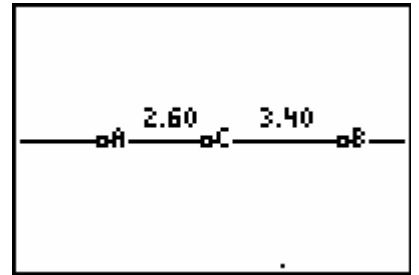
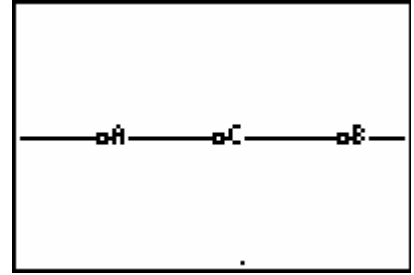


Name: _____ Period: _____ Date: _____

Geometry: Segment and Angle Addition Postulates Exploration with Cabri Jr.

Part 1: Segment Addition Postulate: Draw a segment and place a point on the segment.

- Draw a horizontal line \overline{AB} .
 - Press **[WINDOW]**, and then highlight **Line**. Press **[ENTER]**. Use your cursor and press **[ENTER]** to lay down your first point, then move your cursor away from the first point and press **[ENTER]** to lay down the second point.
 - Press **[GRAPH]**. Scroll up or down to highlight **Alpha-Num**. Press **[ENTER]**.
 - Move your cursor to one of your two endpoints. When your endpoint starts flashing. Press **[ENTER]**.
 - Use green letters to the top right of each key to name your endpoints. For example, press **[APPS]** for **B**.
 - Press **[ENTER]**.
 - Move your cursor to the other endpoint and repeat.
- Construct a point **C** on the line between **A** and **B**.
 - Press **[WINDOW]**, and then highlight **Point**, then **[▶]** to see the sub menu. Scroll down to highlight **Point On**. Press **[ENTER]**.
 - Press **[ENTER]**. Move your cursor in between **A** and **B**. When the line is “dancing” press **[ENTER]**.
 - Press **[GRAPH]**. Scroll up or down to highlight **Alpha-Num**. Press **[ENTER]**.
 - Move to the last point added and press **[ENTER]**. Press **[PRGM]**, for **C**, then press **[ENTER]** again.
- Measure the lengths of segments \overline{AC} and \overline{CB} . Place these measurements above the segments.
 - Press **[GRAPH]**. Scroll up or down to highlight **Measure**, then **[▶]** to see the sub menu. Highlight **D. & Length**. Press **[ENTER]**.
 - Use your cursor to move to the point **A** and while point **A** is blinking press **[ENTER]**, then go to point **C** and while point **C** is blinking press **[ENTER]**.
 - The Hand Tool is initiated with the length of the segment attached. If you want to increase the accuracy of your measurement, then press **[+]** while holding the measurement. To decrease the accuracy press **[-]**. Move this measurement wherever you would like with your cursor. Press **[ENTER]**. The length of your segment is shown.
 - Repeat the above for the segment \overline{CB} .
- Measure the length of segment \overline{AB} . Label the measurement **AB** and place it near the bottom of the screen.
 - Press **[GRAPH]**. Scroll up or down to highlight **Measure**, then **[▶]** to see the sub menu. Highlight **D. & Length**. Press **[ENTER]**.
 - Use your cursor to move to the point **A** and while point **A** is blinking press **[ENTER]**, then go to point **B** and while point **B** is blinking press **[ENTER]**.
 - Press **[GRAPH]**. Scroll up or down to highlight **Alpha-Num**. Press **[ENTER]**. Move you cursor to somewhere in front of your measurement. Press **[ENTER]**. Press **[MATH]**, for **A**, and press **[APPS]**, for **B**. Press **[ENTER]**.
- Calculate the sum of the lengths of segments \overline{AC} and \overline{CB} . Label the calculation and place it near the bottom of the screen.
 - Press **[GRAPH]**. Scroll up or down to highlight **Calculate**. Press **[ENTER]**.
 - Move your arrow until your length for \overline{AC} is blinking. Press **[ENTER]**.
 - Press **[+]**.
 - Move your arrow until your length for \overline{CB} is blinking. Press **[ENTER]**.
 - Your Hand Tool will be activated and carrying your sum. Move your measurement anywhere you would like to place it and press **[ENTER]**.
 - Press **[GRAPH]**. Scroll up or down to highlight **Alpha-Num**. Press **[ENTER]**. Move you cursor to somewhere in front of your calculation. Press **[ENTER]**. Press **[MATH]**, for **A**, and press **[PRGM]**, for **C**, press **[+]**, for +, press **[PRGM]**, for **C**, and **[APPS]** for **B**. Press **[ENTER]**.



