

**SOML MEET 4**  
**EVENT 3**  
**Probability**

**NAME:** \_\_\_\_\_  
**TEAM:** \_\_\_\_\_  
**SCHOOL:** \_\_\_\_\_

1. [2 Points] In a certain lottery, people are asked to select three whole numbers between 1 and 11, inclusive. After all of the lottery tickets have been sold, three of those numbers are randomly selected. Participants win a million dollars if they selected all three of the winning numbers. The order in which the numbers are chosen is unimportant. If you buy just one lottery ticket, what is the probability that you will win the million dollars? Express your answer as a simplified fraction.

ANS: \_\_\_\_\_

2. [3 Points] When three six-sided dice (each with faces marked with the whole numbers 1 through 6) are rolled, what is the probability that a six is showing on at least one of the dice? Express your answer as a simplified fraction.

ANS: \_\_\_\_\_

3. [5 Points] At a certain movie theater, there are seven empty seats in a row. If two people sit in adjacent seats, they will have to share an armrest. Three students are randomly seated into three of these seven seats. What is the probability that no two students will have to share an armrest? Express your answer as a simplified fraction.

ANS: \_\_\_\_\_

**SOML MEET 4**  
**EVENT 3**  
**Probability**

**NAME:** KEY  
**TEAM:** \_\_\_\_\_  
**SCHOOL:** \_\_\_\_\_

1. [2 Points] In a certain lottery, people are asked to select three whole numbers between 1 and 11, inclusive. After all of the lottery tickets have been sold, three of those numbers are randomly selected. Participants win a million dollars if they selected all three of the winning numbers. The order in which the numbers are chosen is unimportant. If you buy just one lottery ticket, what is the probability that you will win the million dollars? Express your answer as a simplified fraction.

**Solution:** The possible number of possible combinations is  $\binom{11}{3}$ , which is sometimes written  ${}_{11}nCr\ 3$ , the value of which is 165. Since only one of those combinations will be the winner, the probability of winning is  $\frac{1}{165}$ .

**ANS:** 1/165

2. [3 Points] When three six-sided dice (each with faces marked with the whole numbers 1 through 6) are rolled, what is the probability that a six is showing on at least one of the dice? Express your answer as a simplified fraction.

**Solution:** Start by finding the probability that a six *is not* showing on any of the three dice.

That probability is  $(\frac{5}{6})(\frac{5}{6})(\frac{5}{6})$ , or  $\frac{125}{216}$ .

The probability that at least one six is showing is  $1 - \frac{125}{216}$ , or  $\frac{91}{216}$ .

**ANS:** 91/216

3. [5 Points] At a certain movie theater, there are seven empty seats in a row. If two people sit in adjacent seats, they will have to share an armrest. Three students are randomly seated into three of these seven seats. What is the probability that no two students will have to share an armrest? Express your answer as a simplified fraction.

**Solution:** There will be a random selection of which three seats will be occupied. This can be done in  $\binom{7}{3}$  ways. This is sometimes written as  ${}_{7}nCr\ 3$ . Thus, there are 35 possible selections. If the seats are numbered consecutively (using the numbers 1 through 7), the following arrangements will have no two people sitting in adjacent seats:

1, 3, 5      2, 4, 6      3, 5, 7  
1, 3, 6      2, 4, 7  
1, 3, 7      2, 5, 7  
1, 4, 6  
1, 4, 7  
1, 5, 7

Thus, the probability is  $\frac{10}{35}$ , which simplifies to  $\frac{2}{7}$ .

**ANS:** 2/7