**Outline**

t.b.d.

**Objectives**

* tbd

**Materials**

* tbd

**Level 0: Teacher Demo of Sample Programs**

1. Sample program #1 is an example of a "Syntax Error". Follow the teacher demo and explain the characteristics of a syntax error. Consider the following criteria:  
   1. Did the program have an error before starting to run?

Yes, it had an error before starting to run

* 1. Did the program encounter an error before it finished running?

No, it failed before even starting

* 1. Did the program do what it was supposed to do?

No, it failed before even starting

1. Sample program #2 is an example of a "Run-time Error". Follow the teacher demo and explain the characteristics of a run-time error. Consider the following criteria:  
   1. Did the program have an error before starting to run?

No, it ran for a short while

* 1. Did the program encounter an error before it finished running?

Yes, it didn’t finish

* 1. Did the program do what it was supposed to do?

No, it started but it didn’t finish

1. Sample program #3 is an example of a "Logic Error". Follow the teacher demo and explain the characteristics of a logic error. Consider the following criteria:  
   1. Did the program have an error before starting to run?

No, it ran for a short while

* 1. Did the program encounter an error before it finished running?
  2. No, there were no errors
  3. Did the program do what it was supposed to do?

No, it printed 2 circles (instead of 3) and they were all black (the wrong colour)

**Level 1: Syntax Errors**

1. Research the definition of the word "Syntax". Summarize its meaning below and how it relates to computer languages and programming.

Syntax refers to the spelling and grammar of a programming language. A syntax is

the arrangement of words and phrases to create well-formed sentences in a language.

1. Research the definition of a "Syntax Error" related to computer programming. Summarize this definition below.

A syntax error is an error in the source code of a program. Since computer programs must follow strict syntax to compile correctly, any parts of the code that do not conform to the syntax of the programming language will produce a syntax error. They’re small grammatical mistakes.

1. Explain why Sample Program #1 is an example of a "Syntax Error".

Sample Program #1 is an example of a Syntax Error because the “Colours” in “circleColours” was spelt incorrectly the second time it was mentioned (went from “Colors” to “Colours”). Additionally, “myPen.down ()” was missing its second bracket.

1. Find and correct the syntax errors in Sample Program #1. Provide a listing of your corrected program below.
   * Use a "#" at the beginning of each line containing an error   
     to "Comment Out" the bad code
   * List the corrected code line underneath the commented out error line

import turtle

myPen = turtle.Turtle()

circleColors = [(196,196,0),(196,0,196),(0,196,196)]

def drawCircle(rgb) :

*#myPen.down(*

**myPen.down()**

myPen.color(rgb)

myPen.begin\_fill()

myPen.circle(8)

myPen.end\_fill()

myPen.up()

myPen.forward(22)

circleNumber = 0

for circleIndex in range(3) :

*#drawCircle(circleColours[circleNumber])*

**drawCircle(circleColors[circleNumber])**

circleNumber = circleNumber + 1

**Level 2: Run-time Errors**

1. Research the definition of a "Run-time Error" related to computer programming. Summarize this definition below.

A runtime error is a programming error that occurs while the program is running.

1. Explain why Sample Program #2 is an example of a "Run-time Error".

Sample Program #2 is an example of a “Run-time Error” because the error occurred while the program was running. The error happened after the program drew the second circle, instead of finishing drawing all 3.

1. Find and correct the run-time errors in Sample Program #2. Provide a listing of your corrected program below.
   * Use a "#" at the beginning of each line containing an error   
     to "Comment Out" the bad code
   * List the corrected code line underneath the commented out error line

import turtle

myPen = turtle.Turtle()

circleColours = [(196,196,0),(196,0,196),(0,196,196)]

def drawCircle(rgb) :

myPen.down()

myPen.color(rgb)

myPen.begin\_fill()

myPen.circle(8)

myPen.end\_fill()

myPen.up()

myPen.forward(22)

*#circleNumber = 1*

**circleNumber = 0**

*#for circleIndex in range(4) :*

**for circleIndex in range(3):**

drawCircle(circleColours[circleNumber])

circleNumber = circleNumber + 1

1. Explain the difference between a "syntax error" and a "run-time error".

A syntax error causes the program to stop before it even starts. A runtime error lets the program run for a short while, but fails while it’s running.

**Level 3: Logic Errors**

1. Research the definition of a "Logic Error" related to computer programming. Summarize this definition below.

A logic error is a mistake in a program's source code that results in incorrect or unexpected behavior.

1. Explain why Sample Program #3 is an example of a "Logic Error".

Sample Program #3 is an example of a “Logic Error” because there was a false input on the programmer’s part; the program didn’t do what it was intended to do.

1. Find and correct the logic errors in Sample Program #3. Provide a listing of your corrected program below.
   * Use a "#" at the beginning of each line containing an error   
     to "Comment Out" the bad code
   * List the corrected code line underneath the commented out error line

import turtle

myPen = turtle.Turtle()

circleColours = [(196,196,0),(196,0,196),(0,196,196)]

def drawCircle(rgb) :

myPen.down()

**myPen.color(rgb)**

myPen.begin\_fill()

myPen.circle(8)

myPen.end\_fill()

myPen.up()

myPen.forward(22)

numOfCircles = 3

*#for circleIndex in range(2) :*

**for circleIndex in range (3) :**

circleNumber = numOfCircles - circleIndex - 1

drawCircle(circleColours[circleNumber])

1. Explain the difference between a "logic error" and a "syntax error".

Syntax errors are grammatical errors, like misspelled keywords. Logic errors are errors that prevent your program from doing what it’s supposed to do.

