

Lesson #22 · Topic 2D · Practice

Name _____

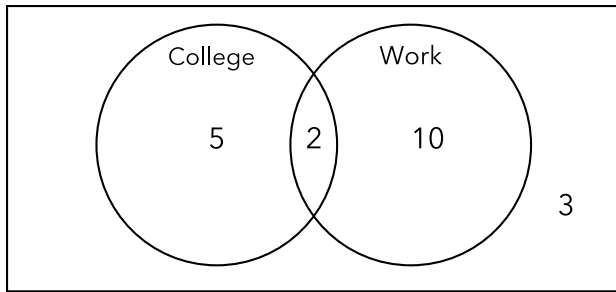
1. A random sample of employed adults was surveyed regarding their work. The two-way table displays the results. Suppose an employed adult from this sample was chosen at random.

Define events X : works full time and Y : works on weekends.

	Works weekends	Does not work on weekends	Total
Full-time	28	72	100
Part-time	8	14	22
Total	36	86	122

- Find $P(X)$. Interpret this value in context.
- Find $P(Y)$. Interpret this value in context.
- Find $P(Y|X)$. Interpret this value in context.
- Find $P(Y|X^C)$. Interpret this value in context.
- Are X and Y independent? Explain what this means in the context of this problem.

2. Pete celebrated his birthday with 20 friends. Each friend introduced themselves and how they knew Pete. Pete made a Venn diagram to represent the results.



Given that the friend knew Pete from college, what is the probability they work with Pete?

3. The probability that a randomly selected individual gets the flu in a particular year is 0.11. The probability that a randomly selected individual is 65 years or older is 0.173. The probability that a randomly selected individual is 65 years or older and gets the flu is 0.006.
- Given that a randomly selected individual is 65 years or older, what is the probability that they get the flu?
 - Given that a randomly selected individual gets the flu, what is the probability that they are 65 years or older?

4. In Peter Liljedahl's research on thinking classrooms, he observed how homework was completed when homework was graded versus when it was not graded. He also noted that students engaged with homework differently. Some completed it individually, some got help to complete it, some completed by copying off others (cheating), and some didn't do it at all. The two-way table displays the results from 200 students in Grades 4-12. Suppose a student is randomly selected.

	Homework graded	Homework not graded
Completely individually	24	28
Got help	33	27
Cheated	25	2
Didn't complete	28	33

a. Are the events "Completed Individually" and "Homework Graded" independent? Justify.

b. Are the events "Got Help" and "Homework Graded" independent? Justify.

5. A company wanted to test the effectiveness of a new digital advertisement for one of the products they sold. To do this, they looked at a random sample of 150 of their customers and sent the new ad to 50 of them. They then recorded whether each of the 150 customers made a purchase for the item in the timespan of one week. Some of the results are given in the table shown.

	Received ad	Did not receive ad
Made purchase		24
Did not make purchase		76

- a. If the ad had no effect on whether a customer purchased the item, what would you expect the counts to be in the missing two entries of the table? Record your answers in the table.
- b. Give a reason for your answer in part (a).
- c. Do you think the company would hope for the events "received ad" and "made purchase" to be independent or NOT to be independent? Explain.

6. The students and teachers at a small high school were asked if they prefer a vanilla or chocolate shake. Their answers are summarized in the table.

	Vanilla	Chocolate	Total
Students	288	238	536
Teachers	17	5	22
Total	305	243	548

Who at this school is more likely to choose vanilla as their preferred shake flavor - a student or a teacher? Justify your answer.

- A) A student because $P(\text{Vanilla}|\text{Student}) > P(\text{Vanilla}|\text{Teacher})$.
- B) A teacher because $P(\text{Vanilla}|\text{Teacher}) > P(\text{Vanilla}|\text{Student})$.
- C) A student because $P(\text{Student}|\text{Vanilla}) > P(\text{Teacher}|\text{Vanilla})$.
- D) A teacher because $P(\text{Teacher}|\text{Vanilla}) > P(\text{Student}|\text{Vanilla})$.
7. A card is selected at random from a standard 52-card deck. The card is looked at, then returned to the deck. The deck is shuffled, and another card is randomly selected. What is the probability that both cards are clubs, given that the first card was black?
- A) $\frac{1}{16}$
- B) $\frac{1}{8}$
- C) $\frac{1}{4}$
- D) $\frac{1}{2}$

8. Suppose that two fair, six-sided dice are rolled. Let A be the event that at least one of the two dice lands on a 5. Let B be the event that the sum of the two dice is 7. Which of the following is true about the events A and B ?
- A) The two events are mutually exclusive and independent.
 - B) The two events are mutually exclusive and not independent.
 - C) The two events are independent and not mutually exclusive.
 - D) The two events are not mutually exclusive and not independent.