

Name Solutions

3 balls colored red, green, or blue are drawn from a large container at random and placed in front of you. How many possible ways are there to arrange the three balls?

6

1. Red Green Blue
2. Red Blue Green
3. Green Blue Red
4. Green Red Blue
5. Blue Green Red
6. Blue Red Green

$$3^3 = 27$$

If we distinguish states by the number of ball of each color (for example 2R1B), then there are 10 unique states. Write them down and give the multiplicity of each state.

1. 3 Green - 1
2. 3 Blue - 1
3. 3 Red - 1
4. 2 Green, 1 Red - 3
5. 2 Green, 1 Blue - 3

6. 2 Red, 1 Green - 3
7. 2 Red, 1 Blue - 3
8. 2 Blue, 1 Red - 3
9. 2 Blue, 1 Green - 3
10. 1 Red, 1 Blue, 1 Green - 6

multiplicity ✓

Now, we will keep score. A red ball scores +1, a green ball scores -1, and a blue ball scores 0. List the possible scores that you can have?

1. -3
2. 0
3. 3
4. -1
5. -2
6. 1
7. 2
8. 1
9. -1
10. 0

-3, -2, -1, 0, 1, 2, 3

What is the least likely score? Why?

-3 and 3 are the least likely scores because they each have only one state with one multiplicity

What is the most likely score? Why?

0 is the most likely score because it has one state with 6 multiplicities and a second state with one multiplicity

What is the probability to get the least likely score?

$$\frac{1}{27} = 3.7\%$$

What is the probability to get the most likely score?

$$\frac{7}{27} = 25.9\%$$