WELCOME TO

TECHNOVATION

Week 4 - October 23

MICHIGAN STATE UNIVERSITY

Agenda

- Icebreaker
- Review Week:
  - Variables
  - Input
- New Material:
  - Loops
- Coding challenges
- Attendance and Temperature Check

Ice Breaker!

Halloween Word Map:

https://www.menti.com/al8e88hzk877

Review: Variables

What's a variable?

A **variable** is like a "cubby" for a number or string of text!

...so what's the point?

Variables let us set a value *once*, then use that same value over and over!

Variables make it easier to modify code!

Example #1: Draw Increasing Circles with Variables

Draw a circle with the value of Radius. Then continue to increase the radius by 25 and draw another circle.

Review: User Input

Variables also let us save *user input*, so that we can change values on-the-fly while running our programs.

How does that work?

We use the `input("prompt")` function!

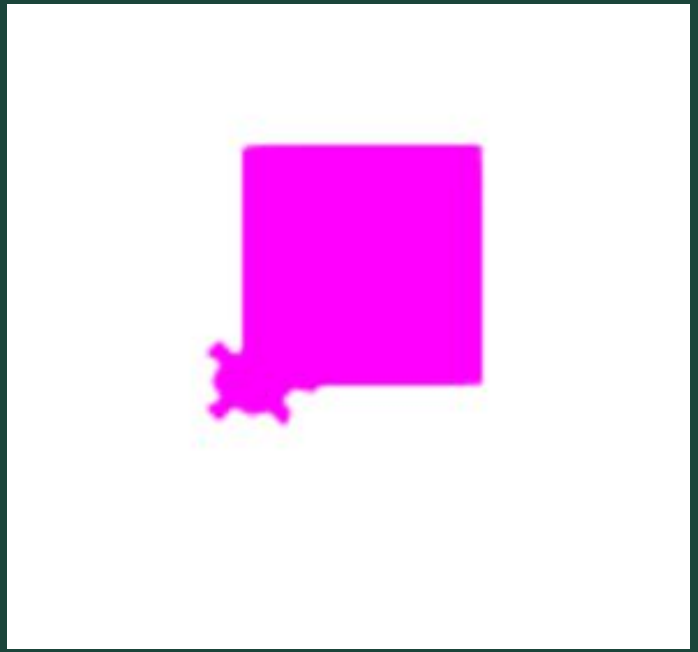

```
clr = input("What color should Tracy be?")

# user types in a color, e.g. "green", and hits enter

color(clr)
```

Example #2: Using User Input to Change a Square Colors

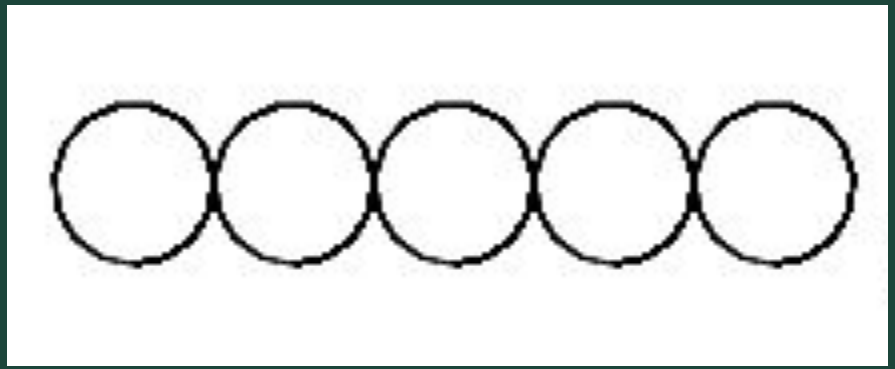
Draw a filled in square with side lengths of 100 that is filled with SquareColor. Once you have your square, modify SquareColor to ask the user for a color.



Introducing Loops!

```
1  circle(20)
2  penup()
3  forward(40)
4  pendown()
5  circle(20)
6  penup()
7  forward(40)
8  pendown()
9  circle(20)
10 penup()
11 forward(40)
12 pendown()
13 circle(20)
14 penup()
15 forward(40)
16 pendown()
17 circle(20)
18 penup()
19 forward(40)
```

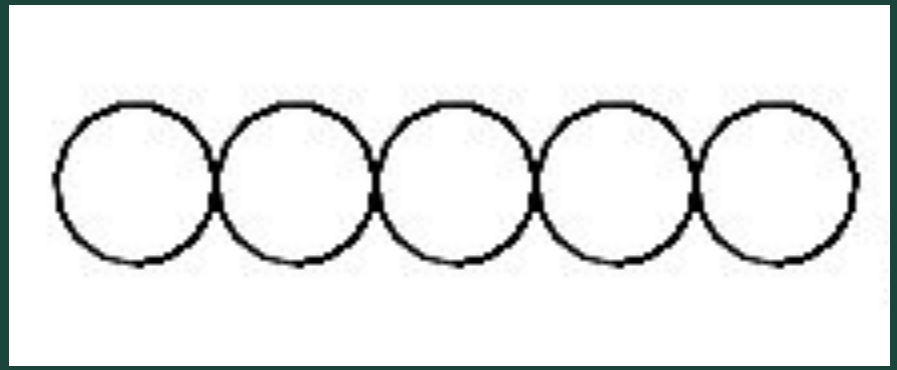
For loops are used to repeat code a fixed number of times.