Exploration: Observe and record how the changes in the measures change and note how they are related when you change the location of the C (to pick up a point: remember to clear all boxes in the top left of the screen by pressing **CLEAR** and then move your cursor to point C and when point C is “dancing” or “blinking” press **ALPHA** to pick up the point) and fill in the table provided:

Postions

1. Dragging it closer to A
2. Dragging it closer to B
3. Dragging it to the other side of A
4. Dragging it to the other side of B.

Position	AB (length of \overline{AB})	BC (length of \overline{BC})	AC (length of \overline{AC})	AC + BC (length of $\overline{AC} + \overline{BC}$)
Position 1				
Position 2				
Position 3				
Position 4				

Define the following terms:

Inductive Reasoning (p. 4) -- _____

Conjecture (p. 5) -- _____

Questions and Conjectures:

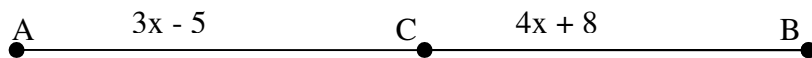
5. Make a conjecture about the length of segments \overline{AC} , \overline{CB} , and \overline{AB} , when C is between A and B. Explain.

6. Make a conjecture about the length of segments \overline{AC} , \overline{CB} , and \overline{AB} , when C is not between A and B. Explain.

7. Copy Postulate 1-6: **Segment Addition Postulate** including picture (p. 26) -- _____



Example 1: If $AB = 38$, find the value of x. Then find AC and BC. Remember AB means the length of \overline{AB} .



$$(3x - 5) + (4x + 8) = 38$$

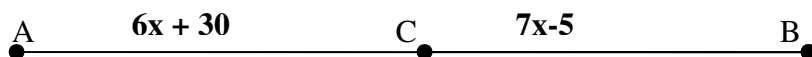
$$7x + 3 = 38 \quad \text{combining like terms}$$

$$7x = 35 \quad \text{subtracting 3 from both sides}$$

$$x = 5 \quad \text{dividing by 7}$$

$$AC = 10 \text{ and } BC = 28$$

8. If $AB = 129$, find the value of x. Then find AC and BC. Remember AB means the length of \overline{AB} .



Example 2: On a number line, the coordinate of $X = -2$ and the coordinate of $Y = 8$. Find XY .

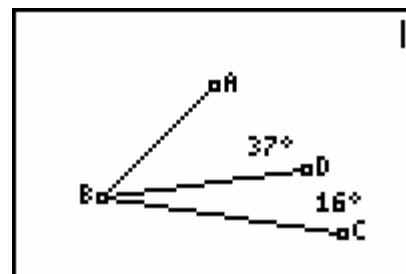
$$XY = |-2 - 8| = 10$$

9. On a number line, the coordinates of $Z = 5$ and the coordinate of $R = -8$. Find ZR

Show the teacher your calculator screen. Teacher Signature: _____

Part 2: Angle Addition: Draw segments to form adjacent angles. Note: there is no ray tool in Cabri Jr.

