

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. $P(\text{Red}) = 7/17$.
3. $P(\text{Blue}) = 10/17$, 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

CHALLENGE

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.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A coin flip chooses between Maya and Luis. Is this fair? Give each probability.	Yes. $P(\text{Maya}) = 1/2$ and $P(\text{Luis}) = 1/2$.
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?	$P(\text{gold}) = 1/2$ and $P(\text{silver}) = 1/2$.
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

- 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.
- 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.