Introducing Loops!

```
1  Tracy, repeat this code 5 times!
2      circle(20)
3      penup()
4      forward(40)
5      pendown()
```

For loops are used to repeat code a fixed number of times.



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13 circle(20)
14 penup()
15 forward(40)
16 pendown()
17 circle(20)
18 penup()
19 forward(40)
```

For loops help us by:

- shortening our code
- making it easy to alter our code

19 lines to 5 lines!

```
1  Tracy, repeat this code 5 times!
2      circle(20)
3      penup()
4      forward(40)
5      pendown()
```

Introducing Loops!

```
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19 forward(40)
```

For loops help us by:

- shortening our code
- making it easy to alter our code

Change radius to 50 pixels

```
1  Tracy, repeat this code 5 times!
2      circle(20)
3      penup()
4      forward(40)
5      pendown()
```

Writing For Loops

```
for i in range (amount of times to repeat):
    Commands to repeat go here (indented!)
```

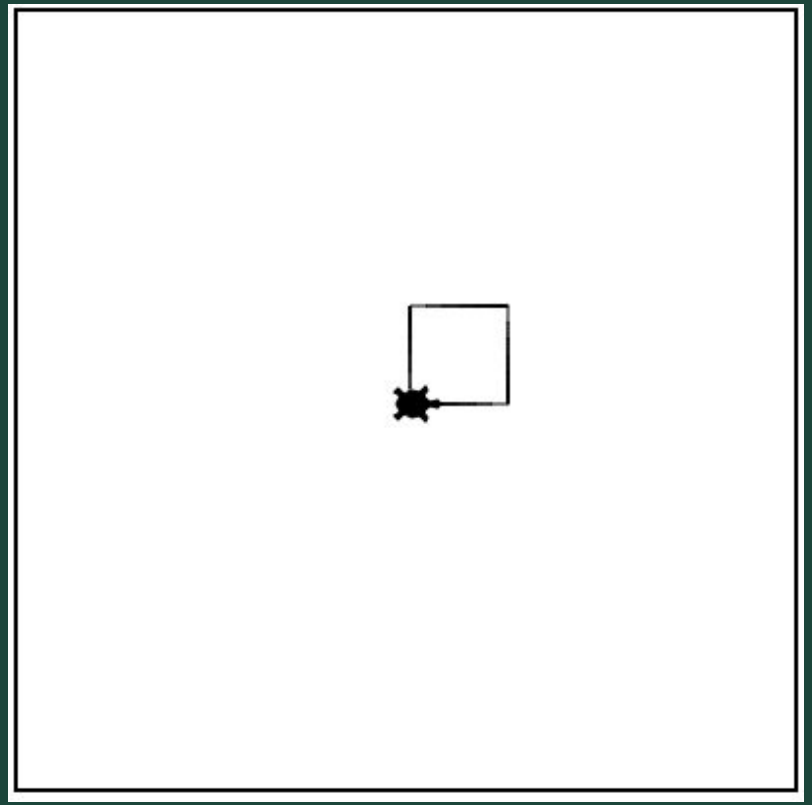
```
1  Tracy, repeat this code 5 times!
2      circle(20)
3      penup()
4      forward(40)
5      pendown()
```

Write loop

