## S.CP.A.3: Conditional Probability

1 Which situation best describes conditional probability?
1) finding the probability of an event occurring two or more times
2) finding the probability of an event occurring only once
3) finding the probability of two independent events occurring at the same time
4) finding the probability of an event occurring given another event had already occurred

2 Sean's team has a baseball game tomorrow. He pitches 50% of the games. There is a 40% chance of rain during the game tomorrow. If the probability that it rains given that Sean pitches is 40%, it can be concluded that these two events are
1) independent
2) dependent
3) mutually exclusive
4) complements

3 A bag contains five green gumdrops and six red gumdrops. If Kim pulls a green gumdrop out of the bag and eats it, what is the probability that the next gumdrop she pulls out will be red?
1) $\frac{5}{11}$
2) $\frac{5}{10}$
3) $\frac{6}{11}$
4) $\frac{6}{10}$

4 Gabriella has 20 quarters, 15 dimes, 7 nickels, and 8 pennies in a jar. After taking 6 quarters out of the jar, what will be the probability of Gabriella randomly selecting a quarter from the coins left in the jar?
1) $\frac{14}{44}$
2) $\frac{30}{44}$
3) $\frac{14}{50}$
4) $\frac{20}{50}$

5 A fast-food restaurant analyzes data to better serve its customers. After its analysis, it discovers that the events $D$, that a customer uses the drive-thru, and $F$, that a customer orders French fries, are independent. The following data are given in a report:

$$P(F) = 0.8$$

$$P(F \cap D) = 0.456$$

Given this information, $P(F|D)$ is
1) 0.344
2) 0.3648
3) 0.57
4) 0.8

6 Consider the probability statements regarding events $A$ and $B$ below.

$P(A \text{ or } B) = 0.3$;
$P(A \text{ and } B) = 0.2$; and
$P(A|B) = 0.8$

What is $P(B)$?

1) 0.1
2) 0.25
3) 0.375
4) 0.667

7 Suppose events $A$ and $B$ are independent and $P(A \text{ and } B)$ is 0.2. Which statement could be true?

1) $P(A) = 0.4$, $P(B) = 0.3$, $P(A \text{ or } B) = 0.5$
2) $P(A) = 0.8$, $P(B) = 0.25$
3) $P(A|B) = 0.2$, $P(B) = 0.2$
4) $P(A) = 0.15$, $P(B) = 0.05$

8 Some books are laid on a desk. Two are English, three are mathematics, one is French, and four are social studies. Theresa selects an English book and Isabelle then selects a social studies book. Both girls take their selections to the library to read. If Truman then selects a book at random, what is the probability that he selects an English book?

9 The probability that a resident of a housing community opposes spending money for community improvement on plumbing issues is 0.8. The probability that a resident favors spending money on improving walkways given that the resident opposes spending money on plumbing issues is 0.85. Determine the probability that a randomly selected resident opposes spending money on plumbing issues and favors spending money on walkways.

10 A student is chosen at random from the student body at a given high school. The probability that the student selects Math as the favorite subject is $\frac{1}{4}$. The probability that the student chosen is a junior is $\frac{116}{459}$. If the probability that the student selected is a junior or that the student chooses Math as the favorite subject is $\frac{47}{108}$, what is the exact probability that the student selected is a junior whose favorite subject is Math? Are the events "the student is a junior" and "the student's favorite subject is Math" independent of each other? Explain your answer.

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## Answer Section

1 ANS: 4 REF: 012008aii

2 ANS: 1
The probability of rain equals the probability of rain, given that Sean pitches.

REF: 061611aii

3 ANS: 4 REF: 011308ia

4 ANS: 1
$$\frac{20-6}{(20-6)+15+7+8} = \frac{14}{44}$$

REF: 061302ia

5 ANS: 4 REF: 081824aii

6 ANS: 2
$P(B) \cdot P(A|B) = P(A \text{ and } B)$

$$P(B) \cdot 0.8 = 0.2$$

$$P(B) = 0.25$$

REF: 081913aii

7 ANS: 2
(1) $0.4 \cdot 0.3 \neq 0.2$, (2) $0.8 \cdot 0.25 = 0.2$, (3) $P(A|B) = P(A) = 0.2$, (4) $0.2 \neq 0.15 \cdot 0.05$

$$0.2 \neq 0.2 \cdot 0.2$$

REF: 011912aii

8 ANS:
$\frac{1}{8}$. After the English and social studies books are taken, 8 books are left and 1 is an English book.

REF: 060933ia

9 ANS:
$P(A+B) = P(A) \cdot P(B|A) = 0.8 \cdot 0.85 = 0.68$

REF: 011928aii

10 ANS:
$$\frac{47}{108} = \frac{1}{4} + \frac{116}{459} - P(M \text{ and } J); \text{ No, because } \frac{31}{459} \neq \frac{1}{4} \cdot \frac{116}{459}$$

$$P(M \text{ and } J) = \frac{31}{459}$$

REF: 011834aii