- Draw and label segments \overline{AB} and \overline{BC} to form $\angle ABC$ having vertex B .
 - Draw \overline{AB}
 - Press **[WINDOW]**, and then highlight **Segment**. Press **[ENTER]**. Use your cursor and press **[ENTER]** to lay down your first point, then move your cursor away from the first point and press **[ENTER]** to lay down the second point.
 - Press **[GRAPH]**. Scroll up or down to highlight **Alpha-Num**. Press **[ENTER]**.
 - Move your cursor to one of your two endpoints. When your endpoint starts flashing. Press **[ENTER]**.
 - Use green letters to the top right of each key to name your endpoints. For example, press **[APPS]** for **B**.
 - Press **[ENTER]**.
 - Move your cursor to the other endpoint and repeat.
 - Draw \overline{BC} as above with the first endpoint being point **B**.
- Construct \overline{BD} so that point D is the interior of $\angle ABC$.
 - Draw \overline{BD} as above with the first endpoint being point **D**.
- Measure $\angle ABD$ and $\angle DBC$. Place these measures in the interior of each angle.
 - Measure $\angle ABD$.
 - Press **[GRAPH]**. Scroll up or down to highlight Measure, then **[▶]** to see the sub menu. Highlight Angle. Press **[ENTER]**.
 - Move your cursor to endpoint **A**. Press **[ENTER]**.
 - Move your cursor to endpoint **B**. Press **[ENTER]**.
 - Move your cursor to endpoint **D**. Press **[ENTER]**.
 - Your Hand Tool will be activated and carrying your measurement. Move your measurement to the interior of $\angle ABD$ and press **[ENTER]**.
 - Measure $\angle DBC$ and place the measurement in the interior of $\angle DBC$ as above.
- Measure $\angle ABC$. Label the measure and place it near the bottom of the screen.
 - Press **[GRAPH]**. Scroll up or down to highlight Measure, then **[▶]** to see the sub menu. Highlight Angle. Press **[ENTER]**.
 - Move your cursor to endpoint **A**. Press **[ENTER]**.
 - Move your cursor to endpoint **B**. Press **[ENTER]**.
 - Move your cursor to endpoint **C**. Press **[ENTER]**.
 - Your Hand Tool will be activated and carrying your measurement. Move your measurement to the bottom of the screen and press **[ENTER]**.
 - Label the measurement **mABC**.
- Calculate $\angle ABD + \angle DBC$. Label the calculation and place it near the bottom of the screen.
 - Press **[GRAPH]**. Scroll up or down to highlight **Calculate**. Press **[ENTER]**.
 - Move your arrow until your angle measurement for $\angle ABD$ is blinking. Press **[ENTER]**.
 - Press **[+]**.
 - Move your arrow until your angle measurement for $\angle DBC$ is blinking. Press **[ENTER]**.
 - Your Hand Tool will be activated and carrying your sum. Move your measurement anywhere you would like to place it and press **[ENTER]**.
 - Press **[GRAPH]**. Scroll up or down to highlight **Alpha-Num**. Press **[ENTER]**. Move you cursor to somewhere in front of your calculation and write **mABD + mDBC**. Note there is no \angle symbol on the TI-84 Plus Silver Edition or TI-83 calculators.



Exploration: Observe and record the changes in the measures and note how they are related when you change the position of \overline{BD} and fill in the table below:

Positions:

10. Dragging **D** closer to \overline{AB} .

11. Dragging **D** closer to \overline{BC} .

12. Dragging **D** to the other side of \overline{AB} .

13. Dragging **D** to the other side of \overline{BC} .

Note: $m\angle ABD$ is the measure of angle ABD.

Position	$m\angle ABD$	$m\angle BDC$	$m\angle ABC$	$m\angle ABD + m\angle BDC$
Position 10				
Position 11				
Position 12				
Position 13				

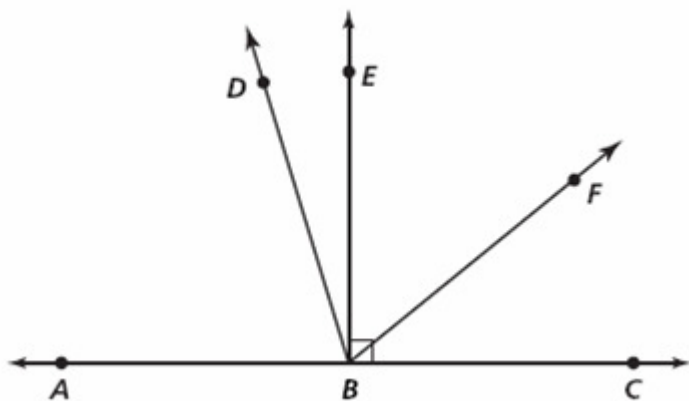
Questions and Conjectures:

14. Make a conjecture about the measures of $\angle ABD$, $\angle DBC$, and $\angle ABC$ when **D** is in the interior of $\angle ABC$. Explain.

15. Make a conjecture about the measures of $\angle ABD$, $\angle DBC$, and $\angle ABC$ when **D** is not in the interior of $\angle ABC$. Explain.

16. Copy Postulate 1-8: **Angle Addition Postulate** including picture (p. 28) -- _____

17. Find the measure of each angle if $m\angle DBF = 57^\circ$ and $m\angle CBF = 48^\circ$



a.) $m\angle EBF =$ _____

b.) $m\angle CBE =$ _____

c.) $m\angle DBE =$ _____

d.) $m\angle ABD =$ _____

Show the teacher your calculator screen. Teacher Signature: _____