Sonic Pi Generative Music Unit Plan
Lesson # 6 - Nested Conditional Statements

Lesson Objectives

Students will be able to use nested conditional statements with specified probability to determine which outcome will be chosen

Suggested Duration

1 period (45 minutes)

NYS Computer Science and Digital Fluency Learning Standards

7-8.CT.8 Develop or remix a program that effectively combines one or more control structures for creative expression or to solve a problem.

Vocabulary

Probability - The extent to which something is probable; the likelihood of something happening or being the case.

Assessments

- Assess ____. Check for the ability to:
  - Use function to affect probability of outcome for conditional statements
  - Create program which uses nested conditional statements

Do Now

Have students log into Peardeck: Lesson 6 - Nested Conditional Lesson Slides

Have students partner up to read their Choose Your Own Adventure stories which should have been completed as homework.

Have the writer of the story read line 1. When given the choice, the other students will flip a coin (Use https://www.random.org/coins/)
Heads - PIck the first choice (line 2)
Tails - Pick the second choice (line 5)

Writer reads the next line. When given the choice, the other student will flip a coin.

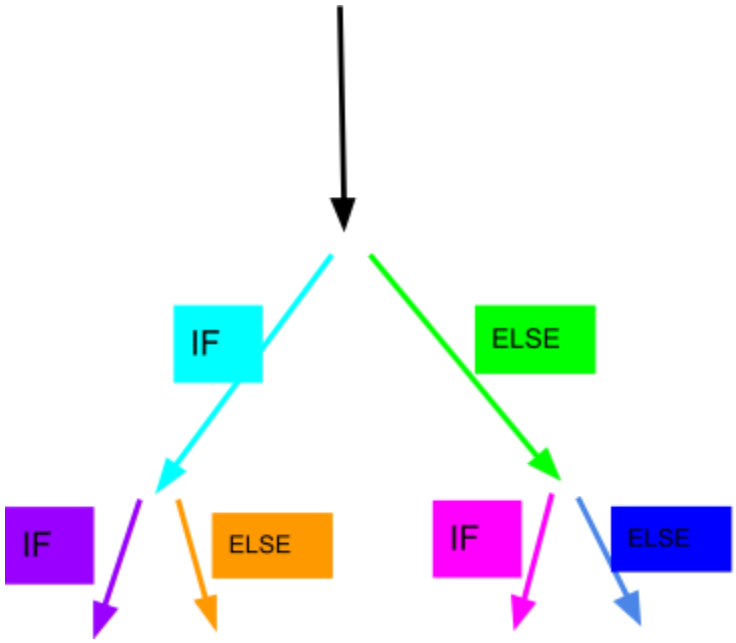
Heads - Pick the first choice
Tails - Pick the second choice.

After they have finished, have students switch rolls and do the other story.
This time, they should use a dice roll to choose which option to pick. (Use https://www.random.org/dice/)
If they roll a 6, pick the first option. Otherwise, pick the second option.

Lesson

Part 1 - Nested conditionals

1. Conditionals are like approaching a fork in the road and having to choose a path. However once we have chosen one path we may wind up with another choice later on.
   This is called a nested condition.
   Present the following image:



Part 2 - Probability

1. Ask students the following question:

When reading your stories with the coin flip, what was the probability of you choosing the first choice?

Students should answer in Peardeck slide
Possible responses: 50%, 50/50, 1 out of 2, 1 in 2

2. When we flip a coin there are 2 possible out comes - heads or tails. Percentage-wise, this would be a 50% chance of each.

   We could also phrase it as a one in two chance.

3. Ask students the following question:
   When reading your stories with the dice roll, what was the probability of you choosing the first choice?

   Students should answer in Peardeck slide
   Possible responses: 1 out of 6, 1 in 6

4. Explain to students that the probability of getting the first choice was less with the dice roll than the coin flip.

Part 3 - one_in(n) function

1. In Sonic Pi, there is a function we can use as a condition to determine a specific probability of which path we will take.

2. Introduce ***one_in(n)***

   This function returns a boolean value (true or false). The number provided as an argument determines the probability that the function will return the value of true

   Example: ***one_in(2)*** - 1 in 2 chance the return value will be true
   one_in(6) - 1 in 6 chance the return value will be true.

3. Show students Choose your Own Adventure Code Template

   Iterate through each line of the code. Point out the nested conditional statements and probability.

```
use_random_seed Time.now.to_i
puts # Enter line 1
if one_in(2)
  puts # Enter line 2
  if one_in(2)
    puts # Enter line 3
  else
    puts # Enter line 4
  end
else
  puts # Enter line 5
  if one_in(2)
    puts # Enter line 6
  else
    puts # Enter line 7
  end
end
```

4. Present students with example code

```
use_random_seed Time.now.to_i
puts "You enter a room. On the table in this room,
there is a plate of cookies and a single cupcake."
if one_in(2)
  puts "Eating the cookie has given you the power to read people's minds."
  if one_in(2)
    puts "The doctor discovers that the effects are only temporary.
You spend the day resting at home and are back to normal the next day."
  else
    puts "You use this power to find out the answers to your math test.
You get in trouble for cheating, fail the test and can no longer read minds."
  end
else
  puts "The cupcake causes all your hair to fall out."
  if one_in(2)
    puts "The adhesive from the wig causes an allergic reaction to your scalp.
Your hair never grows back and your head becomes too sensitive to cover up
with anything else."
  else
    puts "While wearing the hat, Someone on the street mistakes you
for someone they owe $1000 to. They give you the money and you use it
to buy the latest iPhone. Your hair grows back two days later."
  end
end
```

5. Have students copy and paste the lines from their story from the assignment document into the Sonic Pi template code. Run the code a few times to view the results.

   Encourage them to change the argument to the ***one_in*** functions to change the probability of each outcome.

Wrap Up/Assessment

Have students put a copy of the Nested Conditional template in another buffer.

Expectations

- Add play, sample and sleep functions to make different possible outcomes in each if/else statement.
- Change the probabilities of the one_in functions

Extensions -

- Include single line conditionals within an if or else statement to add more possible outcomes.
- Have probabilities in ***one_in*** functions be chosen randomly

Code should be submitted via Google Doc in Google Classroom