AP Computer Science Principles
Introduction to Python
Lesson Plan: Week 3 Day 1

Week 3 Day 1

IOSWBAT: Create lists in Python and access individual elements of lists.

Standards:
- 9-12.CT.7 Design or remix a program that utilizes a data structure to maintain changes to related pieces of data.
- 9-12.DL.2 Communicate and work collaboratively with others using digital tools to support individual learning and contribute to the learning of others.

Aim: How do we create and use lists in Python?

Do Now: Turn and Talk: What do you think the following program will output?

```
1  presidents = ["George Washington", "John Adams", "Thomas Jefferson", "James Madison"]
2  print( presidents[2] )
```

<answer = Thomas Jefferson>

Vocabulary:

- **List:** A list is a data structure that stores a collection of values. *Syntax*: The elements of a list are enclosed in square brackets and separated by commas.
- **Element:** A value that is stored in a list.
- **Index:** The location ("address") of an element in a list. ***In Python, the index of the first item of a list is 0 (NOT 1).

Example: numbers = [5, 3, 12, 4, 9, 12]

numbers[0] = 5
numbers[1] = 3
numbers[2] = 12
numbers[3] = 4
numbers[4] = 9
numbers[5] = 12

The list numbers[] contains 6 elements. Notice that the highest index is 5 (NOT 6).

Example: numbers = [5, 3, 12, 4, 9, 12]

Evaluate the following. Work with your partner and be prepared to share your responses:

1. numbers[2] – 1 <answer = 11>
2. numbers[2 – 1] <answer = 3>
3. numbers[2] - numbers[1] <answer = 9>
4. numbers[1] == 5 <answer = True>
5. numbers[1] == numbers[5] <answer = False>
6. numbers[3] == 5 <answer = False>
7. numbers[3] == numbers[5] <answer = True>

Live Coding: Let's write a program that creates a list and accesses individual elements of the list.

Example: Make a list of the classes you have today (in order, 1st period through 8th period) and print out which class you have each period.

Answer/sample solution

```
1   #live coding session sample solution
2   #declare and initialize list
3   classes = ["ELA", "Gym", "AP CSP", "Lunch", "Advisory", "Physics", "Pre Calc", "Government"]
4   #output individual classes by period
5   print("Period 1: ", classes[0])
6   print("Period 2: ", classes[1])
7   print("Period 3: ", classes[2])
8   print("Period 4: ", classes[3])
9   print("Period 5: ", classes[4])
10  print("Period 6: ", classes[5])
11  print("Period 7: ", classes[6])
12  print("Period 8: ", classes[7])
```

Demonstrate some features of lists before ending the Live Coding session:

- Lists are *mutable* in Python (i.e. they can be changed).

- We can use the assignment operator (=) to change individual elements in the list.
    - For example, suppose your schedule got changed and your Gym class and your Pre Calc classes got switched. How would you change this program?

<answer>

- You could "hard code" the change in the assignment statement for the list
- You could update the list with two new assignment statements
    - classes[1] = "Pre Calc"
    - classes[6] = "Gym"
- Even better:
    - classes[1] = classes[6]
    - classes[6]= "Gym"
- Best:
    - temp = classes[1]
    - classes[1] = classes[6]
    - classes[6] = temp

Practice: Write a program that uses a list to print out the titles of your Top 5 favorite songs in order.

Summary/Wrap-up:

1. What is a list in Python?
2. How do we enter a list in Python (i.e. syntax)?
3. What is an element?
4. What is an index?
5. What is the index of the first element of a list in Python?