

Tuesday, October 30, 2012

Reminder: If you have a signed quiz please have it out on your desk while you are working on your TISK problems.

TISK Problems:

- 1) Find the common difference: 21, 11, 5, 3, 5, 11, ...
- 2) Simplify: $-8x + 4y - (6x - 3y)$
- 3) Determine the probability that a fair six-sided spinner lands on a multiple of 4.

No Mental Math today.

Homework:
Independent & Dependent Events worksheet

Homework Check

- 1) 1
- 2) n
- 3) 1
- 4) 21
- 5) 84
- 6) Permutation: 504
- 7) Combination: 20
- 8) Permutation: 720
- 9) Combination: 45
- 10) Combination: 21

Independent & Dependent Events

- What does it mean to be independent?
- Give an example of two random events that would be independent.
- What does it mean to be dependent?
- Can you think of 2 random events that would be dependent?

Two events are independent if the outcomes of one event have no effect on the outcomes of the other event.

Event A: Rolling a 3 on a fair die.
Event B: Spinning a 3 on a fair spinner.

Two events are dependent if the outcomes of the first event change the outcomes of the second event.

Event A: Picking a red card out of a deck of cards.
Event B: Without replacing the first, pick a second red card.

Probability of Independent Events

- The probability that **two independent events** (Event A then Event B) occur is...

$$P(A \text{ then } B) = P(A) \cdot P(B)$$

Example 1.

- A computer randomly generates 4-digit passwords. Each digit can be used more than once. What is the probability that the first 2 digits in your password are both 1?

Step 1. Identify the two events.

Event A. The first digit is 1.

Event B. The second digit is 1.

Step 2. Find $P(A)$ and $P(B)$.

$$P(A) = \frac{1}{10} \quad P(B) = \frac{1}{10}$$

Step 3. Find $P(A) \cdot P(B)$.

$$\frac{1}{10} \cdot \frac{1}{10} = \frac{1}{100}$$

Example 2. You try it.

- What is the probability of rolling a 5 on each of three different 6-sided dice?

Step 1. Identify the three events.

Event A. The roll is a 5.

Event B. The second roll is a 5.

Event C. The third roll is a 5.

Step 2. Find $P(A)$, $P(B)$, and $P(C)$.

$$P(A) = \frac{1}{6} \quad P(B) = \frac{1}{6} \quad P(C) = \frac{1}{6}$$

Step 3. Find $P(A) \cdot P(B) \cdot P(C)$.

$$\frac{1}{6} \cdot \frac{1}{6} \cdot \frac{1}{6} = \frac{1}{216}$$

Probability of Dependent Events

- The probability that *two dependent events* occur is...

$$P(A \text{ then } B) = P(A) \cdot P(B \text{ given } A)$$

Example 3.

- A jar of jelly beans contains 50 red jelly beans, 45 yellow jelly beans, and 30 green jelly beans. You reach into the jar and randomly select a jelly bean, then select another without putting the first jelly bean back. What is the probability that both jelly beans drawn are red?

Step 1. Identify the two events.

Event A. The first jelly bean is red.

Event B. The second jelly bean is red.

Step 2. Find $P(A)$ and $P(B \text{ given } A)$.

$$P(A) = \frac{50}{125} = \frac{2}{5} \quad P(B \text{ given } A) = \frac{49}{124}$$

Step 3. Find $P(A) \cdot P(B \text{ given } A)$.

$$\frac{2}{5} \cdot \frac{49}{124} = \frac{49}{310}$$

Example 4.

Try this one on your own.

- A group of students consists of 6 girls and 7 boys. Two students are chosen at random one at a time. What is the probability that both students who are selected are girls?

Step 1. Identify the two events.

Event A. The first student is a girl.

Event B. The second student is a girl.

Step 2. Find $P(A)$ and $P(B \text{ given } A)$.

$$P(A) = \frac{6}{13} \quad P(B \text{ given } A) = \frac{5}{12}$$

Step 3. Find $P(A) \cdot P(B \text{ given } A)$.

$$\frac{6}{13} \cdot \frac{5}{12} = \frac{5}{26}$$
