# 12-2 Additional Practice

## Conditional Probability

1. The population of a high school is 51% male. Of those who attend a school concert, 45% are male. Are gender and concert attendance dependent or independent events? Explain.

**The table shows the number of one doctor's patients who caught a cold one week and whether or not they exercised regularly.**

|  | Caught a cold | Did not catch a cold |
|---|---|---|
| **Exercised** | 8 | 30 |
| **Did not exercise** | 10 | 2 |

2. Find $P$(did not exercise | did not catch a cold).

3. Find $P$(did not catch a cold | did not exercise).

4. Are the events "did not exercise" and "did not catch a cold" dependent or independent events? Explain.

5. Based on the data in the table, do you think the doctor should recommend that his patients exercise if they want to avoid colds? Explain.

6. A student says that if $P(A) = P(A | B)$ and $P(B) \neq 0$, then $A$ and $B$ must be independent events. Is the student correct? Explain.

7. A softball game has an 80% chance of being cancelled if it rains and a 30% chance of being cancelled if there is fog when there is no rain. There is a 70% chance of fog with no rain and a 30% chance of rain. What is the probability that the game will be cancelled?

# 12-2 Additional Practice

Conditional Probability

1. The population of a high school is 51% male. Of those who attend a school concert, 45% are male. Are gender and concert attendance dependent or independent events? Explain.

   **Dependent: $P(M) = 0.51$, $P(M \mid C) = 0.45$, so $P(M \mid C) \neq P(M)$**

**The table shows the number of one doctor's patients who caught a cold one week and whether or not they exercised regularly.**

|  | Caught a cold | Did not catch a cold |
|---|---|---|
| **Exercised** | 8 | 30 |
| **Did not exercise** | 10 | 2 |

2. Find $P$(did not exercise | did not catch a cold).

   $\dfrac{1}{16}$

3. Find $P$(did not catch a cold | did not exercise).

   $\dfrac{1}{6}$

4. Are the events "did not exercise" and "did not catch a cold" dependent or independent events? Explain.

   **Dependent events since $P$(did not exercise) $= \dfrac{6}{25}$ and $P$(did not catch a cold) $= \dfrac{16}{25}$, which differ from the conditional probabilities found in 3 and 4, respectively.**

5. Based on the data in the table, do you think the doctor should recommend that his patients exercise if they want to avoid colds? Explain.

   **Sample answer: Yes, because $P$(caught a cold | exercised) is about 21% while $P$(caught a cold | did not exercise) is about 83%. It seems that exercising may reduce the chance of catching a cold.**

6. A student says that if $P(A) = P(A \mid B)$ and $P(B) \neq 0$, then $A$ and $B$ must be independent events. Is the student correct? Explain.

   **Yes, if $A$ and $B$ are independent, then the probability of $A$ will be the same whether or not $B$ occurs.**

7. A softball game has an 80% chance of being cancelled if it rains and a 30% chance of being cancelled if there is fog when there is no rain. There is a 70% chance of fog with no rain and a 30% chance of rain. What is the probability that the game will be cancelled?

   **0.45 or 45%**