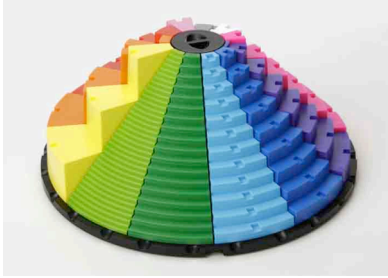


Activity B.10: Pattern Recognition with Repetitive Addition and Subtraction		
<p>Special Note: This lesson is similar to the previous one but the focus is on the distributive property of addition and pattern recognition.</p>		
<p>Learning Objectives:</p> <ol style="list-style-type: none"> 1) Work flexibly with numbers to develop mental math skills. 2) Practice repetitive addition. 3) Develop pattern recognition skills. 4) Develop fluency with numbers. <p>Examples of Skills Accomplished:</p> <ol style="list-style-type: none"> 1) To add 8, you can add 10 and then subtract 2. 2) On $3x$, the tokens will always be a multiple of 3 if you start with a multiple of 3. 	<p>Setup:</p> <ol style="list-style-type: none"> 1) Staircases can be setup in any order. 2) Using one foam card, randomly select twelve tokens whose value is < 20 and place them number side up on the first step of each staircase in use. 3) To recreate the example below (see chart) place the following tokens on the first step of each staircase, $1x \rightarrow 12x$: 11, 12, 7, 6, 9, 2, 1, 4, 3, 8, 5 4) Give each student a foam card. 	<p>Maximum Number of Players for Small Group Activities: 4</p> <p>Players Positions: Seated</p> 
<p>Activities:</p> <ol style="list-style-type: none"> 1) Assign each student a staircase. 2) Explain that when you placed the tokens on the staircase, you choose the numbers randomly. 3) Now instruct your students to use repetitive addition skills to climb to the top. Each student should calculate the height of the next step, by adding the variable represented by his/her staircase to the number on the token on the step below. 4) When students have calculated the value of all the steps on their staircase, check their work and ask them to correct any errors. 	<p>Hint:</p> <p>Each time you put different starting numbers, the calculated values will vary and some of the patterns will. See the chart below for an example of what Zillio would look like for one possible random starting position.</p>	

Observe and Assess:

- 1) Students' repetitive addition skills.
- 2) Ability to recognize and articulate patterns.

Group Discussion & Review of Findings:

- 1) Each time you put different starting numbers the patterns will change. Although the specific numbers will vary, these are the types of following patterns that should be observable:
 - a. On $2x$ → Only odd numbers if you start with an odd, ones digit repeats every 5th steps.
 - b. On $3x$ → Multiples of 3, if you start with a multiple of three.
 - c. On $4x$ → Only odd numbers if you start with odd, ones digit repeats every 10th steps.
 - d. On $5x$ → Ones digit alternates between two numbers (repeats every two steps).
 - e. On $6x$ → Add 10 subtract 4, to calculate the next step (using fact families).
 - f. On $7x$ → Add 10 subtract 3, to calculate the next step (using fact families).
 - g. On $8x$ → Add 10 subtract 2, to calculate the next step (using fact families).
 - h. On $9x$ → Add 10 subtract 1, to calculate the next step (using fact families).
 - i. On $10x$ → Last digit is always the same.
 - j. On $11x$ → Ones and tens digits increase by 1 each step.
 - k. On $12x$ → Pattern in the ones place would repeat every 5 steps.

Transition to Paper:

- 1) Give students a blank 2D worksheet and give them starting positions to write in the first step. Have them complete the chart and write patterns for each staircase.

