LESSON MAKER PRO

Does It Change?

Compare chances when events affect each other.

GRADE 8 · PA.D.2.3

PA.D.2.3 "Define, compare, and contrast the probabilities of dependent and independent events."

NAME _____ DATE _____

THE BIG IDEA

Independent events do not change each other's probabilities. Dependent events do: when you take an item without replacing it, the total number of items changes. To find the probability of both events happening, multiply the probability of the first event by the probability of the second event after the first has happened.

WORKED EXAMPLE

A bag holds 4 purple tiles and 7 gold tiles. You draw a tile, replace it, and draw again. What is the probability of drawing purple both times?

1. The probability of purple on the first draw is 4/11.
2. Because you replace the tile, the probability of purple on the second draw is also 4/11.
3. Multiply: 4/11 × 4/11 = 16/121.

Answer: 16/121

PRACTICE 6 problems

1 Flip a fair coin twice. What is the probability of heads, then tails? Are the flips independent or dependent?

ANSWER _____

2 A bag holds 2 red beads and 6 blue beads. You draw a bead, replace it, and draw again. What is the probability of red both times?

ANSWER _____

3 A bag holds 2 red beads and 3 blue beads. You draw two beads without replacement. What is the probability of red both times?

ANSWER _____

4 Roll a fair six-sided number cube and flip a fair coin. What is the probability of rolling a 2 and getting tails? Are the events independent or dependent?

ANSWER _____

5 A bag holds 1 black bead and 5 white beads. You draw two beads without replacement. What is the probability of white, then black?

ANSWER _____

6 A bag holds 2 red beads and 8 blue beads. Find the probability of red on both draws with replacement and without replacement. Which probability is greater?

ANSWER _____

APPLY IT Show your work

1 Your music app randomly plays one of 6 pop songs or 2 rap songs. If the app allows repeats, what is the probability of hearing pop twice? If it removes each song after playing it, what is the probability of hearing pop twice? Which probability is greater?

WORK SPACE

ANSWER _____

2 At a gaming club event, a prize box holds 5 controller stickers and 9 keychains. Two players each take one prize without replacement. What is the probability that the first player gets a controller sticker and the second gets a keychain?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A pouch holds 2 silver pins and 6 gold pins. Find the probability of drawing silver, then gold with replacement and without replacement. Which is more likely? Explain why in one sentence.

WORK SPACE AND ANSWER

ANSWER KEY

Does It Change?

GRADE 8 · PA.D.2.3

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Flip a fair coin twice. What is the probability of heads, then tails? Are the flips independent or dependent?	**1/4; independent**
2	A bag holds 2 red beads and 6 blue beads. You draw a bead, replace it, and draw again. What is the probability of red both times?	**1/16**
3	A bag holds 2 red beads and 3 blue beads. You draw two beads without replacement. What is the probability of red both times?	**1/10**
4	Roll a fair six-sided number cube and flip a fair coin. What is the probability of rolling a 2 and getting tails? Are the events independent or dependent?	**1/12; independent**
5	A bag holds 1 black bead and 5 white beads. You draw two beads without replacement. What is the probability of white, then black?	**1/6**
6	A bag holds 2 red beads and 8 blue beads. Find the probability of red on both draws with replacement and without replacement. Which probability is greater?	**With replacement: 1/25. Without replacement: 1/45. With replacement is greater.**

PART 2 · APPLY IT

1. **With repeats: 9/16. Without repeats: 15/28. With repeats is greater.** With repeats, multiply 6/8 × 6/8 = 9/16. Without repeats, multiply 6/8 × 5/7 = 15/28, which is less than 9/16.
2. **45/182** Multiply 5/14 for a sticker on the first pick by 9/13 for a keychain after that sticker is removed. The product is 45/182.

CHALLENGE

With replacement: 3/16. Without replacement: 3/14. Without replacement is more likely because removing a silver pin leaves gold pins as a larger share of the pins in the pouch.

Accept equivalent fractions and decimals with exact values. For comparisons, accept a correct explanation that replacement keeps the second probability the same, while no replacement changes it.