1. Explain the difference between a "logic error" and a "run-time error".

A logic error is where your program is perfectly fine from the programming language’s point of view, but simply fails to do what you intended for it to do. A runtime error occurs while the program is running; when something that wasn’t supposed to happen happens, and the program doesn’t know what to do.

**Level 4: Your Sample Program**

1. Create a sample program to show the different types of programming errors. Provide your program listing below.
   * Your program must be of your own design and must be different from the sample programs provided in this module.
   * Your program must contain at least one example of each of: a syntax error, a run-time error, and a logic error.
   * Provide the corrected code in a comment underneath the error code (using a "#" at the beginning of the comment line).

import turtle

#myPen = turtle.turtle()

myPen = turtle.Turtle()

# These variables track the position of the turtle pen

posX = 0

posY = 0

# These variables define the image information.

# Each pixel in the image has a (r,g,b) value

# The complete image is simply a list of pixels

pixelAddress = 0

pixelMemory = [

(255,105,180),(0,0,0),(255,105,180),(0,0,0),(255,105,180),(0,0,0),(255,105,180),(0,0,0),

(255,105,180),(0,0,0),(255,105,180),(255,105,180),(255,105,180),(0,0,0),(255,105,180),(255,105,180),

(233,233,233),(0,0,0),(255,105,180),(255,105,180),(255,105,180),(255,105,180),(0,0,0),(255,105,180),

(255,105,180),(255,105,180),(233,233,233),(231,84,128),(255,105,180),(255,105,180),(255,105,180),(255,105,180),

(255,105,180),(255,105,180),(255,105,180),(233,233,233),(231,84,128),(231,84,128),(255,105,180),#(255,105,aaa 180),

(255,105,180)

(255,105,180),(255,105,180),(255,105,180),(255,105,180),(233,233,233),(0,0,0),(231,84,128),(231,84,128),

(255,105,180),(255,105,180),(255,105,180),(255,105,180),(233,233,233),(0,0,0),(255,105,180),(0,0,0),

(231,84,128),(231,84,128),(255,105,180),(255,105,180),(255,105,180),(0,0,0),(255,105,180),(255,105,180),

(255,105,180),(0,0,0),(231,84,128),(255,105,180),(231,84,128),(0,0,0),(255,105,180),(255,105,180),

(255,105,180),(255,105,180),(255,105,180),(0,0,0),(231,84,128),(0,0,0),(255,105,180),(255,105,180),(255,105,180)

]

# This user defined function draws a single image pixel

def drawPixel(rgb) :

global posX

myPen.down()

#myPen.color(rgb)

myPen.begin\_fill()

myPen.circle(8)

myPen.end\_fill()

myPen.up()

myPen.forward(18)

posX = posX + 18

# This user defined function starts a new row of pixels

def newRow() :

global posX

global posY

myPen.up()

myPen.left(180)

myPen.forward(posX)

myPen.left(90)

myPen.forward(18)

myPen.left(90)

myPen.down()

posX = 0

posY = posY + 18

# THE MAIN PROGRAM CODE STARTS HERE

#

# Draw eight rows of the image.

# Each row contains eight pixels

for row in range (9) :

for column in range(9) :

drawPixel(pixelMemory[pixelAddress])

pixelAddress += 1

newRow()

The program can’t even run due to all of the errors. It doesn’t start (syntax error), and even if the program was wrong, there would be a logic error (the rgb was taken out, leaving everything to be painted black) and it would’ve stopped running halfway through due to “aaa” being placed in the middle of all of the code.

**SAMPLE PROGRAM #1 - Syntax Error**

import turtle

myPen = turtle.Turtle()

circleColors = [(196,196,0),(196,0,196),(0,196,196)]

def drawCircle(rgb) :

myPen.down(

myPen.color(rgb)

myPen.begin\_fill()

myPen.circle(8)

myPen.end\_fill()

myPen.up()

myPen.forward(22)

circleNumber = 0

for circleIndex in range(3) :

drawCircle(circleColours[circleNumber])

circleNumber = circleNumber + 1

**SAMPLE PROGRAM #2 - Run-time Error**

import turtle

myPen = turtle.Turtle()

circleColours = [(196,196,0),(196,0,196),(0,196,196)]

def drawCircle(rgb) :

myPen.down()

myPen.color(rgb)

myPen.begin\_fill()

myPen.circle(8)

myPen.end\_fill()

myPen.up()

myPen.forward(22)

circleNumber = 1

for circleIndex in range(4) :

drawCircle(circleColours[circleNumber])

circleNumber = circleNumber + 1

**SAMPLE PROGRAM #3 - Logic Error**

import turtle

myPen = turtle.Turtle()

circleColours = [(196,196,0),(196,0,196),(0,196,196)]

def drawCircle(rgb) :

myPen.down()

myPen.begin\_fill()

myPen.circle(8)

myPen.end\_fill()

myPen.up()

myPen.forward(22)

numOfCircles = 3

for circleIndex in range(2) :

circleNumber = numOfCircles - circleIndex - 1

drawCircle(circleColours[circleNumber])