**Activity 2.5.4 Parallel Lines and Corresponding Angles**

1. Open the file Activity\_2\_5\_4\_file.gbb. You will find $\overleftrightarrow{BC}$ with point *A* not on $\overleftrightarrow{BC}$ as shown.



1. Use the parallel line tool to draw a line through *A* parallel to $\overleftrightarrow{BC}$.



1. Use the line tool to draw a transversal to the two parallel lines through *A* and *C*.



1. Use the point-on-object tool to create point *D* on the line parallel to $\overleftrightarrow{BC}$ and point *E* on line $\overleftrightarrow{AC}$.
2. Measure $∠$*BCA* and $∠$*DAE*. What do you notice?
3. $∠$*BCA* and $∠$*DAE* are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ angles.



1. Use the translate tool to translate $\overleftrightarrow{BC}$ by the vector from *C* to *A*. Follow these steps.
2. First select the line $\overleftrightarrow{BC}.$ Then select points *C* and *A* (in that order) to create the vector. You should now see the image of $\overleftrightarrow{BC}$ highlighted and the vector should appear as an arrow.
3. You will now translate individual points. With the translate tool select point *A* and then the vector. Then select point *B* and the vector. Finally select point *C* and the vector.
4. Describe the positions of points *A’*, *B’,* and *C’.*
5. $∠$*B’C’A’* is another name for which angle?
6. How do you know that m$∠$*BCA*  *=* m$∠$*B’C’A’*?
7. Study this proof of the Parallel Lines Corresponding Angles Theorem and discuss it with your classmates.

**Parallel Lines Corresponding Angles Theorem**

If two parallel lines are cut by a transversal, then pairs of corresponding angles are congruent.

Given:$\overleftrightarrow{ AD}∥\overleftrightarrow{CB}$.

Prove: $∠BCA ≅ ∠DAE $

Proof:

Translate $∠BCA$ by the vector from *C* to *A*.

Then *C*’ coincides with *A* and *A*’ lies on $\overleftrightarrow{ AC}$,

by special property (a) of translation: the line containing the translation vector and any line parallel to the vector is mapped onto itself.

Also $\overleftrightarrow{ C'B'}∥\overleftrightarrow{CB}$ by special property (b) of translation: a line not containing the translation vector is mapped onto a line parallel to itself.

By the Parallel Postulate there is exactly one line through *A* that is parallel to $\overleftrightarrow{ CB}$. Therefore $\overleftrightarrow{ C'B'}$ and $\overleftrightarrow{AD}$ coincide. This means that $∠B'C'A'$ coincides with $∠DAE $so they are names for the same angle. Because $∠B'C'A'$ is the image of $∠BCA $under an isometry, $∠BCA ≅ ∠B'C'A'$. Therefore $∠BCA ≅ ∠DAE.$

12. Why is the Parallel Postulate needed to complete this proof?