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Probability and statistics

4/7/2021
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Understanding Basic Statistics

QUIZ-Elementary Probability Theory

Directions: Provide complete responses to each question.

1. Use the following table to answer questions (a)-(e):

The following table gives the two-way classification of 500 students based on sex and whether or not they suffer from math anxiety.

Suffer from math anxiety

Sex	**YES**	**NO**
Male	167	73
Female	168	92

(a) If you randomly select one student from these 500 students, the probability that this selected student is a female is: (round your answer to three decimal places, so 0.0857 would be 0.086)

168 + 92 = 260, 260 / 500 = 0.52

Answer: 0.52

(b) If you randomly select one student from these 500 students, the probability that this selected student suffers from math anxiety is: (round your answer to three decimal places, so 0.0857 would be 0.086)

167 + 168 = 335 335 / 500 = 0.67

Answer: 0.67

(c) If you randomly select one student from these 500 students, the probability that this selected student suffers from math anxiety, given that he is a male is: (round your answer to three decimals places, so 0.0857 would be 0.086)

167 + 73 = 240 167 / 240 = 0.666666667

Answer: 0.667

(d) If you randomly select one student from these 500 students, the probability that this selected student is a female, given that she does not suffer from math anxiety is: (round your answer to three decimal places, so 0.0857 would be 0.086)

92 + 168 = 260 92 / 260 = 0.3538

Answer: 0.354

(e) Which of the following pairs of events are mutually exclusive? (Note: Make only one choice from the following options)

1) Female and male

4) Male and no

2) Female and no

5) Male and yes

3) Female and yes

6) No and yes

Answer: No and yes

2. The athletic department of a school has 12 full-time coaches, and 4 of them are female. The director selects two coaches at random from this group. The probability (to three decimal places) that neither of them is a female is:
4 female coaches

8 male coaches

Probability of no female coaches = 8C2 (8*7) / (1*2) = 56 / 2 = 28

Random pairs in general = 12C2 (12*11) / (1*2) = 132 / 2 = 66, 28 / 66 = 0.424

Answer: 0.424

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3. The probability that an adult possesses a credit card is 0.71. A researcher selects two adults at random. The probability (rounded to three decimal places) that the first adult possesses a credit card and the second adult does not possess a credit card is:

0.1 – 0.71 = 0.29

0.29 * 0.71 = 0.2059

Answer : 0.206

4. The probability that a student at a university is a male is 0.52, that a student is a business major is 0.17, and that a student is a male and a business major is 0.08. The probability that a randomly selected student from this university is a male or a business major is:

Male student = 0.52

Business student= 0.17

P(Male student) + P(business student) – P(both male and busines student)

0.52 + 0.17 = 0.69

0.69 – 0.08 = 0.61

Answer: 0.61

5. There are 12 people on a basketball team, and the coach needs to choose 5 to put into a game. How many

different possible ways can the coach choose a team of 5 if each person has an equal chance of being selected?

(1) 12P5

(3) 12C5

(2) 5P12

(4) 5C12

Answer: Answer choice (1) 12P5

6. Six members of a school's varsity tennis team will march in a parade. How many different ways can the players be lined up if Angela, the team captain, is always at the front of the line?

Answer: 5! = 5*4*3*2*1= 20*3*2*1 = 60*2*1= 120*1

Answer = 120

7. How many different five-member teams can be made from a group of eight students, if each student has an equal chance of being chosen?

(1) 40

(3) 336

(2) 56

(4) 6,720

8! / 5! (8! – 5!) = (8 * 7 * 6 * 5 *4 * 3 *2 *1) /(5 * 4 *3 *2 *1) (3 * 2 *1) = 8*7

Answer : 56

8. A certain state is considering changing the arrangement of letters and numbers on its license plates. The two options the state is considering are:

Option 1: three letters followed by a four-digit number with repetition of both letters and digits allowed

Option 2: four letters followed by a three-digit number without repetition of either letters or digits

[Zero may be chosen as the first digit of the number in either option.]

Which option will enable the state to issue more license plates? How many more different license plates will that option yield?

