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| **Lesson Name:** | **Sequences** |
| **Grade Level(s):** | 9th Grade Math |
| **Goal/Objective(s):** | The goal of this lesson is for students to see sequences as a process of repeating a task over and over, whether it be in a real world situation or in mathematics. |
| **Standard(s):** | **Math Standards:**  **M.1HS.14** Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. Draw examples from linear and exponential functions. Draw connection to M.1HS.21, which requires students to write arithmetic and geometric sequences. Emphasize arithmetic and geometric sequences as examples of linear and exponential functions.  **M.1HS.21** Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.  **M.A1HS.20** Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. Draw connection to **M.A1HS.27**, which requires students to write arithmetic and geometric sequences. Emphasize arithmetic and geometric sequences as examples of linear and exponential functions.  **M.A1HS.27** Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.  **School Counseling – Student Success Standards:**  **ALP.SS.1.2.3** apply knowledge of skills, interests, aptitudes and the workplace to guide decision-making in relation to postsecondary choices.  **ALP.SS.1.2.5** use personal data to refine academic plan and career/life goals.  **ALP.SS.2.1.2** evaluate roles, responsibilities and requirements for progression of career levels from entry to advanced positions. |
| **Instructions:** | Recursive functions each have an initialization and a repeated process.  For example, reading a book: INITALIZATION: Open book to page 1. REPETETION: Turn the page, one by one, until you reach the end.  Model this process for the students.  Divide students into small groups and randomly assign them a repetitive task from the list provided. Have each group roleplay the task out to the class, showing the beginning and how each step is repeated. Have students discuss whether they would have done each roleplay in a different way than how it was presented.  Have students login to CFWV and take the Career Clusters Survey. When they receive their results, have them click on View Careers in this Cluster. They should pick three careers that sound interesting to them. Have them read the description of each career.  Next, students should think of a task performed by each career that they chose that could be modelled using the recursion roleplay model and write out the recursive steps. Have a few students act out the recursive steps of their career(s) to the class.  Next, show or have students watch the follow two videos on Khan Academy:  <https://www.khanacademy.org/math/algebra-home/algebra/sequences/introduction-to-sequences/v/explicit-and-recursive-definitions-of-sequences>  <https://www.khanacademy.org/math/algebra-home/algebra/sequences/introduction-to-sequences/v/recursive-formulas-for-sequences>  Then, have students practice on the this Khan Academy workpage:  <https://www.khanacademy.org/math/algebra-home/algebra/sequences/introduction-to-sequences/e/evaluating-sequences-in-recursive-form> |
| **Materials:** | 1 Computer per Student  CFWV.com  Khanacademy.com |
| **CFWV Tools Used:** | Career Clusters Survey |
| **Assessment** | This problem from Illustrative Math can be used as a lesson assessment.  Snake on a Plane: <https://www.illustrativemathematics.org/content-standards/tasks/1695>  You may wish to print the student section, as the website contains an answer key. |