LESSON MAKER PRO

Chance Changes

Test whether one outcome affects the next.

GRADE 8 · 8.PS.1.a

8.PS.1.a "Determine whether two events are independent or dependent and explain how replacement impacts the probability."

NAME _____ DATE _____

THE BIG IDEA

Independent events do not change each other's probabilities. Replacement usually makes draws independent because the total and the choices stay the same.

WORKED EXAMPLE

A jar has 3 orange and 8 green counters. Draw an orange counter, replace it, then draw an orange counter. Find the probability.

1. Total counters: 3 + 8 = 11.
2. P(orange first) = 3/11.
3. After replacement, P(orange second) = 3/11.
4. Multiply: 3/11 x 3/11 = 9/121.

Answer: 9/121; the draws are independent.

PRACTICE 5 problems

1 A fair coin is tossed twice. Are the tosses independent or dependent? Explain.

ANSWER _____

2 A music app selects 1 song from 12 songs, removes it, then selects again. Independent or dependent?

ANSWER _____

3 A box has 2 blue and 5 red tokens. Draw a blue token, replace it, then draw a blue token. Find the probability.

ANSWER _____

4 A bag has 1 gold and 6 silver tokens. Draw a gold token and do not replace it. What is P(gold, then gold)?

ANSWER _____

5 Flip a fair coin, then spin a spinner with 5 equal sections, 1 blue. Find P(heads, then blue).

ANSWER _____

APPLY IT Show your work

1 At game night, a prize box has 4 game-pass cards and 16 regular cards. You pick a game-pass card, replace it, then pick again. What is P(two game-pass cards)? Are the picks independent?

WORK SPACE

ANSWER _____

2 A school store has 5 glow keychains and 7 regular keychains. You buy one glow keychain, and it is not replaced before you buy another. What is P(two glow keychains)? Are the picks dependent?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A bag has 5 green and 4 black tiles. Find P(two green tiles) with replacement and without replacement. Explain why the probabilities differ.

WORK SPACE AND ANSWER

ANSWER KEY

Chance Changes

GRADE 8 · 8.PS.1.a

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A fair coin is tossed twice. Are the tosses independent or dependent? Explain.	**Independent. The first toss does not change the coin.**
2	A music app selects 1 song from 12 songs, removes it, then selects again. Independent or dependent?	**Dependent. Removing a song changes the choices.**
3	A box has 2 blue and 5 red tokens. Draw a blue token, replace it, then draw a blue token. Find the probability.	**4/49**
4	A bag has 1 gold and 6 silver tokens. Draw a gold token and do not replace it. What is P(gold, then gold)?	**0; the events are dependent.**
5	Flip a fair coin, then spin a spinner with 5 equal sections, 1 blue. Find P(heads, then blue).	**1/10; the events are independent.**

PART 2 · APPLY IT

1. **1/25; independent.** There are 20 cards, so each game-pass probability is 4/20 = 1/5. Replacement keeps the probability the same: 1/5 x 1/5 = 1/25.
2. **5/33; dependent.** The probability is 5/12 x 4/11 = 20/132 = 5/33. The first purchase changes the keychains left.

CHALLENGE

With replacement: 25/81. Without replacement: 5/18. Without replacement, the first green tile leaves 4 green out of 8 tiles, so the second probability changes.

Accept equivalent unsimplified fractions where appropriate. For independence explanations, accept statements that the first event does or does not change the second probability.