### SOL 4.15 Numerical Patterns

#### Number Lines
- Use an unlabeled number line drawn on the board or a piece of adding machine tape that has been laminated. Line can be labeled using any increments (1, 2, 3, 4, 5, 10, etc.) with some numbers missing. Students identify the pattern and fill in the missing numbers. The same number line can be erased and used for many different patterns. This is an easy warm up activity.
- Form a human number line. A group of 8 – 10 students are given cards with numbers in increments of 1, 2, 5, or 10. (Example 58, 68, 78, 88, 98, 108, 118, 128) Students must line up in order to form a number line. (Alternate version: students can pin their numbers to a clothes line, making adjustments as each new number is placed. This is especially interesting when students cannot see each others' numbers and approach the line one at a time in random order. Numbers must be placed at equal intervals.) Have students identify the pattern.
- Use calculators to generate patterns. (Key in + 5 =, =, =,...) Students write the numbers down on a number line they've drawn on adding machine tape omitting some of the numbers in their pattern and skipping the appropriate marks on the number line. Students can exchange number lines and fill in the missing number using a different color. (Students do not always need to start at 0 when generating patterns on a calculator.)
- Students can work with a partner, independently, or with teacher in small group solving these Number Line Patterns.
- Have students complete the Number Line Patterns activity as formative assessment.

#### Number Patterns
- Have students practice growing number patterns with the Growing Number Pattern worksheet.
- Have students create number patterns. They can switch with a partner and try to find the rule for their partner’s pattern.
- Number Pattern activity can be used for formative assessment.
- Have students practice Fraction Number Patterns.
- It would benefit students to have experience seeing fractions using input/output tables.
- Use the Super Sequencer to explore number patterns. The teacher can input a start number and an increment to have students try to determine the rule (function).

#### Function Machines
- Read Two of Everything (Hong, 1993). Relate the story to function machines.
- Play What's My Rule as a partner game to practice input/output
- Provide practice in recording input/output numbers in a table. Function Machine Practice can be used for practice or formative assessment.
- It would benefit students to have experience seeing fractions using input/output tables.
- Practice with function machines using various websites found below.
- Practice patterns on a number line with It’s a Bit Nutty interactive.
- Use an interactive function machine to find a rule.

**Geometric and Other Patterns**
- Have students identify and describe patterns in their environments.
- Have students create a pattern with objects or pictures then pass to another to extend the pattern.
- Build, extend, and describe patterns that grow with this model lesson.
- Show the first two frames of a pattern involving shapes or pictures that are transforming in some way. Allow students to guess the pattern. Gradually reveal more of the pattern until students figure it out.
- Students can work in groups with patterns from the CCPS Pattern Collection. These problems are designed to be challenging and should be used as a basis for discussions about patterns.
- Have students practice finding the nth piece in a pattern. The Top of the Morning activity is a performance task that could be used as formative assessment.
- Use this interactive lesson to explore growing patterns.
- Use these practical pattern problems to help your students think about identifying and applying patterns that use addition and subtraction of fractions.
- Practice more Practical Problems to help develop applying patterns that involve fractions.
- VDOE Released Practice Items

**Websites for Practice:**
- Function Machines - A game that allows you to choose a one or two step function and have students guess the function. Can also be set to allow random functions to be generated.
- Number Crunchers - A game for students that allows them to enter an input number and the program generates the output number and creates a table with the results. Students must determine the rule or function.