MATH ACTIVITY 9.3

Sorting by Rules

Purpose: Identify input and output sets and create sorting rules that are functions.

Materials: Attribute Pieces in the Manipulative Kit or Virtual Manipulatives.

1. Six attribute pieces have been sorted as shown in the diagram here.

   a. Sort the remainder of the attribute pieces into two groups in a way that you think the pieces in groups A and B suggest and record the sorting rule you used.

   b. A function is two sets, an input set and an output set, and a rule that assigns to each input exactly one output. Is your sorting rule for groups A and B a function? If not, re-sort so it is. Sketch and mark the input and output sets in an arrow diagram like the one at the left to describe your rule. For this function the inputs are the attribute pieces, and the outputs are the sets A and B.

   c. Sketch two or more circles and sort six to eight attribute pieces into the circles based on a function rule that you create. Challenge a partner to guess your rule and finish the sort.

   d. If a piece can go into more than one circle, your rule is not a function. Sketch two more circles and devise a sorting rule that is not a function.

   e. If more than one piece can go into a circle, your rule may still be a function. Explain why this is the case.

2. Functions have often been described in terms of a “function machine.” This function machine shows the outputs for four integer inputs. What is the rule for this function machine?

   a. Complete this input-output table by using this function machine rule to fill in the output row.

<table>
<thead>
<tr>
<th>Input</th>
<th>-7</th>
<th>-1</th>
<th>6</th>
<th>102</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   b. Using the input set of whole numbers, create a function rule using basic operations and write two input-output pairs in an input-output table. Ask a partner to guess your rule. Keep adding input-output pairs until they can. Then have your partner devise a function rule that you try to guess.

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1. "The Functionator 3000: Transforming Numbers and Children," Teaching Children Mathematics, NCTM