

# Vectors (Continued)

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## AP Environmental Studies Lesson Summary

**Nicholas Trunfio**

**NSF GK-12 Vibes and Waves in Action**

**AP Environmental Science**

**Summary of lesson:**

This lesson is intended to provide the students with a review of the concepts relating to vectors that were covered last week. Additionally, the computers file management systems is introduced to give a greater understanding of the concepts variables and values. The scalar is shown to be a vector of length one in this context.

# AP Environmental Science Lesson Plan

**Objectives:** Solidify the concepts of using vectors in R.

**Frameworks:** Math: N-Q, A-all, A-SSE, A-APR, A-CED, A-REI, F-IF, F-LE. Inquiry: SIS1, SIS2, SIS3, SIS4

## L-Side Activities: Teacher

*At the bell:* Define the relationship between a variable and a value. Use words and R-Syntax as needed. Additionally, define a vector in the same way you defined a variable.

*Agenda:*

1. Review
  - o Vectors: The combine command, c()
  - o Special functions
  - o Subscripting
2. File Management System (FMS)
  - o Cabinet
  - o Folders
  - o Papers
3. FMS In Class Activity
4. Finish Assignment from Last Week

## R-Side Notes: Students

*Outline:*

1. Review
  - a. Vectors, the c() command
    - Vectors from values
    - Vectors from variables
    - Vectors from vectors
  - b. Special Functions
    - The repeat function
    - The sequence function
  - c. Subscripting
2. File Management System
  - a. Cabinet
    - The metaphor for the hard drive
    - Structural support
    - Contains everything else
  - b. Folder
    - Metaphor for the variable names
    - Provide a way to quickly skim the contents of the hard drive to find the folder (var) that we're interested in
    - Folders inside of folders
  - c. Papers
    - Metaphor for the variable values
    - Papers can be put inside of folders
    - Papers can be removed from folders, xeroxed and placed back in its original folder plus a new one

# File Management System (In Class Activity)

## Summary:

The computer's processor carries out the instructions of a computer program. The program is simply a list of instructions that are followed in order. The processor follows these instructions by saving variables to the hard drive, loading variables from the hard drive and performing basic math and logic operations. The memory functions as a storage place for information. The information could be anything, such as: numbers, letters, words, pictures, etc. In this exercise we will be working with numbers only. **STRESS THAT STUDENTS SHOULD TRY AND THINK THIS WAY WHILE THEY WRITE CODE** (use of workspace for quality assurance).

## Group Roles:

- Processor - 1 person
- Hard Drive - 3 people

## Group Responsibilities:

- Processor:
  - Instruct the hard drive to create a variable
    - And to give a value to that variable
  - Ask the hard drive what value is stored in a variable
  - Do Math
- Hard Drive
  - Let the processor assign a value to it
  - Tell the processor what value is currently stored

## Activity:

Do as a class with the instructor as the processor and student volunteers as the hard drive.

- Assign variable 1 (volunteer student name) to take on the value of 12
- Assign variable 2 (another volunteer student name) to take on the value of 12
- Assign variable 3 (another volunteer student name) to take on the value of variable 1 multiplied by variable 2
  - Ask student 1 and 2 what values that have taken on
  - Multiply them together
  - Assign the value to student 3
- Assign variable 4 (another volunteer student name) to take on the value of 2 plus 12
- Assign variable 2 (same student as before) to take on the value of variable two time variable 3
  - Ask student 2 and 3 what values they have taken on
  - Multiply them together

- Assign the value to student 2
- Assign variable 5 to take on the value of  $e^{\text{variable 2}}$ 
  - Ask student 2 what value s/he has taken on
  - Evaluate the mathematical expression
  - Assign the value to student 5