

Name _____ Date _____

Day 5 - Independent and Dependent Events

Independent Events

- Event A occurring does NOT affect the probability of Event B occurring.
- $P(A \text{ and } B) = P(A \cap B) = P(A) \cdot P(B)$

1. A coin is tossed and a 6-sided die is rolled. Find the probability of landing on the head side of the coin and rolling a 3 on the die.

2. A card is chosen at random from a deck of 52 cards. It is then replaced and a second card is chosen. What is the probability of choosing a jack and an eight?

3. A jar contains 3 red, 5 green, 2 blue and 6 yellow marbles. A marble is chosen at random from the jar. After replacing it, a second marble is chosen. What is the probability of choosing a green and a yellow marble?

4. A school survey found that 9 out of 10 students like pizza. If three students are chosen at random with replacement, what is the probability that all three students like pizza?

Dependent Events

- Event A occurring AFFECTS the probability of Event B occurring.
 - Usually you will see the words "WITHOUT REPLACING."
 - $P(A \text{ and } B) = P(A \cap B) = P(A) \cdot P(B|A)$
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5. A jar contains 3 red, 5 green, 2 blue and 6 yellow marbles. A marble is chosen at random from the jar. A second marble is chosen without replacing the first one. What is the probability of choosing a green and a yellow marble?
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6. An aquarium contains 6 male goldfish and 4 female goldfish. You randomly select a fish from the tank, do not replace it, and then randomly select a second fish. What is the probability that both fish are male?
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7. A random sample of parts coming off a machine is done by an inspector. He found that 5 out of 100 parts are bad on average. If he were to do a new sample, what is the probability that he picks a bad part and then, picks another bad part if he doesn't replace the first?
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How to Determine If 2 Events Are Independent:

- Substitute in what you know in to $P(A \cap B) = P(A) \bullet P(B)$ and check to see if left side equals right side.
 - If it's equal, then it's independent.
 - If it's not equal, then it's not independent (or dependent).
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8. Let event M = taking a math class. Let event S = taking a science class. Then, M and S = taking a math class and a science class. Suppose $P(M) = 0.6$, $P(S) = 0.5$, and $P(M \text{ and } S) = 0.3$. Are M and S independent?
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9. In a class, 60% of the students are female. 50% of all students in the class have long hair. 45% of the students are female and have long hair. Of the female students, 75% have long hair. Let F be the event that the student is female. Let L be the event that the student has long hair. One student is picked randomly. Are the events of being female and having long hair independent?
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