**Name:**_____     **Partners:**   _____
## Python Activity 10: Strings
*Strings are a sequence of characters, and there's some handy tools for working with these sequences!*

**Learning Objectives**
Students will be able to:
*Content:*
- Demonstrate the use of **index** and **slicing** with strings.
- Identify the purpose of the **in** operator
*Process:*
- Write code that uses **indices** and **slicing** to access elements of a string
- Write code that efficiently finds the **len**gth of a sequence
- Write code that uses the **in** operator to find items in a sequence

**Prior Knowledge**
- String literals, expressions, types

**Critical Thinking Questions:**

1. Observe the following interaction with interactive python:

```
>>> word = "Pixel"
>>> word[0]
'P'
>>> word[2]
'x'
>>> word[4]
```


Pixel

a. What might the last line of code return? _____

b. What does the `[]` do? _____

c. Write a line of code using the `[]` to have python display the 4th letter of `word`.
   _____

d. What might happen if we enter the following: `word[5]`?
   _____
   _____

> **FYI:** We can access elements of a sequence (such as a string) using its **index**.

e. What is the last **index** in `"Pixel"`?_____
f. How many indices does the string `"Pixel"` have?  _____

2. Observe the following interaction with interactive python:
```
>>> len("Pixel")
5
>>> len("pneumonoultramicroscopicsilicovolcanoconiosis")
45
>>> len("Williams")
```

a. What might the last line of code return? _____

b. What does the `len()` function do? _____

c. Write a line of code using `len()` to find how many characters are in a string, `word`.

_____

d. Write a line of code to calculate the number of indices the string `"Pixel"` has:

_____

e. How might we do the same for any given string, `word`?

_____

3. Observe the following interaction with interactive python:

```
>>> word = "Pixel"
>>> word[-1]
'l'
>>> word[-5]
'P'
>>> word[-4]
```

a. What might the last line of code return? _____

b. What does a negative index do? _____

c. Write a line of code using a negative index to have python display the 4th letter of `word`.

_____

4. Observe the following interaction with interactive python:

```
>>> place = "Williamstown"
>>> place[0:8]
'Williams'
>>> place[8:12]
'town'
>>> place[4:7]
```

a. What might the last line of code return? _____

b. What does the first number in a `[:]` operator do?

_____

c. What does the second number in a `[:]` operator do?

_____

d. Write a line of code using this new **slicing** operator to display `"ill"`.

_____

e. `place[:8]` returns the same string as `place[0:8]`. What might `[:4]` return?

_____

f. Do we always need a first number before the colon? Under what conditions might this be necessary?

_____

5.     Observe the following interaction with interactive python:

```
0| >>> place = "Williamstown"
1| >>> place[::1]
2| 'Williamstown'
3| >>> place[::2]
4| 'Wlimtw'
5| >>> place[::3]
6| 'Wlmo'
7| >>> place[0:8:1]
8| 'Williams'
9| >>> place[0:8:2]
```

a.  Given lines 0-6, what might `place[::4]` return? _____

b.  What does the final number in a slicing operator do?

_____

c.  What might the last line of code return? _____

d.  Write a line of code using all three parameters of the `[]` operator. What will your code output?

_____

_____

> **FYI:** The **Slicing Operator** allows you to access parts of sequences such as strings. You can select
> multiple elements of a sequence.
> **Syntax:** <sequence_name>[start_inclusive : end_exclusive : step_increment].

6. Observe the following interaction with interactive python:

```
>>> place = "Williamstown"
>>> place[0::-1]
'nwotsmailliW'
>>> place[::-2]
'nosali'
>>> place[8:0:-1]
'tsmailli'
```

a.  Why might `place[8:0:-1]`   return the string that it does?

_____

b.  What does a negative step increment do?

_____

7.     Observe the following interaction with interactive python:

```
>>> "nut" in "Peanut Butter"
True
>>> 'B' in "Peanut Butter"
True
>>> 'p' in "Peanut Butter"
False
>>> "nut" in "PeaNUt Butter"
```

a. Circle the new keyword.  What are the types of variables that appear after it? _____ Before it? _____

b. What might that new keyword do?

_____

c. What might the last line of code return? _____

d. Why will it return that?

_____

_____

> **FYI:** The **in** operator is used to test if a given sequence is a subsequence of another sequence. It returns True or False.

## Application Questions: Use the Python Interpreter to check your work

1. Enter and execute the following code. Examine the syntax of the code. It uses slicing to access parts of a string.

```python
course_name = "Introduction to Computer Science"
print(course_name)
print(course_name[0])
print(course_name[-2])
print(course_name[0:13])
print(course_name[16:24])
print(course_name[25:])
```

a. What is the output for each print statement in the program?

_____

_____

_____

_____

_____

_____

b. What does the fourth print statement do? Explain the meaning of **[0:13]**:
```python
print(course_name[0:13])
```

_____

_____

_____

c. What does the following print statement do? Explain the meaning of **[16:27]**.
```python
print(course_name[16:27])
```

_____

_____

_____

d. What does the following print statement do? Explain the meaning of **[28:]**.

```
print(course_name[28:0])
```

_____

_____

_____

2.     We are going to be writing some code to identify if a user has submitted a proper string. This can be added to later on in the course to see if the user has entered a properly formatted password.

a. Write a function, `is_vowel`, that takes in a single character `string`, and returns `True` if that character is a vowel, `False` otherwise.

_____

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b. Write a function, `has_capital`, that returns True if a given string has at least one capital letter in it, False otherwise.

_____

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d. In a `main():` function, write code that asks the user to enter a word that is 9 characters long. If they enter a word that is not 9 characters long, print an error message about the word's length. If the word is the proper length, check that the word has at least one vowel in it. Use the functions you wrote previously.

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