

## ***“Three by 33⅓” OzoBlockly Challenge***

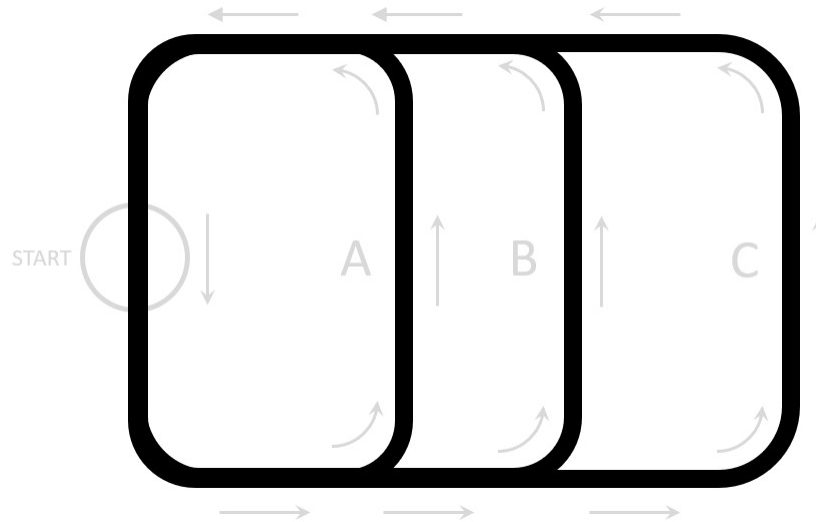
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This challenge will test your OzoBlockly coding skills to the limit! Can you code with variables, button presses, functions, nested if-else structures, loops, line navigation, sound, and light effects? Is so that is a great start.

But the real test of this challenge is in the “Three by 33⅓” feature. Consider the Ozomap shown below. A full-page copy of this map appears on the last page of this document. You will use map this while solving the challenge.



Evo starts at the location shown, facing the direction of the arrow. Evo may only move on the different segments in the direction shown by the arrows. **As Evo moves round-and-round, he must follow routes A, B, and C randomly and with equal probabilities—33⅓% for route A, 33⅓% for route B, and 33⅓% for route C.** You will need to think very carefully about probability concepts to get this right!

### ***Additional Program Requirements***

- The total number of loops to be executed by Evo should be stored in a variable. It is suggested that this number be between 10 and 15.
- When following route A, Evo’s top light should be red. When following route B, it should be green. When following route C, it should be blue.

- When Evo has completed the required number of loops, he should stop moving and wait for a button press.
- When the button is pressed, he should speak the number of times that he followed routes A, B, and C, in that order. Then Evo should turn off.

View the accompanying video for an example run of six loops.

### ***Data Analysis***

Each run of the program will provide different counts since Evo's choices are random. But after many runs of the program, the total number of times each of the routes is taken should get closer and closer to the same. But this will only happen if you have correctly solved the "Three by  $33\frac{1}{3}$ " requirement. To check out your work run the program 15 times, recording the counts in the table below.

| Run #          | Route A Count | Route B Count | Route C Count |
|----------------|---------------|---------------|---------------|
| 1              |               |               |               |
| 2              |               |               |               |
| 3              |               |               |               |
| 4              |               |               |               |
| 5              |               |               |               |
| 6              |               |               |               |
| 7              |               |               |               |
| 8              |               |               |               |
| 9              |               |               |               |
| 10             |               |               |               |
| 11             |               |               |               |
| 12             |               |               |               |
| 13             |               |               |               |
| 14             |               |               |               |
| 15             |               |               |               |
| <b>TOTALS→</b> |               |               |               |

Are your totals "reasonably" similar in value, allowing for randomness? Or is there a clear incorrect pattern in your totals. For example, are the totals for routes B and C similar, but only about half that of route A? If so, you may have incorrectly solved the "Three by  $33\frac{1}{3}$ " requirement.

# Three by $33\frac{1}{3}\%$ OzoBlockly Challenge

