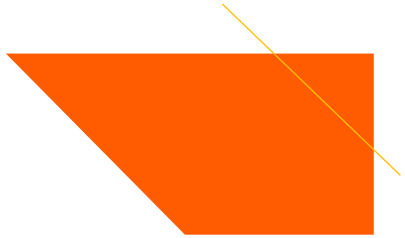
Introduction to Problem Solving in Python

COSI 10A

Class objectives

- For Loops
- Practice on For Loops



Definite Loops - for loops

Review: `for` loop syntax

Syntax:

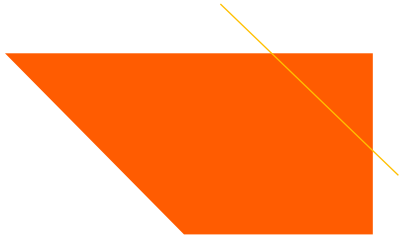
```
for variable in range (start, stop):
      statement
      statement
      ...
      statement
```

header

body

- Set the **loop variable** equal to the **start** value
- Repeat the following:
  - Check if the **variable** is **less than** the **stop**. If not, stop
  - Execute the **statement**s
  - Increase the variable's value by 1

```
for i in range(1, 6):     # repeat 5 times
      bake_cookies()
```



Review: Ways to create ranges

Range From	Description	Example	Numbers in Range
`range(max)`	Range from 0 (inclusive) to max (exclusive)	`range(5)`	0, 1, 2, 3, 4
`range(min, max)`	Range from min (inclusive) to max (exclusive)	`range(3, 7)`	3, 4, 5, 6

Repetition over a range

```
print("1 squared = ", 1*1)
print("2 squared = ", 2*2)
print("3 squared = ", 3*3)
print("4 squared = ", 4*4)
print("5 squared = ", 5*5)
print("6 squared = ", 6*6)
```

- Let's use a `for` loop …

```
for i in range(1, 7):
    print(i, "squared = ", i*i)
```

Exercise 1

```
for i in range(1, 5):
    print(i, " squared = " , i*i)

print("Whoo!")
```

- What is the output?

Exercise 1

```
for i in range(1, 5):
    print(i, " squared = " , i*i)

print("Whoo!")
```

- What is the output?

```
1   squared =  1
2   squared =  4
3   squared =  9
4   squared =  16
Whoo!
```

Exercise 2

```
print("+----+")
for i in range(1, 4):
      print("\\    /")
      print("/    \\")
print("+----+")
```

- What is the output?

Exercise 2

```
print("+----+")
for i in range(1, 4):
      print("\\    /")
      print("/    \\")
print("+----+")
```

- What is the output?

```
+----+
\  /
/  \
\  /
/  \
\  /
/  \
+----+
```

Expression for counter

```
high_temp = 5
for i in range(-3, high_temp // 2 + 1):
    print(i * 1.8 + 32)
```

Output:

```
26.6
28.4
30.2
32.0
33.8
35.6
```

Exercise 3

- Complete the following code, to produce the following output

```
def main():
      for i in range(FINISH ME)
            print (FINISH ME)

main()
```

```
2 times 1 = 2
2 times 2 = 4
2 times 3 = 6
2 times 4 = 8
```

Exercise 3

- **Complete the following code, to produce the following output**

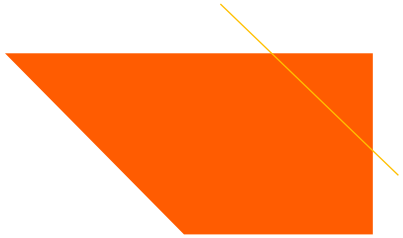
```
2 times 1 = 2
2 times 2 = 4
2 times 3 = 6
2 times 4 = 8
```

```
def main():
      for i in range(FINISH ME)
            print (FINISH ME)

main()
```

```
def main():
    for i in range(1, 5):
        print("2 times", i, "=", (2 * i))

main()
```



Ways to create ranges

Range From	Description	Example	Numbers in Range
`range(max)`	Range from 0 (inclusive) to max (exclusive)	`range(5)`	0, 1, 2, 3, 4
`range(min, max)`	Range from min (inclusive) to max (exclusive)	`range(3, 7)`	3, 4, 5, 6
`range(min, max, step)`	Range from min (inclusive) to max (exclusive), increasing by step each time	`range(4, 22, 3)`	4, 7, 10, 13, 16, 19

Exercise 4

```
for i in range(2, 9, 2):
    print(i)
```

Output:

Exercise 4

```
for i in range(2, 9, 2):
    print(i)
```

Output:

```
2
4
6
8
```

Decrementing loop

- Sometimes we want to process a range of numbers in reverse order, counting down rather than up

```
for i in range(5, 0, -1):
    print(i)
print ("Happy New Year!")
```

Output:

```
5
4
3
2
1
Happy New Year!
```

print('', end='')

```
high_temp = 5
for i in range(-3, high_temp // 2 + 1):
    print(i * 1.8 + 32)
```

Output:

```
26.6
28.4
30.2
32.0
33.8
35.6
```

print('', end='')

- Adding `end=''` allows you to print without moving to the next line

```
high_temp = 5
for i in range(-3, high_temp // 2 + 1):
    print(i * 1.8 + 32, end=' ')
```

Output:

```
26.6 28.4 30.2 32.0 33.8 35.6>>>
```

```
high_temp = 5
for i in range(-3, high_temp // 2 + 1):
    print(i * 1.8 + 32, end=' ')
print()
```

Exercise 5

- Write a for loop that produces the following output:

```
T-minus 10, 9, 8, 7, 6, 5, 4, 3, 2, 1, blastoff!
The end.
```