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# Unit 8, Lesson 5: More Estimating Probabilities

Let's estimate some probabilities.

## 5.1: Is it Likely?

1. If the weather forecast calls for a 20% chance of light rain tomorrow, would you say that it is likely to rain tomorrow?

2. If the probability of a tornado today is $\frac{1}{10}$, would you say that there will likely be a tornado today?

3. If the probability of snow this week is 0.85, would you say that it is likely to snow this week?

## 5.2: Making My Head Spin

m.openup.org/1/7-8-5-2

Your teacher will give you 4 spinners. Make sure each person in your group uses a different spinner.

1. Spin your spinner 10 times, and record your outcomes.

2. Did you get all of the different possible outcomes in your 10 spins?

3. What fraction of your 10 spins landed on 3?

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4. Next, share your outcomes with your group, and record their outcomes.

   a. Outcomes for spinner A:

   b. Outcomes for spinner B:

   c. Outcomes for spinner C:

   d. Outcomes for spinner D:

5. Do any of the spinners have the same sample space? If so, do they have the same probabilities for each number to result?

6. For each spinner, what is the probability that it lands on the number 3? Explain or show your reasoning.

7. For each spinner, what is the probability that it lands on something other than the number 3? Explain or show your reasoning.

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8. Noah put spinner D on top of his closed binder and spun it 10 times. It never landed on the number 1. How might you explain why this happened?

9. Han put spinner C on the floor and spun it 10 times. It never landed on the number 3, so he says that the probability of getting a 3 is 0. How might you explain why this happened?

**Are you ready for more?**

Design a spinner that has a $\frac{2}{3}$ probability of landing on the number 3. Explain how you could precisely draw this spinner.

## 5.3: How Much Green?

Your teacher will give you a bag of blocks that are different colors. Do not look into the bag or take out more than 1 block at a time. Repeat these steps until everyone in your group has had 4 turns.

- Take one block out of the bag and record whether or not it is green.
- Put the block back into the bag, and shake the bag to mix up the blocks.
- Pass the bag to the next person in the group.

1. What do you think is the probability of taking out a green block from this bag? Explain or show your reasoning.

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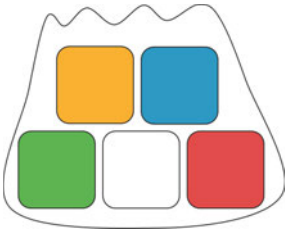
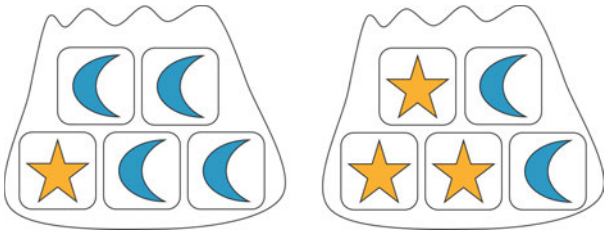
2. How could you get a better estimate without opening the bag?

## Lesson 5 Summary

Suppose a bag contains 5 blocks. If we select a block at random from the bag, then the probability of getting any one of the blocks is $\frac{1}{5}$.



Now suppose a bag contains 5 blocks. Some of the blocks have a star, and some have a moon. If we select a block from the bag, then we will either get a star block or a moon block. The probability of getting a star block depends on how many there are in the bag.



In this example, the probability of selecting a star block at random from the first bag is $\frac{1}{5}$, because it contains only 1 star block. (The probability of getting a moon block is $\frac{4}{5}$.) The probability of selecting a star block at random from the second bag is $\frac{3}{5}$, because it contains 3 star blocks. (The probability of getting a moon block from this bag is $\frac{2}{5}$.)

This shows that two experiments can have the same sample space, but different probabilities for each outcome.

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1. What is the same about these two experiments? What is different?

   - Selecting a letter at random from the word “ALABAMA”
   - Selecting a letter at random from the word “LAMB”

2. Andre picks a block out of a bag 60 times and notes that 43 of them were green.

   a. What should Andre estimate for the probability of picking out a green block from this bag?

   b. Mai looks in the bag and sees that there are 6 blocks in the bag. Should Andre change his estimate based on this information? If so, what should the new estimate be? If not, explain your reasoning.

3. A person suspects a standard number cube is not so standard. He rolls it 100 times, and it lands on a six 40 times. Another person rolls this cube 100 times, and it lands on a six 42 times. A third person rolls the cube 100 times, and it lands on a six 33 times. Based on the results, is there evidence to help prove that this cube is not a standard number cube? Explain your reasoning.

4. A textbook has 428 pages numbered in order starting with 1. You flip to a random page in the book in a way that it is equally likely to stop at any of the pages.

   a. What is the sample space for this experiment?

   b. What is the probability that you turn to page 45?

   c. What is the probability that you turn to an even numbered page?

   (from Unit 8, Lesson 3)

5. A rectangular prism is cut along a diagonal on each face to create two triangular prisms. The distance between $A$ and $B$ is 5 inches.

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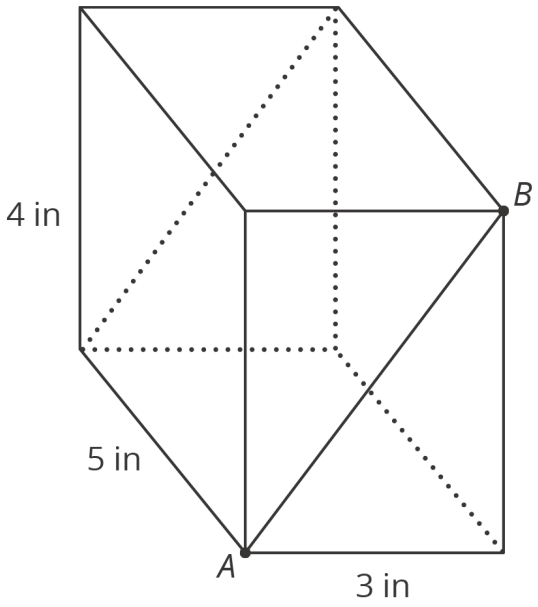


What is the surface area of the original rectangular prism? What is the total surface area of the two triangular prisms together?

(from Unit 7, Lesson 15)