Writing and Altering Code   
 for a Coin Toss Simulator

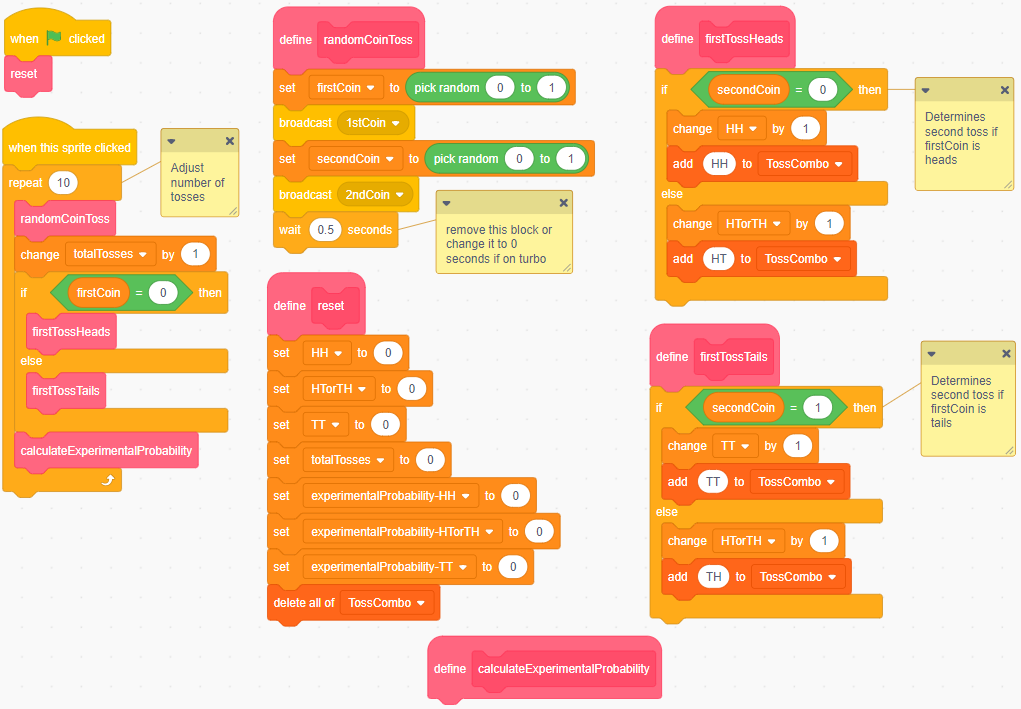
**Algebra**

**Unit 3 Line Master 8a**

Here’s the starting Scratch code:

<https://scratch.mit.edu/projects/719187744/editor/>

If you have a Scratch login, save the project in your   
Scratch account by selecting Remix at the top of the screen.   
A login is not required to work with the code, but you will not   
be able to save your changes without it.

The code simulates repeatedly tossing two coins.

Writing and Altering Code   
 for a Coin Toss Simulator (cont’d)

**Algebra**

**Unit 3 Line Master 8b**

Click on the green flag  to reset the application.

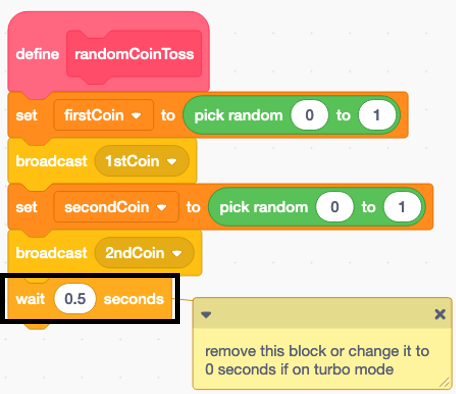
Click on the Toss button Graphical user interface, application, chat or text message

Description automatically generated to execute the code.

The starting code tosses two coins 10 times.

1. Where in the code is the number of tosses specified?

2. Which random number is used to represent heads?  
 To represent tails?  
3. Alter the code to toss the two coins 100 times.   
 Notice the coins toss every 0.5 s, which is specified in the   
 randomCoinToss subprogram.



Toss the coins faster by reducing the wait time in the code.