```
1  for i in range(5):
2      circle(20)
3      penup()
4      forward(40)
5      pendown()
```

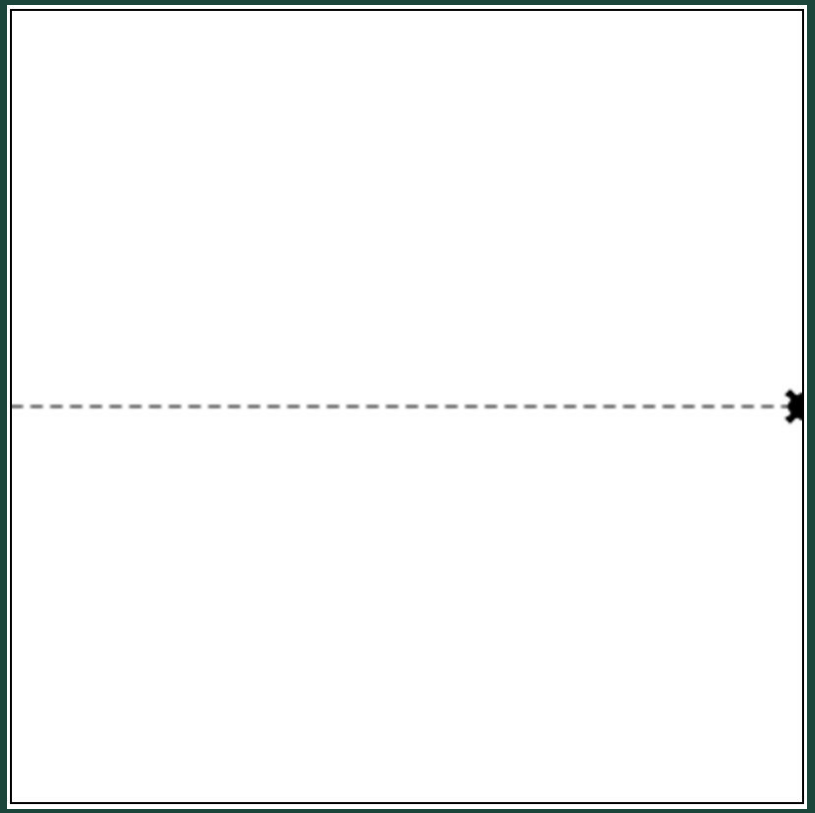
Example #3: Square using for loops

Write a program that has Tracy draw a square with sides of 50 pixels using a for loop.



Example #3: Create a Dashed Line Using a For Loop

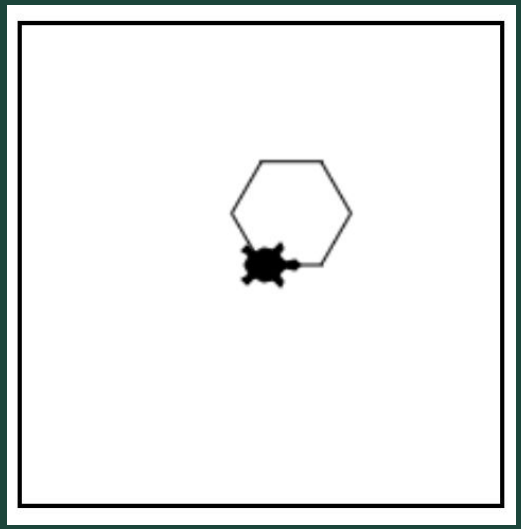
Knowing that tracy is working with a 400 x 400 canvas, create a dashed line along the x-axis. Each dash/black space should be 5 pixels long.



Review: Tracy's Movements

Command	What does it do?
`left(90)`	Turns Tracy 90 degrees to the left
`right(90)`	Turns Tracy 90 degrees to the right
`for i in range(number):`	Initialize a loop
`left(angle)`	Turns Tracy left at a specified angle
`right(angle)`	Turns Tracy right at a specified angle
`setposition(x, y)`	Moves Tracy to a specified coordinate
`speed(number 0-10)`	Determines how quickly Tracy will move through commands

Code Along: Hexagon



Write a program that will have Tracy draw a hexagon.

You should:

- Have hexagon sides that are 50 pixels long
- Use a for loop

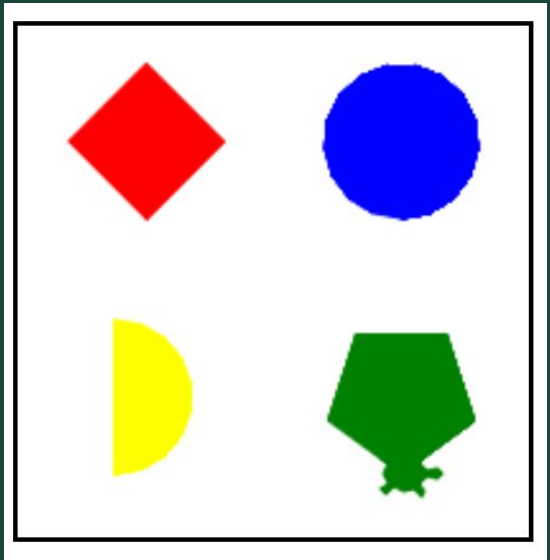
Hint: Figure out how much Tracy will need to turn after drawing each side of the shape to add up to the total 360 degrees.

Extra: How can we colour in the shape?

Review: Let's Get Creative

Command	What does it do?
`color("color_name")`	Changes Tracy's trail color
`pensize(90)`	Changes Tracy's trail thickness
`begin_fill()`	Starts filling in drawn shapes
`end_fill()`	Stops filling in drawn shapes
`circle(radius, extent,steps)`	Can control the radius, degree, and number of points of a circle
`def function_name():`	Declares a function
`function_name()`	Calls a function

Code Along: Kids Shapes Toys



Write a program that represents a popular kid's toy that teaches them about different shapes and colors.

Your toy should include:

- a red square
- a blue circle
- a yellow semicircle
- a green pentagon

These shapes should be centered in a square formation on the canvas and **should each have radii of 60 pixels**. You should use only the `circle()` command to create all shapes. (Remember the extended parameters we learned about!)

Extra: How can we divide our program into functions?

Coding Time

- Let’s use today to work on the exercises we haven’t been able to finish!
- Break into our smaller Coding Rooms
- Work at your own pace! Ask questions!
- If you are all caught up, explore the weekly challenges or the Sandbox in CodeHS

Standup

- What was an exercise you worked on today?
- What is something you were successful at?
- What was a challenge you had while coding?

Attendance and Temperature Check

Attendance

Temperature Check