Dice Probability

What is the probability it will rain today? What about snow? How likely is it for a baseball player to hit two homeruns back to back?
All these probabilities can be calculated. You are going to calculate all the different outcomes of rolling two dice. In the game of backgammon, craps and many other games, the players rely on knowing what the chances of them rolling certain sums are.
You and your partner will each take a die and roll them together and take the sum of the two dice. The lowest possible sum would be 2 since the lowest each of you can roll is a 1. Since the highest number each of you can roll is a 6, the largest sum will be 12. Thus, all rolls will be between 2 and 12. Use tally marks in the chart below to record your data and then add up your tally count and record the total number of times each sum occurred. You will roll the dice 40 times. If you accidently roll it more times, that is okay.

Before rolling the dice, discuss with your partner which roll you think will occur the least and explain your reasoning.
Discuss which roll you think will occur the most and why.
(YOUR TEACHER MIGHT STOP THE CLASS HERE TO HAVE EVERYONE DISCUSS HIS/HER OPINION. THE TEACHER WILL LET YOU KNOW.)

Use the chart below to record your data and see if your predictions were correct.

Sum of Dice	Tally count	Total Occurrences
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

You are now going to put your data into a spreadsheet. On your computer, go to
and click on the video that will explain what you are going to do. The video is located at
https://www.youtube.com/watch?v=u7jZsFI8wLk

After watching the video, follow the directions below that walk you through it again, step by step.

1. Go to your school email and open google sheets.
2. Click on Blank under start a new spreadsheet.
3. In cell A1, type "Sum of Dice" and then type "Total Occurrences" in cell B1.
4. In column A under A1, you want the possible sum of the dice, which we know is 2 through 12. So, put 2 in cell A2, 3 in cell A3, continuing until you have 12 in cell A12. (You will later learn how to do a fill series down to save time.)
5. Now fill in your data results from where you rolled the dice in cells B2 through B12.
6. Right click on cell A1 and while holding it down drag your cursor to cell B12, which should highlight all of the cells.
7. Click on the Insert tab and choose Chart.
8. To the far right you will see a window that says "Chart Type." From that list of choices, scroll down to Column Chart and pick the first one.
9. Go back and highlight cells A1 through B12 again go to insert a chart. Scroll down in the list of choices and pick the first pie chart to the left.

Discuss with your partner which one of these graphs you think is better to use and why.
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Before you rolled the dice, you predicted which roll would occur the least and which would occur the most. Since you only rolled the dice around 40 times, there is no guarantee that your data is accurate as compared to what might happen if you rolled the dice 10,000,000 times. Your task now is to determine all the different possibilities of what could be rolled. You only have your dice and your partner's dice to consider, so it could be that you rolled a 4 and your partner rolled a 1. That could be written as (4, 1). If you rolled a 4 and your partner rolled a 2, that is a different outcome and could be written as (4, 2). You and your partner need to come up with a way of listing out all the possibilities. There are a total of 36 possibilities, so see if you can get them all and be able to explain to your class how you decided to organize your data.
(YOUR TEACHER MIGHT STOP THE CLASS HERE TO HAVE EVERYONE DISCUSS HIS/HER OPINION. THE TEACHER WILL LET YOU KNOW.)

Check your answer against the picture of all possibilities, which your teacher will share with you.

Now that you can see all possibilities, answer these questions, putting your answers in the blanks below the numbers:
Out of the 36 how many add up to

2	3	4	5	6	7	8	9	10	11	12

Notice that out of the 36 different possibilities, there are 3 of them that have the dice add up to 4. Thus, the probability of getting a sum of 4 is 3 out of 36 (3/36).
Fill in the chart below with the probability of rolling each sum.

2	3	4	5	6	7	8	9	10	11	12

Your teacher will now share with you a Probability Chart. Were your answers correct?

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You and your partner will now go to https://academo.org/demos/dice-roll-statistics/ to have the computer constantly roll the dice for you. To the right of the page, change the number of dice to 2 and click the box that says "roll automatically."
At this point, we know that rolling a sum of 7 has the highest probability. However, you might notice that at first (several hundred rolls in), the sum of 7 might not be occurring the most. If you wait for about 3 minutes when the computer has rolled the dice almost 2000 times, you should notice a symmetrical looking bar graph with the sum of 2 and 12 occurring about the same number of times, 3 and 11 occurring the same number of times (4 and 10, 5 and 9, etc.). Did this occur for you and your partner? Please know that you can start and stop the dice from rolling by clicking the "roll automatically button."

Did the chart produce a bar graph like you though it would? Discuss with your partner.