LESSON MAKER PRO

# Chance to Choose

*Use equal probabilities to make fair choices.*

**HIGH SCHOOL · HSS-MD.B.6**

**CCSS.Math.Content.HSS-MD.B.6** "(+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator)."

NAME _____ DATE _____

## FAIR BY CHANCE

A random method is fair when each person or choice has the same probability. Count the equally likely outcomes assigned to each choice. Equal counts mean equal chances.

## WORKED EXAMPLE

A random number generator has 17 equally likely outcomes. Team Red gets 7 outcomes, and Team Blue gets the other outcomes. Is the choice fair?

1. There are 17 equally likely outcomes.
2. P(Red) = 7/17.
3. P(Blue) = 10/17, so the probabilities are not equal.

**Answer: No. Team Red has probability 7/17, and Team Blue has probability 10/17.**

## PRACTICE 5 problems

**1** A coin flip chooses between Maya and Luis. Is this fair? Give each probability.

**ANSWER** _____

**2** Pick one card at random from cards W, X, Y, and Z. Ava gets W or X. Ben gets Y or Z. Is this fair?

**ANSWER** _____

**3** A bag has 6 gold tickets and 6 silver tickets. What is the probability of each color?

**ANSWER** _____

**4** A box holds 12 equal-size cards. Six say game night, and six say movie night. Is a random draw a fair way to choose an activity?

**ANSWER** _____

**5** A bag has 14 black cards and 11 white cards. How many white cards must be added so each color is equally likely?

**ANSWER** _____

## APPLY IT Show your work

**1** Four student DJs are finalists for a school event. Twenty equal slips are put in a bag: 4 for Inez, 6 for Kai, 5 for Lila, and 5 for Omar. Is this a fair selection method? If not, state a fair number of slips for each finalist.

WORK SPACE

**ANSWER** _____

**2** Eighteen students volunteer for six backstage passes at a concert. Each student gets one number, and six different numbers are randomly selected. Is every volunteer equally likely to get a pass? What is the probability for one volunteer?

WORK SPACE

**ANSWER** _____

## CHALLENGE One step up

A random number generator picks an integer from 1 through 30. Choice A gets multiples of 2. Choice B gets multiples of 3 that are not multiples of 2. Choice C gets all remaining numbers. Is this a fair three-way decision? Explain using probabilities.

WORK SPACE AND ANSWER

**ANSWER KEY**

# Chance to Choose

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## PART 1 · PRACTICE

| # | PROBLEM | ANSWER |
|---|---|---|
| 1 | A coin flip chooses between Maya and Luis. Is this fair? Give each probability. | **Yes. P(Maya) = 1/2 and P(Luis) = 1/2.** |
| 2 | Pick one card at random from cards W, X, Y, and Z. Ava gets W or X. Ben gets Y or Z. Is this fair? | **Yes. Each has probability 1/2.** |
| 3 | A bag has 6 gold tickets and 6 silver tickets. What is the probability of each color? | **P(gold) = 1/2 and P(silver) = 1/2.** |
| 4 | A box holds 12 equal-size cards. Six say game night, and six say movie night. Is a random draw a fair way to choose an activity? | **Yes. Each activity has probability 1/2.** |
| 5 | A bag has 14 black cards and 11 white cards. How many white cards must be added so each color is equally likely? | **3 white cards.** |

## PART 2 · APPLY IT

1. **No. Inez has probability 4/20, Kai has probability 6/20, and Lila and Omar each have probability 5/20. Use 5 slips for each finalist.** The probabilities are based on the number of slips out of 20. A fair method gives all four finalists 5 of the 20 slips.
2. **Yes. Each volunteer has probability 6/18 = 1/3.** Each student has one number among 18 equally likely numbers. Six selected numbers win, so each student has the same probability, 6/18.

## CHALLENGE

**No. Choice A has 15 outcomes, so P(A) = 15/30 = 1/2. Choice B has 5 outcomes, so P(B) = 5/30 = 1/6. Choice C has 10 outcomes, so P(C) = 10/30 = 1/3. The probabilities are not equal.**

Accept equivalent fractions, such as 6/18 for 1/3. For fairness explanations, accept any correct comparison showing that all choices do or do not have equal probabilities.