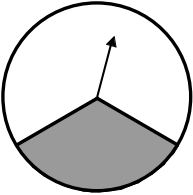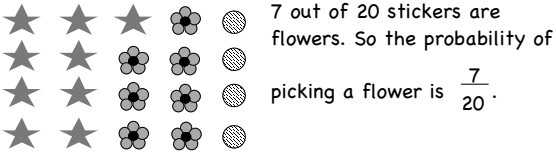# Grade 4, Unit Five: Probability & Data Analysis

In this unit your child will:

- describe the probability of events using words such as *likely*, *unlikely*, and *impossible*
- describe the probability of events as a number out of a total or as a fraction (e.g., 1 out of 2 or ½)
- use the results of experiments to make judgments about situations
- interpret pictographs (a graph in which pictures are used to show how many) and pie graphs (also called circle graphs)
- create and interpret bar graphs
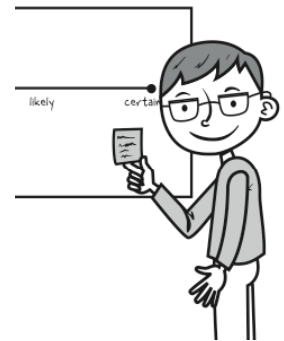
Your child will learn and practice these skills by solving problems like those shown below. Keep this sheet for reference when you're helping with homework.
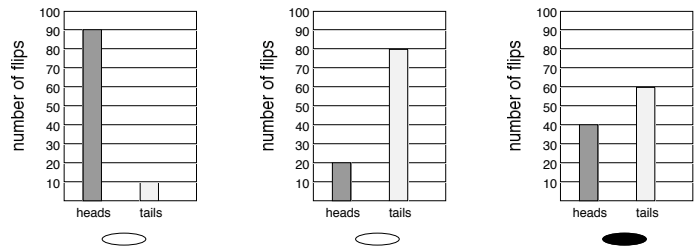
Problem	Comments
If you spin this spinner 12 times, about how many times will the arrow land in the gray section and how many times will it land in the white section? $\frac{1}{3}$ of the spinner is gray, so about a third of the spins will land on gray. So there will be about 4 spins on gray and about 8 on white. It probably won't come out exactly 4 and 8, though. 12 spins isn't very many, so almost anything could happen. It could be 2 gray and 10 white or even all white. Probably there will be a few gray and a lot more white.	Since a third of the spinner is gray, the arrow would land on the gray part about a third of the time if you spun it many, many times. However, 12 is a very small number of spins: you could get 12 white or 12 gray spins in a row, even though it's not very likely. It's more likely, however, that you'll get a few gray and the rest white. It's reasonable to expect that of the 12 spins, about 2 to 6 will be gray and the rest white. The answer at left shows a good understanding of the conditions (the makeup of the spinner), the probability of spinning gray (1 out of 3), and the element of uncertainty involved in spinning such a small number of times.
Michelle has 20 stickers. Of the 20 stickers, 9 are stars, 7 are flowers, and 4 are circles. If she puts them in a bag, shakes the bag to mix them up, closes her eyes, and picks one sticker out of the bag, what is the probability it will be a flower sticker? 7 out of 20 stickers are flowers. So the probability of picking a flower is $\frac{7}{20}$.	The probability of picking a flower sticker can be represented as the fraction of the stickers that are flowers. Seven of the 20 stickers are flowers, so the probability of picking a flower sticker is 7 out of 20.

Look at the question about Michelle's stickers. Would you describe picking a flower sticker as *likely, as likely as it is unlikely*, or *unlikely*? Explain your answer. It's more likely that she will pick something other than a flower, but 7 out of 20 is not too far from half. I'd say it's unlikely that she will pick a flower, but it wouldn't be very surprising if she got a flower either.	Students need to be able to represent probability as a fraction (as in the previous example), but using words to describe the probability of an event puts that fraction in context. Using words to describe the likelihood of something happening clarifies the concepts for students and allows the teacher to see how well they understand probability.
Jake flipped a coin 100 times. Fill in the oval beneath the graph that shows the results he most likely got. Explain your choice. Jake could have gotten any of these results. 40 heads and 60 tails is the most likely one, though, because he has an equal chance of getting heads or tails each time. Since 40 and 60 is closest to half and half, those are the most likely results.	Students interpret bar graphs and draw conclusions about a situation based on what they know about probability. During the unit, students also create bar graphs to show and think about the results of their own probability experiments.

Frequently Asked Questions about Unit Five

Q: The homework has a lot to do with figuring out all the possible combinations in a situation. What does this have to do with probability?

A: To determine the probability of any given outcome, students first need to have a clear picture of what all the possible outcomes are in a situation. For example, the probability of getting two heads if you flip two coins at the same time is 1 out of 4, because it is one of four possible outcomes. (See the picture at right to see why.)

	Second Coin	
First Coin	**Heads**	**Tails**
Heads	HH	HT
Tails	TH	TT

The homework presents more complicated situations than this one. In fourth grade, students will not become proficient at determining probabilities in these kinds of situations, but thinking about them now will be useful when they study probability in the future.

Q: I think probability is confusing. How can I still help my child?

A: Probability is complex and can be confusing even for adults, but the experiences students have in this unit will serve them well in the future. To help your child, insist that he or she complete homework assignments and try to help as much as you can. If you both get stuck, help your child write a note to the teacher about what is confusing.