4. Notice that the experimental probability variables are set to 0   
 and never change when the code is executed.   
 That’s because you need to write the code to do these   
 calculations.  
 This code will be part of a subprogram called  
 calculateExperimentalProbability.

Writing and Altering Code   
 for a Coin Toss Simulator (cont’d)

**Algebra**

**Unit 3 Line Master 8c**

Look through the code to locate the block that says   
define calculateExperimentalProbability (Graphical user interface, application, background pattern

Description automatically generated).   
When the file opens, there is no code in this block.  
Follow these steps to create the code for this block.

* Start by writing code to calculate the experimental probability   
  of tossing two heads. Store this number in a variable called experimentalProbability-HH that has already been created.
* To do this, under Variables, select the set block and place it beneath the define calculateExperimentalProbability.
* Graphical user interface, application

  Description automatically generatedEnsure the experimentalProbability-HH   
  variable is selected from the pulldown menu.  
  Graphical user interface, application, PowerPoint

  Description automatically generated
* Under Operators, select the division   
  operator () and place it inside   
  the set block.
* From Variables, drag the HH variable block inside the first part   
  of the division operator.   
  Drag the totalTosses variable block inside the second part   
  of the division operator.  
  Graphical user interface, application

  Description automatically generated

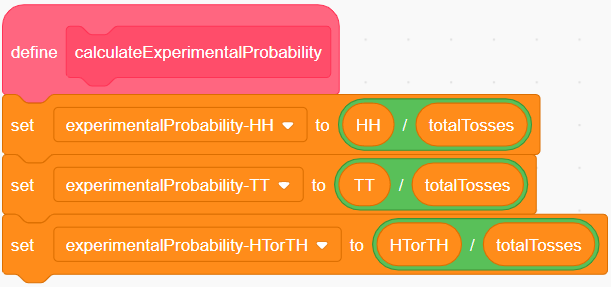
Writing and Altering Code   
 for a Coin Toss Simulator (cont’d)

**Algebra**

**Unit 3 Line Master 8d**

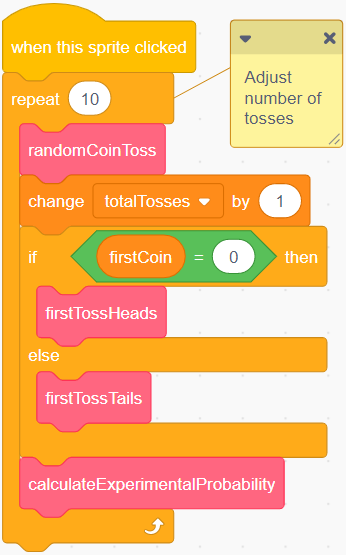
* Repeat this process by adding additional set blocks and division operators to this subprogram for:

experimentalProbability-TT

experimentalProbability-HTorTH  
 

Notice that the calculateExperimentalProbability block   
is inside the repeat.

This means that it will calculate   
the experimental probability   
with each toss as the code is executed.



Record the experimental probability   
for 10 trials.

Writing and Altering Code   
 for a Coin Toss Simulator (cont’d)

**Algebra**

**Unit 3 Line Master 8e**

5. Test your new code.

* Change the wait time to 0 in the randomCoinToss   
  subprogram.
* Alter the repeat value to 1000.
* Click on the green flag to reset the variables, then click   
  on the Toss button to execute the code.
* Check that the numbers are close to what you expected   
  based on the theoretical probability of tossing two coins   
  many times.

If the numbers seem wrong, look through your code to identify   
any errors.

Writing and Altering Code   
 for a Coin Toss Simulator (cont’d)

**Algebra**

**Unit 3 Line Master 8f**

6. Alter the code to do a large number of trials.

* Graphical user interface, application

  Description automatically generatedFirst, turn on Turbo Mode so that   
  you don’t have to wait for the results.   
  Under Edit, select Turn on Turbo Mode.

You will know that Turbo Mode is on   
because it will indicate this above the Stage.  
 A screenshot of a computer

Description automatically generated

* Click on the green flag to reset the variables.
* Alter the repeat value to 10 000.   
  What are the experimental probabilities for each event?
* Alter the repeat value to 1 000 000. Compare the expermental probability to the value you recorded for 10 trials.   
  Explain why the numbers are different.