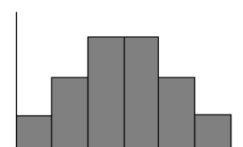## Probability Distributions and Shapes of Distributions

- **Probability distribution:** a function that gives the probability of each outcome in a sample space.
- **Uniform distribution:** a probability distribution that is equal for each event in the sample space.
- **Cumulative frequency:** the number of times events with values that are less than or equal to a given value occur. It's the probability of events occurring with values that are less than or equal to a given value.
- **Distribution shapes:** Distributions may come in many shapes. Examples are distribution shapes are uniform, symmetrical, bimodal, skewed left, skewed, right, and normal (bell shaped). The distributions are modeled below:
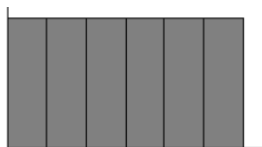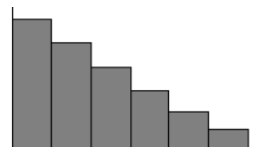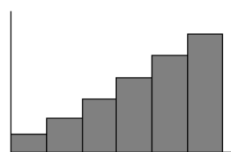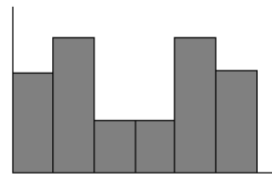
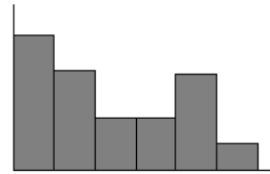Uniform & symmetrical   Skewed right   Symmetrical

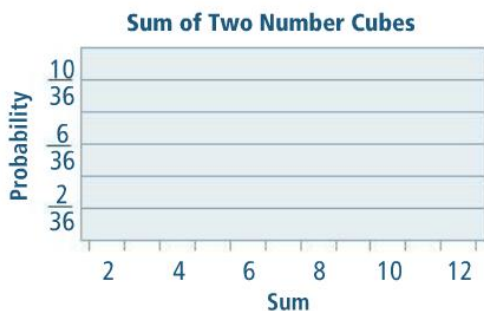Skewed left   Bimodal & symmetrical   Bimodal & skewed right

Activity 1

Roll a pair of standard number cubes 36 times. Record the sum for each roll.

1. Use the frequency table below. Complete the table using your data.

Event: Sum	2	3	4	5	6	7	8	9	10	11	12
Frequency											
Probability											

2. Complete the graph using your data.

Sum of Two Number Cubes

3. Make a graph of the probability distribution for the sums of two number cubes rolled 36 times, based on the theoretical probabilities of each sum.

Sum of Two Number Cubes
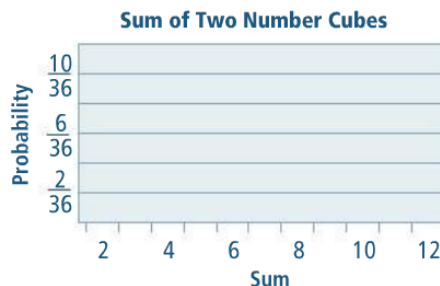
4. a. Reasoning Compare the graphs. Do you think the number cubes you rolled are fair? Explain.

b. Explain why there are differences, if any, between the theoretical model and the experimental model.

Activity 2

5. Complete the table. Add the theoretical probabilities within each range to find the cumulative probabilities.

Sum	2 to 4	2 to 6	2 to 8	2 to 10	2 to 12
Cumulative Probability					

Add the probabilities for the sums of 2, 3, and 4.

Add the probabilities for sums of 5 and 6 to the previous total.

6. Reasoning Explain why the cumulative probability in the last interval is 1.

7. Complete the graph below using the cumulative probabilities you computed.

Cumulative Probability Distribution
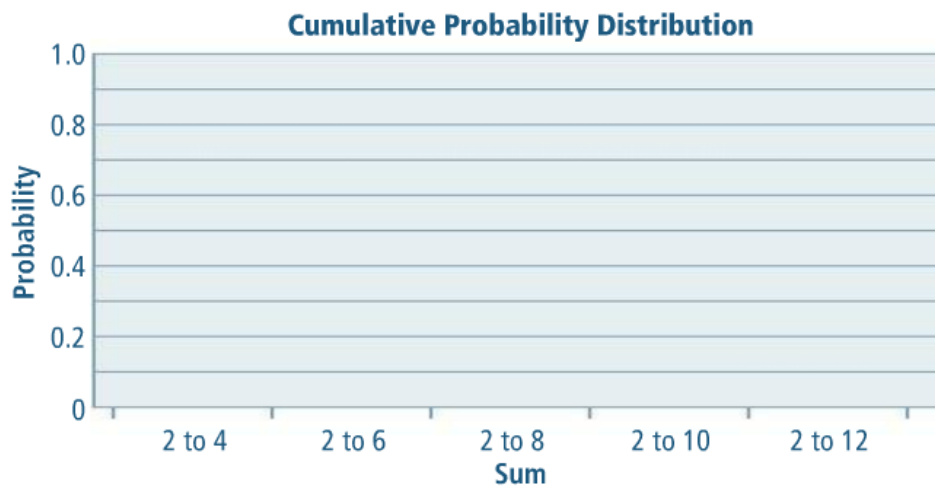
8. a. If you roll a pair of number cubes to model a situation and observe a sum of 7 four times in a row, would you question the model? Explain.

b. If you observed a sum of 2 four times in a row, would you question the model? Explain.