Investigating a Point on an Angle Bisector

Lesson Summary:
Students will investigate the properties of a point on a bisector of an angle. Students will construct the point using Geometry software and measure the distance from the sides. This is a good beginning lab when introducing the use of software to investigate geometric properties.

Key Words:
angle, bisector, perpendicular

Background Knowledge:
Students should have a basic understanding of the major tools in Geometry software. Students also understand angle bisectors.

NCTM Standards:
(4) Geometry; Standard 7 – Geometry from a synthetic perspective

Learning Objectives
1. To draw an angle bisector and to discover its basic properties using software.

Materials:
Cabri II or other geometry software
Copy of the lab worksheet for each student.

Procedures:
• Divide students into groups of 2-3
• Have students complete the lab worksheets.
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Team members: _________________________________________________________

File name: _____________________________________________________________

Lab goals:
Discover the properties of a point that is on a bisector of an angle.

Investigation:
1. Draw two rays \( AB \) and \( BC \) that form angle \( \angle ABC \) (use the ray tool)

2. Draw the angle bisector of \( \angle ABC \). (use angle bisector tool)

3. Mark a point \( P \) anywhere on the bisector in the interior of \( \angle ABC \). (using point tool)

4. Measure \( \angle ABP \) and \( \angle CBP \) and label the measurements. (use angle measure tool)

What do you notice about these angles? ________________________________

____________________________________________________________________

Move \( P \) along the angle bisector. Do the angle measurements change? _________

____________________________________________________________________
Grab point A or point C and move ray \( \overline{AB} \) or \( \overline{BC} \) up and down. What do you notice about the angles? 

5. Create a perpendicular line from point P to line \( \overline{AB} \) and another perpendicular line from point P to line \( \overline{BC} \). Call the intersection point on line \( AB \) point X and call the intersection point on line \( BC \) point Y. (use perpendicular tool)

6. Now make segments from point P to X, and another from P to Y. Hide lines \( \overline{XP} \), and \( \overline{YP} \). (using segment tool and hide/show tool)

6. Measure the lengths of segments \( \overline{XP} \) and \( \overline{PY} \). (use measure tool) What do you notice?

7. Grab point P and move it further along the angle bisector line. What do you notice about the measures of \( \angle ABP \) and \( \angle CBP \)?

What do you notice about the measure of segments \( \overline{XP} \) and \( \overline{PY} \)?

Grab point A or point C and move ray \( \overline{AB} \) or \( \overline{BC} \) up and down. What do you notice about the measures of \( \angle ABP \) and \( \angle CBP \)?
What do you notice about the measure of segments $XP$ and $PY$?

What can you conclude about an angle bisector?

* If you are not familiar with Cabri’s tools, press F1 on the keyboard. A help menu for each tool selected will appear on the bottom of the screen.
Journal Activity
Investigating a Point on an Angle Bisector

1. What was your favorite thing about this activity?

2. What was the most challenging thing?

3. What did you gain the most confidence about through completing this lesson?

4. Where do you possibly see yourself using this knowledge in the future?