ALBERT

Name _____ Date _____

Independent Events Worksheet

Geometry · Common Core HSS-CP.A.2

> Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.

Practice

Builds the skill step by step.

1. A coin is flipped and a number cube is rolled. What is P(heads and 6)?

2. Two coins are flipped. What is P(both heads)?

3. When are events A and B independent?

   A. when P(A and B) = P(A) × P(B)

   B. when P(A or B) = 1

   C. when P(A) = P(B)

   D. when A and B can't happen together

4. A and B are independent, P(A) = 0.5 and P(B) = 0.4. What is P(A and B)?

5. P(A) = 0.3, P(B) = 0.6 and P(A and B) = 0.18. Are A and B independent?

   A. Yes, because 0.3 × 0.6 = 0.18.

   B. No, because 0.3 + 0.6 ≠ 0.18.

   C. No, because 0.18 < 0.3.

   D. You can't tell.

6. P(A) = 0.3, P(B) = 0.6 and P(A and B) = 0.2. Are A and B independent?

   A. No, because $0.3 \times 0.6 = 0.18$, not 0.2.

   B. Yes, because $0.2 < 0.3$.

   C. Yes, because $0.3 + 0.6 < 1$.

   D. You can't tell.

7. A number cube is rolled twice. What is P(6 both times)?

8. A spinner numbered 1 to 4 is spun and a coin is flipped. What is P(3 and heads)?

9. A and B are independent, $P(A) = \frac{1}{3}$ and $P(B) = \frac{3}{4}$. What is P(A and B)?

10. Three coins are flipped. What is P(all heads)?

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On Level

Grade-level practice.

1. The table shows 100 households by pet ownership. A household is chosen at random. What is P(owns a dog and owns a cat)?

	Owns a cat	No cat	Total
Owns a dog	12	18	30
No dog	28	42	70
Total	40	60	100

2. The table shows 100 households by pet ownership. Are owning a dog and owning a cat independent?

	Owns a cat	No cat	Total
Owns a dog	12	18	30
No dog	28	42	70
Total	40	60	100

A. Yes: P(dog) × P(cat) = 0.3 × 0.4 = 0.12 = P(both).

B. No: more households have no pets.

C. No: 12 ≠ 30.

D. You can't tell from a table.

3. The table shows 200 students by grade and whether they have a car. A student is chosen at random. What is P(has a car and is a senior)?

	Juniors	Seniors	Total
Has a car	30	50	80
No car	70	50	120
Total	100	100	200

4. The table shows 200 students by grade and whether they have a car. What is P(has a car) × P(senior)?

	Juniors	Seniors	Total
Has a car	30	50	80
No car	70	50	120
Total	100	100	200

5. The table shows 200 students by grade and whether they have a car. Are having a car and being a senior independent?

	Juniors	Seniors	Total
Has a car	30	50	80
No car	70	50	120
Total	100	100	200

A. No: P(car and senior) $= \frac{1}{4}$ but P(car) × P(senior) $= \frac{1}{5}$.

B. Yes: half the students are seniors.

C. Yes: 50 = 50.

D. You can't tell.

6. A and B are independent. P(A) = 0.7 and P(A and B) = 0.28. What is P(B)?

7. A card is drawn from a standard 52-card deck. A is "heart" and B is "king." Are A and B independent?

   A. Yes: $\frac{1}{4} \times \frac{1}{13} = \frac{1}{52}$ = P(king of hearts).

   B. No: there is only one king of hearts.

   C. No: hearts and kings overlap.

   D. You can't tell.

8. Two cards are drawn without replacement from a standard 52-card deck. Are "first card is an ace" and "second card is an ace" independent?

   A. No: the first draw changes what's left in the deck.

   B. Yes: every card is equally likely.

   C. Yes: aces are always $\frac{1}{13}$.

   D. You can't tell.

9. A player makes 80% of free throws, and shots are independent. What is the probability she makes two in a row?

10. P(A) = 0.5, P(B) = 0.2 and P(A and B) = 0.1. Show whether A and B are independent.

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Challenge

Multi-step and word problems that stretch it.

1. A and B are independent, P(A) = 0.6 and P(B) = 0.5. What is P(A or B)?

2. A and B are independent, P(A) = 0.6 and P(B) = 0.5. What is P(neither A nor B)?

3. A number cube is rolled. A is "even" and B is "1 or 2." Are A and B independent?

   A. Yes: P(A and B) $= \frac{1}{6} = \frac{1}{2} \times \frac{1}{3}$.

   B. No: they share the outcome 2.

   C. No: B is smaller than A.

   D. You can't tell.

4. A number cube is rolled. A is "even" and B is "2 or 4." What is P(A and B)?

5. P(A) = 0.2, P(B) = 0.5, and A and B are mutually exclusive. Are they independent?

   A. No: P(A and B) = 0 but P(A) × P(B) = 0.1.

   B. Yes: mutually exclusive events are always independent.

   C. Yes: 0.2 + 0.5 < 1.

   D. You can't tell.

6. Each part a machine makes is defective with probability 0.05, independently. What is the probability two parts are both fine?

7. A coin is flipped 4 times. What is P(at least one head)?

8. In a table, 20 items are A and B, x are A and not B, 30 are not A and B and 60 are not A and not B. For what x are A and B independent?

9. A and B are independent, P(A) = 0.4 and P(B) = 0.5. What is P(A and not B)?

10. A fair coin lands heads 5 times in a row. What is the probability it lands heads on the next flip?