26 letters in the alphabet

There are 10 single digit numbers (0 , 1, 2 …..)

Option 1 you can repeat letters and numbers

Option 1 (26 * 26 * 26 * 10 * 10 * 10 * 10)

Option 1: 17,576 * 10,000

Option 1: 175,760,000

Option 2 you cannot repeat numbers or letters

Option 2 : (26 * 25 * 24 * 23 * 10 * 9 * 8)

Option 2: 358,800 * 720

Option 2 : 258,336,000

258,336,000 – 175,760,000 = 82,576,000

Answer: option 2 will yield 82,576,000 more license plates

9. In a game, each player receives 5 cards from a deck of 52 different cards. How many different groupings of cards

are possible in this game?

(1) 52P5

(3)5!/52!

(2) 52C5

(4) 5!

Answer: Answer choice (2) 52C5

10. How many different three-member teams can be selected from a group of seven students?

(1) 1

(3) 210

(2) 35

(4) 5,040

(7 * 6 * 5 * 4 * 3 * 2 *1) / 4 * 3 * 2 *1 (3 * 2 * 1) = 7 * 6 * 5 / 6 = 7 * 5

Answer : Answer choice (2) 35

11. An algebra class of 21 students must send 5 students to meet with the principal. How many different groups of 5 students could be formed from this class?

21! / (5! * (21-5)!) = 21! / 5! * 16! = 21 * 20 * 19 * 18 * 17 / 16 * 15 * 14 * 13 …. (5 * 4 * 3 * 2 * 1 = 2,441, 880 / 120 = 20,349

Answer: 20,349

12. The value of 3! / 7! is

(1) 840

(3) 7

(2) 24

(4) 4

7* 6 * 5 * 4 *3 * 2 *1 / 3* 2 * 1 = 7 * 6 * 5 * 4 = 840

Answer: Answer choice (1) 840

13. The expression 9C2 is equivalent to

(1) 9P2

(3) 9C7

(2) 9P7

(4) 2! / 9!

Answer: Answer choice (3) 9C7

14. Max goes through the cafeteria line and counts seven different meals and three different desserts that he can choose. Which expression can be used to determine how many different ways Max can choose a meal and a dessert?

(1) 7•3

(3) 7C3

(2) 7! •3!

(4) 7P3

Answer: Answer choice (1) 7*3

15. If the Math Olympiad Club consists of eighteen students, how many different teams of four students can be formed for competitions?

(1) 66

(3) 3,060

(2) 72

(4) 73,440

18! / 4! * 14! = 18 * 17 * 16 * 15 / 4 * 3 * 2 *1 = 73,440 / 24 = 3,060

Answer: Answer choice (3) 3,060

16. In the next Olympics, the United States can enter four athletes in the diving competition. How many different teams of four divers can be selected from a group of nine divers?

(1) 36

(3) 3,024

(2) 126

(4) 6,561

9* 8 * 7 * 6 / 4 * 3 *2 *1= 3024 / 24 = 126

Answer: (2) 126

17. Five friends met for lunch, and they all shook hands. Each person shook the other person's right hand only once. What is the total number of handshakes?

5 * 4 / 2 *1 = 20 / 2 = 10

Answer: 10

18. A committee of five members is to be randomly selected from a group of nine freshmen and seven sophomores. How many different committees of three freshmen and two sophomores can be chosen?

9 * 8 * 7 / 3 * 2 * 1 = 504 / 6 = 84

7 * 6 / 2 * 1 = 42 / 2 = 21

21* 84 = 1,764

Answer: 1,764

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19. On a bookshelf, there are five different mystery books and six different biographies. How many different sets of four books can Emilio choose if two of the books must be mystery books and two of the books must be biographies?

5 * 4 * 3 * 2 *1 / 2 * 1 * 3 * 2 * 1 = 5 * 4 / 2* 1 = 20 / 2 = 10

6 * 5 * 4 * 3 * 2 * 1 / 2 * 1 * 4 * 3 * 2 *1 = 6 * 5 / 2 * 1 = 30 / 2 = 15

10 * 15 = 150

Answer : 150