**Activity 3.2.2 Exterior Angles of Polygons**

When one side of a convex polygon is extended beyond a vertex, the angle formed with the adjacent side is called an **exterior angle** of the polygon. In the figure at the right$ ∠$*FAB* is an exterior angle of pentagon *ABCDE.*

The exterior angle of a polygon and its adjacent angle form a **linear** pair. Recall that the definition of a linear pair: two angles that have a common side and whose other sides are opposite rays. In the diagram below $∠CAD and ∠ BAD$ form a linear pair. The **Linear Pair Postulate** states that the angles in a linear pair are **supplementary**, that is, the sum of their measures is 180°.



We will use this information to make a conjecture about relationships between exterior angles and the non-adjacent angles in a triangle.

1. Using the definition of supplementary angles and linear pairs, what is the measure of $∠$*NMP* ?



1. What do you notice about the relationship between $∠$*NMP* and angles *MON* and *ONM*?
2. Using the definition of supplementary angles and linear pairs, what is the measure of $∠$*LIJ* ?



1. What do you notice about the relationship between $∠$*LIJ* and angles *IKJ* and *IJK*?
2. Using the definition of supplementary angles and linear pairs, what is the measure of $∠$*EFH* ?



1. What do you notice about the relationship between $∠$*EFH* and angles *FEG* and *EGF*?
2. Based on what you have observed, make one or more conjectures.
3. Ask a friend: Turn to your neighbor and write down their answer to question 7?
4. Are you and your neighbor in agreement? If not, try to resolve any differences.
5. Combine your thoughts from your answers to questions 7 and 8 to make final conjectures.
6. After discussion with the entire class, prove your conjecture(s).