

Lesson 45 – Introduction to Experimental Probability

Probability with M&Ms

In this activity, you will be drawing M&Ms from a bag to determine what the probability is of getting each color of M&M. You will record your results in a table.



Major Super Duper Important Things:

- DO NOT EAT the M&Ms until the activity is over. Yes, you will get to eat in class – but only when you are done with your experiment. ☺
- REPLACE each M&M that you draw before drawing the next one. This makes your probability calculations easier.
- SHAKE the bag after you replace each M&M. This will help your draws be more “random” so that your data will be a good representation.

Procedures:

- 1) **Draw** one M&M. **Record** the color in the table by marking a tally mark in the first row of the table.
- 2) **Replace** the M&M. **Shake** the bag.
- 3) **Repeat** steps 1 and 2 **twenty-five times**.

	Brown	Blue	Red	Orange	Yellow	Green
Tally Marks:						
Total:						
Probability (as a fraction):						
Probability (as a decimal):						

- 4) In the second row of the table, write down the **total number of tally marks** from each color.
- 5) **Calculate the probability** of drawing each color, based on the number of times you drew M&Ms (25) and the number of times you drew each color. Write these probabilities down in **fraction form** in the third row of the table and in **decimal form** in the last row of the table.

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- 6) Now you may eat your M&Ms, but you have to record some stuff as you do. In the table below, **record the actual number of each color** of M&M.

	Brown	Blue	Red	Orange	Yellow	Green
Actual Number:						
Probability (as a fraction):						
Probability (as a decimal):						

- 7) Write down the **total number of M&Ms** in the bag: _____
- 8) **Calculate the probability** of drawing each color, based on the total number of M&Ms in the bag and the actual number of each color. Write these probabilities down in **fraction form** in the second row of the table above, and then in **decimal form** in the last row.
- 9) Are your probabilities in the first table similar to your probabilities in the second table?
- 10) Do you think your probabilities in the first table *should be* similar to your probabilities in the second table? Why or why not?
- 11) One of these tables represents “experimental probability” and one represents “theoretical probability.” Which one do you think is which? What do you think “experimental probability” means? What do you think “theoretical probability” means?
- 12) One of these tables involves finding probability from a “sample” and one involves finding probability from a “population.” Which one do you think is which? What do you think a “sample” is? What do you think a “population” is?
- 13) What changes could you make to the experiment in numbers 1-3 to produce more accurate results (results that are more similar to your theoretical probability)?

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Questions for Basic Concepts of Probability

Directions: Determine the probability of the event described in each exercise. Unless stated otherwise, assume all items of chance (dice, coins, cards, spinners, etc.) are fair.

1. Roll an even number on one roll of a die.
2. Roll an odd number on one roll of a die.
3. Roll a prime number on one roll of a die.
4. Roll an odd prime number on one roll of a die.
5. Roll an odd prime number greater than 4 on one roll of a die.
6. Roll an even prime number greater than 4 on one roll of a die.
7. Roll an odd prime number or a multiple of 2 on one roll of a die.
8. Roll an odd prime number and a multiple of 2 on one roll of a die.
9. Roll a total of 8 on one roll of 2 dice.
10. Roll a total of 18 on one roll of 2 dice.
11. Roll a total that is a prime number on one roll of two dice.
12. Roll a total that is a prime number or a multiple of 5 on one roll of two dice.
13. Toss heads on one flip of a coin.
14. Toss heads or tails on one flip of a coin.
15. Toss 3 heads on three flips of a coin.
16. Toss 3 heads on five flips of a coin.
17. Toss at least 3 heads on five flips of a coin.
18. Toss less than 1 tail on eight flips of a coin.
19. Toss no more than 1 tail on eight flips of a coin.
20. Toss at most 1 tail on eight flips of a coin.
21. Toss no less than 1 tail on eight flips of a coin.
22. Toss more than 1 tail on eight flips of a coin.
23. Draw a red card from a standard deck of playing cards.
24. Draw a red face card from a standard deck of playing cards.
25. Draw a black prime number from a standard deck of playing cards.
26. Draw a diamond from a standard deck of playing cards.
27. Draw the ace of spades from a standard deck of playing cards.
28. Draw any card other than a club from a standard deck of playing cards.
29. Draw a card used to make a royal flush from a standard deck of playing cards.
30. Draw a red card or a black card from a standard deck of playing cards.
31. Draw a red card or a card less than 7 from a standard deck of playing cards.
32. Draw a heart greater than 8 that is not a face card from a standard deck of playing cards.
33. Spin an even number on a 1-to-8 spinner.
34. Spin a prime number less than 7 on a 1-to-10 spinner.
35. Spin an odd prime number less than 7 on a 1-to-12 spinner.
36. Spin a positive integer on a 1-to-6 spinner.
37. Pull a green sock from a drawer containing 4 black, 3 red, and 2 green socks.
38. Pull a blue sock from a drawer containing 4 black, 3 red, and 2 green socks.
39. Pull a red or a black sock from a drawer containing 4 black, 3 red, and 2 green socks.
40. Randomly choose a vowel from the letters in the phrase, "The Seahawks are better than the Eagles."
41. Rain falls when a 40% chance of rain is forecast.
42. No rain falls when a 70% chance of rain is forecast.
43. A month with a prime number of letters in its name is randomly chosen from the months after April.