The Scene: In this activity we build and investigate some discrete probability models.

1. Consider 2 regular dice, a red one and a blue one. Let X denote the sum of the values if we roll them together.

   (a) Convince yourself that the sample space for this random process is

   $$S = \{2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}.$$

   Convinced? You may proceed.

   (b) In the grid below, record the sum of the dice for each of the 36 possible outcomes (For instance, if the red die is 3 and the blue die is 5, the sum is 8.) Then, assuming each of these 36 outcomes is equally likely, determine a valid probability model for the sum of two dice in the table at right.

blue die

	1	2	3	4	5	6
1						
2						
3				8		
4						
5						
6						

red die

x	2	3	4	5	6	7	8	9	10	11	12
$P(x)$											

2. Using the probability model.

   (a) For the dice in [1], what is the probability that a given roll produces a sum that is an even number?

   (b) Which is more likely, that the dice in [1] give a sum greater than 8, or that the dice in [1] give a sum less than 5? Explain.

3. A regular deck of cards has 52 cards, 13 of each suit (diamond, heart, spade, club). Suppose we pick a card at random. Let A be the event that we pick a face card (a J, Q, or K of any suit). Let B be the event that we pick a red card (diamond or heart).

   Determine $P(A)$, $P(\text{not } A)$ $P(B)$, and $P(A \text{ or } B)$.

4. Suppose we flip a coin 3 times and we're interested in X = the number of heads we flip in 3 tries.

   (a) What is the sample space for X, the number of heads we flip in 3 tries.

   (b) There are 8 different possible sequences of 3 flips. Here are 2 possibilities: T T T; and T T H. List the other 6.

   (c) Treat these 8 different sequences as equally likely and use them to determine a probability model for X. That is, complete this table.

x	0	1	2	3
$P(x)$				

   (d) Using the table above, what is the probability of flipping at least 2 heads?