

## MATH 130: 3/5 ACTIVITY

### PROBABILITY: DICE

*Probability* is the mathematics of quantifying uncertainty. Today we will do some activities with dice to begin our exploration of probability.

#### Simple outcomes

With a partner, roll a six-sided die about 30 times and record the results. Each outcome is a number between 1 and 6.

- For each number, what proportion of rolls come up that number?
- What proportion of rolls came up even? Came up odd?

Do the same thing with a four-sided die. Then with an eight-sided die. Do you observe any patterns?

#### Rolling multiple dice and combining the outcomes

With a partner, roll two six-sided dice and add the values shown. Do this about 20 to 30 times, recording the results.

- For each result, what proportion of the rolls had that result?
- What are the possible results? Are there any that didn't come up?
- If some outcomes seem more likely than others, can you explain why? If they seem equally likely, say why.

Now roll a six-sided die and an eight-sided die and record which one has the larger value, or if they are equal. Do this about 20 to 30 times, recording the results.

- What proportion of results had the eight-sided die larger? Had the six-sided die larger? Had them equal? Explain what you see.

Now roll two eight-sided dice and add the values shown. Do this about 20 to 30 times, recording the results.

- For each result, what proportion of the rolls had that result?
- What are the possible results? Are there any that didn't come up?
- If some outcomes seem more likely than others, can you explain why? If they seem equally likely, say why.

**Taking a highest or lowest value**

With a partner, you will roll multiple 20-sided dice. For each trial, roll about 20 to 30 times.

- Roll a single 20-sided die and record how often the result is at least 11. What proportion of rolls had this result?
- Roll two 20-sided dice and record how often the larger of the two is at least 11. What proportion of rolls had this result?
- Roll two 20-sided dice and record how often the smaller of the two is at least 11. What proportion of rolls had this result?
- Explain what you see.
- What do you think will happen if you roll three 20-sided dice and want to know how often the largest is at least 11? How often the smallest is at least 11?

**Averages**

With a partner, roll each of these 20 to 30 times, recording the results.

- Roll a four-sided die. What is the average value of the outcomes?
- Roll a six-sided die. What is the average value of the outcomes?
- Roll an eight-sided die. What is the average value of the outcomes?
- What do you think the average value of the outcomes will be if you roll a twelve-sided die? Roll it to check your guess.
- What do you think the average value of the outcomes will be if you roll a twenty-sided die? Roll it to check your guess.

Reminder: to calculate an average of a bunch of numbers you add them all up then divide by how many things you added.

**PRACTICE PROBLEMS**

There are no practice problems for this activity, and thus no homework. I apologize for not giving you any homework this week.