**DAY 4: Cups & Stacks**

**Materials**

*Copies:* 4.1 Silent Board Game master for Elmo

4.2 Cups & Stacks

 Ticket Out the Door Day 4

*Supplies:* Styrofoam Cups (3 per group)

Rulers (1 per student)

**Objective**

Students will use stacks of cups to generate a linear equation and understand the concept of slope and *y*-intercept.

**Student Talk Strategy**

Think-Write-Pair-Share 4.2

Inside-Outside Line 4.2

**Academic Language Use**

Origin- The center of the coordinate plane, represented by the point (0,0). This will be understood by the students as the “starting point” before graphing a point.

Coordinate Plane- The *xy*-coordinate plane has two coordinate axes, the *x*- and *y*-axis. They are perpendicular to each other. A point in the *xy*-plane is represented by two numbers, (*x, y*), where *x* and *y* are the coordinates of the *x*- and y-axes.

*x*-axis- The horizontal axis in the coordinate plane.

*y*-axis- The vertical axis in the coordinate plane.

*y-*intercept- The coordinate point where the graph of the line passes through the *y*-axis. In the context of patterns, the *y*-intercept is the “starting point” or “step zero” meaning the value of *y*, when *x* = 0.

**5 minutes: Silent Board Game**

Put up activity sheet 3.1. When a student thinks he/she knows the pattern, he/she will come up and silently write the answer in a missing box. If it is correct, reward them with a gotcha ticket & they return to their seat. If it is incorrect, erase it and allow the student to try again later. \*Note: Save the variable until the end. Remind the students that this is a silent game. If no one can solve after 2 minutes, fill in an additional answer. Once all the boxes, except the variable are complete, ask students for the “rule”. Record it in words, then as an expression (i.e.- Multiply by 3 and subtract 1 or 3*n-1*).

Lip



 Height

 (*cm*)

**45 min: Cups & Stacks**

Put students into groups of 4. Pass out activity sheet 4.2, 3 cups & a ruler to each of the groups. Model explicitly how to measure the height of one cup and clarify the portion of the cup that is called the “lip”. See picture above. Be sure to keep the ruler at a right angle to the desk when finding the height. Also be sure to orient students to centimeters on their rulers.

Instruct students to complete the table & graph on 4.2 by measuring 1 cup (in *cm*), then 2 cups stacked, then 3 cups stacked. Remind students of what they learned in Nuts & Bolts, Toothpicks, and Pattern Relay to generate an expression for *c* (i.e.- finding differences, going backwards to the 0 step etc). \*Note: Some students may start filling in the measure of one cup in the first row that has a zero. Be sure they start in the right spot. Set the timer for 10 minutes for students to complete part A on 4.2.

After ten minutes, number the class off by 2’s. Assign all the number 1’s to think about question #1 on 4.2. Assign all the number 2’s to think about question #2 on 4.2. Using Think-Write-Pair-Share, give students 1-2 minutes to silently think through their answer and write it down. Then allow 3 minutes for the 1’s at the table to discuss and the 2’s at the table to discuss their answer with one another.

Now instruct all the 1’s to get into a line. Then all the 2’s will get into a line facing the 1’s so that each #1 is lined up and facing a #2. Give the #1’s one minute to explain their answer, then announce it’s time to switch and have the #2’s share their answer. **One** line will then rotate by everyone moving to their left or right. Repeat the process now that everyone is speaking to someone new. Repeat up to 2 more times so everyone has talked to 3 other people.

Instruct students to go back to their desks to complete the remaining 3 questions in part B of 4.2 using think-write-pair-share. Give students 1-2 minutes to silently think through their answer and write it down. Then give students 1 minute to share with a partner followed by random selection to share out.

**10 minutes: Ticket out the Door**

Pass out the Ticket out the Door and have the students raise their hands when finished (so that you can check it and then dismiss them).