED* is related to the **sum** of *m*∠*EDF* and *m*∠*DFE*.

In **Step 6**, students are asked to make a conjecture about an exterior angle and its remote interior angles.
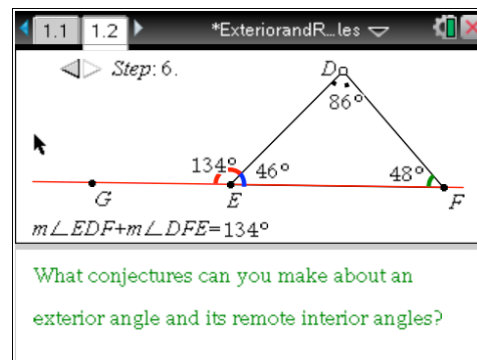
Sample Student Solutions

1. Why is ∠**GED** called an <u>exterior angle</u>? It is called an exterior angle because it is on the outside of the triangle.

2. Why are ∠**EDF** and ∠**DFE** called <u>remote interior angles</u>? They are called remote interior angles because they are inside the triangle, but they are not a linear angle with the exterior angle.

3. Move point *D* to four different positions and collect the data in the table below.

Position	*m∠GED*	*m∠EDF*	*m∠DFE*
1	134°	86°	48°
2	77°	52°	25°
3	90°	62°	28°
4	154°	64°	90°

4. How is the measure of ∠*GED* related to the measure of ∠*EDF*? *m∠GED* is greater than m∠*EDF*

5. How is the measure of ∠*GED* related to the measure of ∠*DFE*? m∠*GED* is greater than m∠*DFE*

6. Move point *D* to four different positions and collect the data in the table below.

Position	*m∠GED*	*m∠EDF + m∠DFE*
1	117°	117°
2	90°	90°
3	88°	88°
4	55°	55°

7. How is the measure of $\angle GED$ related to the sum of the measures of $\angle EDF$ and $\angle DFE$? They are equal.

8. Angle *GED* 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?

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.