Instructions

For this lab assignment we will be using the discussion facility within WebCT. You are to post comments regarding the questions of the following lab to your discussion group # - not to the All or Main discussion topic areas. Do not send attachments or communicate by other means, such as email. Do not discuss this assignment with students who are members of other groups! After reviewing and discussing your ideas, you must agree on the best possible answers and submit them to me by Friday May 2.
Pick’s Theorem

Team Members’ Names: ___________________________________________________

File Name: _______________________________________________________________________

Goal 1: Discover Pick’s Theorem for calculating the area of polygons whose vertices are lattice points.

Investigate Using Cabri Geometry II*

1. Construct polygons A - J
   (Choose the show axes tool. Then choose the define grid tool.
   You should now have grid points showing.
   Create the polygons within this grid by using the polygon tool.)

   A.  
   B.  
   C.  

   D.  
   E.  
   F.  

   G.  
   H.  
   I.  

2. Use each of your constructions to complete the following table of values.

<table>
<thead>
<tr>
<th>Polygon</th>
<th>( b ) (# of dots in boundary of polygon)</th>
<th>( i ) (# of dots in interior of polygon)</th>
<th>( A ) (Area of polygon)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polygon A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polygon B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polygon C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polygon D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polygon E</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polygon F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polygon G</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Polygon H</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polygon I</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Do you notice a pattern? If so, explain what pattern you observe involving the numbers \( b \) & \( i \).
6. Using your observations, create a generalization for finding the area of a lattice polygon in terms of the number of boundary \( b \) and interior points \( i \).

You have just discovered Pick’s Theorem!

**Extension**

7. Calculate \( b, i \), and the area for the following figure.

8. Why does this not contradict Pick’s Theorem?

9. Can you develop an extension to Pick’s Theorem for a region that is inside one lattice polygon and outside a second lattice polygon. (Hint: label \( b_x, i_x \) the boundary and interior points of the exterior polygon and \( b_y, i_y \) the corresponding numbers of the interior polygon)
Journal Activity
Pick’s Theorem

1. List all definitions and properties that you have learned in this activity.
2. Can you think of any application of this theorem?
3. Can you relate this topic/concepts with other(s) previously study?
   Explain your answer.