

## Lesson 16: Making Fair Decisions

### Classwork

#### Exploratory Challenge 1: What Is a Fair Decision?

Andre, Bobby, and Chris are competing in a 3-on-3 basketball tournament where a set number of teams compete to determine a winning team. Each basketball team plays with three players on the court at the same time.

The team of three wins the tournament. Part of the prize package is a pair of new basketball shoes. All three players want the shoes, but there is only one pair. The boys need to figure out a fair way to determine who gets to keep the new shoes.

- Chris wants to flip a coin two times to decide who will get the shoes. If two heads appear, then Andre keeps the shoes. If two tails appear, then Bobby keeps the shoes. And if one head and one tail appear (in either order), then Chris will keep the shoes.
- Bobby wants to write each of their names 10 times on torn pieces of paper and put all 30 pieces in a hat. He will give the hat a good shake, and then Bobby will choose one piece of paper from the hat to determine who gets the shoes.
- Andre wants to roll a fair six-sided die to decide who will keep the shoes. If a 1 or 2 appears, Andre will keep the shoes. If a 3 or 4 appears, Bobby will keep the shoes. If a 5 or 6 appears, then Chris keeps the shoes.

Which player's method is the most fair?

**Exploratory Challenge 2**

Work with your group to explore each of the decision-making methods. Your teacher will assign one or more methods to each group and specify the number of times each decision should be simulated. Record the outcomes in the table.

Method	Probability Andre keeps shoes	Probability Bobby keeps shoes	Probability Chris keeps shoes
Drawing a name out of a hat (Selecting at Random)			
Fair Coin			
Fair Six-Sided Die			
Random Number Generator (Technology Based)			
Spinner			

Which method do you think should be used to make a fair decision in this case? Explain.

**Lesson Summary**

- A decision can be considered fair if it does not favor one outcome over another.
- Fair decisions can be made by using several methods like selecting names from a hat or using a random number generator.

**Problem Set**

1. You and your sister each want to sit in the front seat of your mom's car. For each of the following, decide if the decision would be fair or unfair and explain your answer.
  - a. You flip a two-sided coin.
  - b. Both you and your sister try to pick a number closest to one randomly generated on a smartphone.
  - c. You let your mom decide.
2. Janice, Walter, and Brooke are siblings. Their parents need them to divide the chores around the house. The one task no one wants to volunteer for is cleaning the bathroom. Janice sees a deck of 52 playing cards sitting on the table and convinces her brother and sister to use the cards to decide who will clean the bathroom.
  - Janice thinks they should draw one card. If a heart is drawn, Janice cleans the bathroom. If a spade is drawn, then Walter cleans. If a diamond is drawn, then Brooke cleans. All of the club cards will be removed from the deck before they begin drawing a card.
  - Walter wants to draw two cards at a time. If both cards are red, then Janice cleans. If both cards are black, then Walter cleans. If one card is red and one card is black, then Brooke cleans the bathroom.
  - Brooke thinks they should draw cards until they get a heart. If the first card drawn is a heart, then Janice cleans the bathroom. If the second card drawn is a heart, then Walter cleans the bathroom. If it takes three or more times to draw a heart, then Brooke cleans the bathroom.

Whose method is fair? Explain using probabilities.

3. A large software company is moving into new headquarters. Although the workspace is larger, there is not enough space for each of the 239 employees to have his own office. It turns out that two of the employees will need to share an office. Explain how to use a random number generator to make a fair decision as to which employees will share an office.
4. Leslie and three of her friends each want to eat dinner at different restaurants. Describe a fair way to decide to which restaurant the four friends should go to eat dinner.