

## Chapter 5 Multiple Choice Practice

## ANSWER KEY

**Directions.** Identify the choice that best completes the statement or answers the question. Check your answers and note your performance when you are finished.

- The probability that you will win a prize in a carnival game is about  $1/7$ . During the last nine attempts, you have failed to win. You decide to give it one last shot. Assuming the outcomes are independent from game to game, the probability that you will win is:
  - $1/7$
  - $(1/7) - (1/7)^9$
  - $(1/7) + (1/7)^9$
  - $1/10$
  - $7/10$
- A friend has placed a large number of plastic disks in a hat and invited you to select one at random. He informs you that half are red and half are blue. If you draw a disk, record the color, replace it, and repeat 100 times, which of the following is true?
  - It is unlikely you will choose red more than 50 times.
  - If you draw 10 blue disks in a row, it is more likely you will draw a red on the next try.
  - The overall proportion of red disks drawn should be close to 0.50.
  - The chance that the 100<sup>th</sup> draw will be red depends on the results of the first 99 draws.
  - All of the above are true.
- The two-way table below gives information on males and females at a high school and their preferred music format.

	CD	mp3	Vinyl	Totals
Males	146	106	48	300
Females	146	64	40	250
Totals	292	170	88	550

You select one student from this group at random. Which of the following statement is true about the events "prefers vinyl" and "Male"?

- The events are mutually exclusive and independent.
  - The events are not mutually exclusive but they are independent.
  - The events are mutually exclusive, but they are not independent.
  - The events are not mutually exclusive, nor are they independent.
  - The events are independent, but we do not have enough information to determine if they are mutually exclusive.
- People with type O-negative blood are universal donors. That is, any patient can receive a transfusion of O-negative blood. Only 7.2% of the American population has O-negative blood. If 10 people appear at random to give blood, what is the probability that "at least 1" of them is a universal donor?
    - 0
    - 0.280
    - 0.526
    - 0.720
    - 1

↑ is the complement of "none"

$$\text{so } P(\text{at least 1}) = 1 - P(\text{none})$$

$$1 - (.928)^{10}$$

↑

if 7.2% can donate, then 92.8% can't

Mutually exclusive is if the two events cannot occur at the same time.  
 since there are males who prefer vinyl (48 of them) these events are not mutually exclusive

Independent is if  $P(\text{vinyl and males}) = P(\text{vinyl}) \cdot P(\text{males})$

$$\frac{48}{550} \stackrel{?}{=} \frac{88}{550} \cdot \frac{300}{550}$$

5. A die is loaded so that the number 6 comes up three times as often as any other number. What is the probability of rolling a 4, 5, or 6?
- (A)  $2/3$
  - (B)  $1/2$
  - (C)  $5/8$
  - (D)  $1/3$
  - (E)  $1/4$

1	2	3	4	5	6
$1/8$	$1/8$	$1/8$	$1/8$	$1/8$	$3/8$

6. You draw two candies at random from a bag that has 20 red, 10 green, 15 orange, and 5 blue candies without replacement. What is the probability that both candies are red?
- (A) 0.1551
  - (B) 0.1600
  - (C) 0.2222
  - (D) 0.4444
  - (E) 0.8000

$$P(\text{red then red}) = \frac{20}{50} = \frac{19}{49}$$

7. An event A will occur with probability 0.5. An event B will occur with probability 0.6. The probability that both A and B will occur is 0.1.

- (A) Events A and B are independent.
- (B) Events A and B are mutually exclusive.
- (C) Either A or B always occurs.
- (D) Events A and B are complementary.
- (E) None of the above is correct.

$$P(A) = .5 \quad P(B) = .6 \quad P(A \text{ and } B) = .1$$



8. Event A occurs with probability 0.8. The conditional probability that event B occurs, given that A occurs, is 0.5. The probability that both A and B occur is:

- (A) 0.3
- (B) 0.4
- (C) 0.625
- (D) 0.8
- (E) 1.0

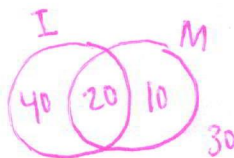
$$\text{formula: } P(B|A) = \frac{P(A \text{ and } B)}{P(A)}$$

$$P(A) = .8 \quad P(B|A) = .5 \quad P(A \text{ and } B) = ?$$

$$.5 = \frac{x}{.8}$$

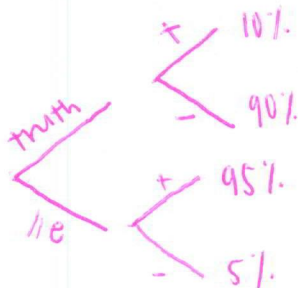
9. At Lakeville South High School, 60% of students have high-speed internet access, 30% have a mobile computing device, and 20% have both. The proportion of students that have neither high-speed internet access nor a mobile computing device is:

- (A) 0%
- (B) 10%
- (C) 30%
- (D) 80%
- (E) 90%



10. Experience has shown that a certain lie detector will show a positive reading (indicates a lie) 10% of the time when a person is telling the truth and 95% of the time when a person is lying. Suppose that a random sample of 5 suspects is subjected to a lie detector test regarding a recent one-person crime. The probability of observing no positive readings if all suspects plead innocent and are telling the truth is:

- (A) 0.409
- (B) 0.735
- (C) 0.00001
- (D) 0.591
- (E) 0.99999



$(.90)^5$   
 ↑  
 negative and telling truth

1. A   2. C   3. B   4. C   5. C   6. A   7. C   8. B   9. C   10. D

## FRAPPY! Free Response AP® Problem, Yay!

The following problem is modeled after actual Advanced Placement Statistics free response questions. Your task is to generate a complete, concise response in 15 minutes. After you generate your response, view two example solutions and determine whether you feel they are “complete”, “substantial”, “developing” or “minimal”. If they are not “complete”, what would you suggest to the student who wrote them to increase their score? Finally, you will be provided with a rubric. Score your response and note what, if anything, you would do differently to increase your own score.

A simple random sample of adults in a metropolitan area was selected and a survey was administered to determine political views. The results are recorded below:

Age	Political Views			Total
	Conservative	Moderate	Liberal	
18-29	10	15	30	55
30-44	20	30	35	85
45-59	35	15	20	70
Over 60	20	15	10	45
Total	85	75	95	255

- (a) What is the probability that a person chosen at random from this sample will have moderate political views?

$$75/255 = \boxed{.294}$$

↑  
 $P(\text{moderate})$

- (b) What is the probability that a person chosen at random from those in the sample who are between the ages of 30 and 44 will have moderate political views? Show your work.

$$P(\text{moderate} | 30-44) = \frac{30}{85} = \boxed{.353}$$

- (c) Based on your answers to (a) and (b), are political views and age independent for the population of adults in this metropolitan area? Why or why not?

If  $P(A|B) = P(A)$  then  
the two events are  
independence

since  $P(\text{moderate} | 30-44) \neq P(\text{moderate})$   
these events are not independent