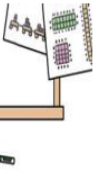


Probability & Scratch



Mathematics Knowledge Network
Réseau de connaissances en mathématiques



Name: _____

Date: _____

Step 1:

You will create clear instructions to describe to someone else the process of how you will find the probability of rolling a certain number on a dice.

Try to find the probability by rolling your dice at least **20 times** and recording how many times you rolled your chosen number. Use the chart on the **next page** to help you.

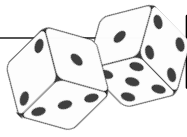
What probability did you find? _____

Now describe what you did to calculate the probability of rolling your number on the die step-by-step so that someone else could repeat your method without seeing you do it. You should have **at least 6** steps for someone to recreate! (You may not need to fill all 9 lines)

(e.g. Flipping a Coin: Step 1: Pick up your coin. Step 2: Flip coin. ... etc.)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____

Trade instructions with a partner, are the results the same when you follow their instructions? (Do not do any steps that are not written down!) Why or why not?



Probability & Scratch



Choose a number on the dice (between 1 and 6). The number I chose is: _____

chosen#

Roll your dice **20 times** and fill out the chart below as you go:

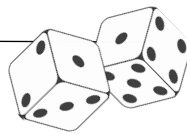
Roll #	Number Rolled	Is it your number? (√ or X)	Roll #	Number Rolled	Is it your number? (√ or X)
1.			11.		
2.			12.		
3.			13.		
4.			14.		
5.			15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		

Count how many times you rolled your chosen number: _____
of times it was rolled

Calculate the probability of rolling your chosen number:

In **20** rolls I rolled the number _____ times. This means that the probability I
chosen# # of times it was rolled
found is _____ ÷ **20** x 100% = _____.
of times it was rolled # total rolls PROBABILITY!

***Go back to page 1 to answer the rest of the questions**



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Step 2:

On your Chromebook, go to <https://scratch.mit.edu/projects/237147913/> and click  Explore the program to understand what it does and answer the following questions:

What number is the program calculating the probability of rolling? How do you know?

In your own words, write down what steps the program does to calculate the probability:

(It might not take all 9 lines)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____

Are the steps of the program the same as the steps you wrote for your die? How? How are they different?

Step 3:

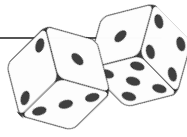
a) Roll the dice *on the program* **10 times** and record the probability given. Click **Restart and repeat 5 times**.

1. _____ 2. _____ 3. _____ 4. _____ 5. _____

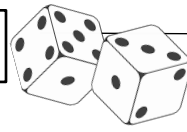
b) Modify the code so that it will roll **100 times** in a row on **one click**.

Roll the dice 100 times and record the probability given. **Restart and repeat 5 times**.

1. _____ 2. _____ 3. _____ 4. _____ 5. _____



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How do the probabilities in a) compare to the probabilities in b)? Which one do you think is more **accurate**? Why do you think this is?

What do you think the **theoretical** probability is? Why?

Describe how you would know what the **theoretical** probability is. Is there a formula?

Check with a teacher to make sure your formula is correct before moving on

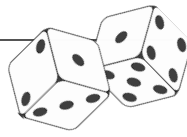
What do you think the probability will be if you choose **2 numbers** to count instead of just 1?

Modify the code to find the probability of choosing two numbers. The two numbers I chose to explore the probability of are _____ and _____.

The probability after 100 rolls was: _____%.

Were you correct? Why or why not?

What could you do to increase the accuracy of the simulation?



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Step 4:

We would like to know: *If there are two tiles in a bag – one red and one blue – and you randomly pick a tile, put it back and pick again, what is the probability that you pick the red tile twice in a row?*

Make an **estimate** for what you think the probability is and justify your answer:

On your Chromebook, go to: <https://scratch.mit.edu/projects/237152318/>

You will see that part of a program has been started to help answer this question. It is your job to **put the coding blocks given to you together** in order to **finish the program**. *You only need to edit the “Button 2” (CHOOSE) sprite*. All the blocks that you will need have been created and placed in the coding area, *you do not need to create any more blocks*. Any variables (orange) or math operations (green) that have numbers greater than zero are **correct**, any that are blank or are zero **need to be filled in** by you.

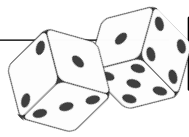
Broadcasts are messages that can be used to communicate between different sprites. **Variables** can be used to store a number that you will need for choosing a colour and calculating probability.



When you are finished the program should:

- **Show the two files** under the given titles “Pick 1” and “Pick 2” when “Choose” is clicked
- Show the **probability** of picking both red files
- As you click “Choose” multiple times the program will **continue to calculate** the probability until “Reset” is clicked.

**Hint: use the program from Step 2 to help guide you*



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When you have completed the program answer the following questions:

After many trials what does your program tell you the probability of picking two red tiles is?

Is this what you **expected**? Why or why not?

Explain in words what the **theoretical probability** of choosing two red tiles in a row is:

Describe a general formula for how to find the theoretical probability: **refer to step 3**

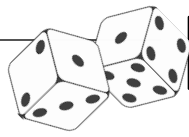
OPTIONAL:

How do you think the probability of picking all red tiles would change if you picked from two tiles **three** times instead of twice (like you were doing above)?

**If you have time, modify your program so that it shows three tiles being chosen.*

(to do this you will need to create a new sprite using the two tiles as examples, you will also need to add a new variable and change the yellow "if -- then" block, and don't forget to include your new variable in the "Reset" sprite's code! HAVE FUN!)

Then, think of your own probability question to answer!



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Step 5:

Explore some of the following links to see what is possible with coding probability in Scratch! The possibilities range from simple to very complex. There are virtually no limits to what you can create!

Probability Tools (Dice and Coin): <https://scratch.mit.edu/projects/17779923/>

Probability Spinner: <https://scratch.mit.edu/projects/742139/>

Pascal's Triangle: <https://scratch.mit.edu/projects/451972/>

Yahtzee: <https://scratch.mit.edu/projects/2611073/>

Pig – A Dice Game: <https://scratch.mit.edu/projects/1479420/>

Describe a question/activity that you think using coding would be fun or helpful to explore:
