Probability: Final Exam Prep

Math II

Name: _____

Directions: The following questions are sample items similar to those found on the EOC Exam. Answer each to the best of your ability.

1. Events M and N have probabilities such that $P(M) = 0.4$, $P(N) = 0.28$, $P(M \cup N) = 0.56$, and $P(M \cap N) = 0.12$. Are event M and event N independent?

   A no, because $P(M) - P(N) = P(M \cap N)$

   (B) no, because $P(M) \cdot P(N) \neq P(M \cap N)$

   C yes, because $P(M) + P(N) = P(M \cup N)$

   D yes, because $P(M) \cdot P(N) \neq P(M \cup N)$

   $P(M \cap N) = P(M) \cdot P(N)$
   $0.12 = (0.4)(0.28)$
   $0.12 \neq 0.112$

2. Brittany can choose to travel by bus or train.

   - The probability of the bus arriving late at Brittany's destination is 33%.
   - The probability of the train arriving late at Brittany's destination is 10%.
   - Because the price of a bus ride is cheaper, Brittany chooses the bus 80% of the time.

   $\dfrac{0.536}{0.716}$

   What is the **approximate** probability that Brittany took the bus, given that she did not arrive late to her destination?

   A 0.67

   (B) 0.75

   C 0.80

   D 0.93

	BUS	Train	Total
on time	$.67(0.8) = 0.536$	$0.9(0.2) = 0.18$	0.716
Late	$0.33(0.8) = 0.264$	$0.1(0.2) = 0.02$	0.284
Total	0.8	0.2	1

3. There are 250 students in a senior class.

   - Of the 250 students, 102 are boys.
   - There are 20 senior girls and 18 senior boys on the track team.

   What is the probability a randomly chosen student from the senior class is a girl who does not run track?

   A 0.920

   (B) 0.512

   C 0.497

   D 0.135

   $\dfrac{128}{250}$

	Track	No Track	Total
Boys	18	84	102
Girls	20	128	148
Total	38	212	250

   $\dfrac{128}{250}$

   $\dfrac{128}{250}$

4. Twenty-one students at a school have an allergy to peanuts, shellfish, or both.

- Fourteen students at the school are allergic to peanuts.
- Twelve students at the school are allergic to shellfish.

How many of the students are allergic to both peanuts and shellfish?

A 12

B 7

C 5

D 2

(handwritten: 14 + 12 = 26; 26 − 21 = 5)

5. The frequency table below shows the age distribution of people at a park.

	0–19 years	20–39 years	40–59 years	60–70 years	80–99 years
Male	50	18	12	4	2
Female	42	18	14	6	1

What is the probability a randomly selected person at the park is a female, given that the person is under 40 years old? *conditional prob.*
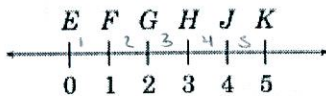
A $\frac{60}{167}$

B $\frac{15}{32}$

C $\frac{1}{2}$

D $\frac{60}{81}$

(handwritten: under 40 Total = 128, woman = 60, $\frac{60}{128} = \frac{15}{32}$)

6. A number line is shown below.

$$E \quad F \quad G \quad H \quad J \quad K$$
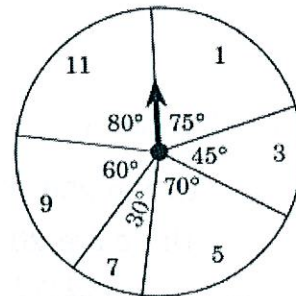$$0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5$$

Point P will be picked at random on $\overline{EK}$. What is the probability that P will be on $\overline{FK}$?

A $\frac{4}{6}$

B $\frac{3}{4}$

C $\frac{4}{5}$

D $\frac{5}{6}$

(handwritten: $\frac{4}{5}$)

7. In order to win a game, Sheila must spin a 7 on the spinner below.

If the spinner is fair, what is the probability that she will spin a 7?

A $\frac{1}{12}$

B $\frac{1}{6}$

C $\frac{3}{10}$

D $\frac{5}{12}$

(handwritten: $\frac{30°}{300°} = \frac{1}{12}$)

A total of 540 customers, who frequented an ice cream shop, responded to a survey asking if they preferred chocolate or vanilla ice cream.

- 308 of the customers preferred chocolate ice cream.
- 263 of the customers were female.
- 152 of the customers were males who preferred vanilla ice cream.

What is the probability that a customer chosen at random is a male or prefers vanilla ice cream?

A $\frac{419}{540}$

B $\frac{119}{180}$

C $\frac{197}{540}$

D $\frac{38}{135}$

	Chocolate	Vanilla	Total
Male	125	152	277
Female	183	80	263
Total	308	232	540

$$\frac{277}{540} + \frac{232}{540} - \frac{152}{540} = \frac{357}{540} = \frac{119}{180}$$

9. Suppose that Jamal can choose to get home from work by taxi or bus.

- When he chooses to get home by taxi, he arrives home after 7 p.m. 8 percent of the time.
- When he chooses to get home by bus, he arrives home after 7 p.m. 15 percent of the time.
- Because the bus is cheaper, he uses the bus 60 percent of the time.

0.09

0.122

What is the **approximate** probability that Jamal chose to get home from work by bus, given that he arrived home after 7 p.m.?

A 0.09

B 0.14

C 0.60

D 0.74

	BUS	Taxi	Total
B7	$0.85(0.6) = 0.51$	$0.92(0.4) = 0.368$	0.878
A7	$0.15(0.6) = 0.09$	$0.08(0.4) = 0.032$	0.122
Total	0.60	0.40	1

10. Twenty-one students at a school have an allergy to peanuts, shellfish, or both.

- Fourteen students at the school are allergic to peanuts.
- Twelve students at the school are allergic to shellfish.

How many of the students are allergic to both peanuts and shellfish?

A 12

B 7

C 5

D 2

$$\begin{array}{r} 14 \\ +12 \\ \hline 26 \end{array} \qquad \begin{array}{r} 26 \\ -21 \\ \hline 5 \end{array}$$

11. For a carnival game, a jar contains 20 blue marbles and 80 red marbles.

- Children take turns randomly selecting a marble from the jar.
- If a blue marble is chosen, the child wins a prize.
- After each turn, the marble is replaced.
- Casey has drawn six red marbles in a row.

Which statement is true?

A   If Casey selects another red marble, then 2 of her next 3 picks will be blue marbles because 2 blue marbles are selected for every 8 red marbles selected.

B   The probability that Casey selects a blue marble on the next turn is higher than it was on her last turn because she has chosen so many red marbles in a row.

C   The probability that Casey selects a blue marble on her next turn is the same as it was on the last turn because selections are independent of each other.

D   If Casey draws 4 more times, she will select 2 blue marbles because the probability that a blue marble will be selected is 2 out of every 10 turns.

12. A point is chosen at random inside rectangle PQRS.
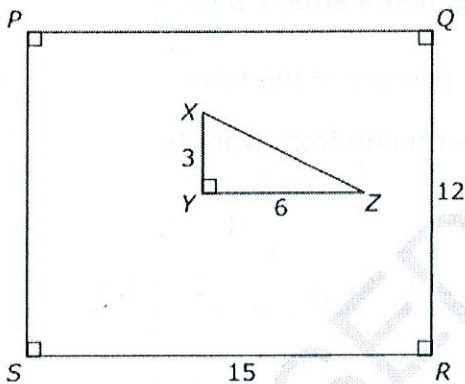
What is the probability that the point is inside $\triangle XYZ$?

A $\frac{1}{3}$

B $\frac{1}{6}$

C $\frac{1}{10}$

D $\frac{1}{20}$

$A_\triangle = \frac{(3)(6)}{2} = \frac{18}{2} = 9$

$A_\square = (15)(12) = 180$

$\frac{9}{180} = \frac{1}{20}$

13. If a point is chosen at random on $\overline{AG}$, what is the probability that the point will be on $\overline{BE}$?

A   0

B $\frac{1}{4}$

C $\frac{1}{2}$

D   1

$\frac{3}{6} = \frac{1}{2}$