Algebra 2 - 3416
Chapter 11 - Probability Unit Review

Name: KEY
Date: _____ **Period:** _____

1.) How many different 12-member juries can be chosen from a pool of 32 people?

$_{32}C_{12} = 225,792,840$

2.) A test consists of 20 questions, but you are told to answer only 15. In how many different ways can you choose the 15 questions?

$_{20}C_{15} = 15,504$

3.) In math class, there are 24 students. The teacher picks 4 students to help do a demonstration. How many different groups of 4 could she have chosen?

$_{24}C_{4} = 10,626$

4.) Irene's Ice Cream serves 10 flavors of ice cream, 4 kinds of syrup and 6 varieties of toppings. How many different sundaes can you make if each cone has 2 flavors of ice cream, 2 kinds of syrup, and 3 toppings?

$_{10}C_{2} \cdot {}_{4}C_{2} \cdot {}_{6}C_{3} = 5400$

$45 \cdot 6 \quad 20$

5.) A sandwich shop offers 4 different types of meat, 5 choices of bread, and 3 choices for cheese. How many different types of sandwiches are possible if you are choosing one of each item?

$4 \cdot 5 \cdot 3 = 60$

6.) There are 15 questions on a test. Of the first 8 questions on the test, a student must answer 6 of them. Of the next 7 questions, 4 must be answered. In how many ways can this be done?

$_{8}C_{6} \cdot {}_{7}C_{4} = 980$

$28 \cdot 35$

7.) Katie, Brittany, Megan, and Kristin are going to race. How many ways could we get 1st, 2nd, and 3rd place winners from the 4 girls?

$4 \cdot 3 \cdot 2 \cdot 1 = 4! = {}_{4}P_{4} = 24$

8.) Suppose that 7 people enter a swim meet. Assuming that there are no ties, in how many ways could the gold, silver, and bronze medals be awarded?

$7 \cdot 6 \cdot 5$ or ${}_{7}P_{3} = 210$

9.) There are 25 people who work in an office together. Five of these people are selected to attend five different conferences. The first person selected will go to a conference in Hawaii, the second will go to New York, the third will go to San Diego, the fourth will go to Atlanta, and the fifth will go to Nashville. How many such selections are possible? Hint: Does order matter here?

$25 \cdot 24 \cdot 23 \cdot 22 \cdot 21$ or ${}_{25}P_5 = 6{,}375{,}600$

10.) How many different distinguishable ways can the letters from the words below be rearranged?

a.) MATH

$\frac{4!}{0!} = 24$

b.) PERMUTATIONS

$\frac{12!}{2!} = 239{,}500{,}800$

T

c.) COMBINATIONS

$\frac{12!}{2!\,2!\,2!} = 59{,}875{,}200$

O N I

d.) PROBABILITY

$\frac{11!}{2!\,2!} = 9{,}979{,}200$

I B

11.) Brittany gets a box of chocolates from her husband for their anniversary. The box contains 6 chocolate covered cherries, 5 milk chocolate coconut creams, 7 dark chocolate truffles, and 6 milk chocolate butter cream caramels. She decides to not look at the insert that tells her which one is which and grabs one from the box. Find each of the probabilities.

24 CHOCOLATES

a.) P(1Dark Chocolate Truffle)

$\frac{7}{24} = 0.2917 = 29.17\%$

b.) P(Chocolate Covered Cherry, Coconut Cream, Butter Cream without replacement)

$\frac{6}{24} \cdot \frac{5}{23} \cdot \frac{6}{22} = \frac{180}{12144} = \frac{15}{1012} = 0.015 = 1.5\%$

c.) P(4 Chocolate Covered Cherries without replacement)

$\frac{6}{24} \cdot \frac{5}{23} \cdot \frac{4}{22} \cdot \frac{3}{21} = \frac{360}{255024} = \frac{5}{3542} = 0.001 = 0.1\%$

or $\frac{{}_6C_4}{{}_{24}C_4}$

d.) P(Coconut Cream, Chocolate Truffle, Butter Cream with replacement)

$\frac{5}{24} \cdot \frac{7}{24} \cdot \frac{6}{24} = \frac{210}{13824} = \frac{35}{2304} = 0.015 = 1.5\%$

12.) Students were surveyed on whether or not they get an allowance for completing chores at home. The results are in the table below.

	Allowance	No Allowance	Total
Chores	60	48	108
No Chores	18	24	42
Total	78	72	150

Let event 'C' be the probability of chores, 'NC' is the probability of no chores, 'A' is allowance, and 'NA' is no allowance. Find the following probabilities.

a.) What is the probability that students receive allowance given they do chores?

$$\frac{60}{108} = \frac{5}{9} = .56 = 56\%$$

b.) What is the probability that students do not receive an allowance given they do chores?

$$\frac{48}{108} = \frac{4}{9} = .44 = 44\%$$

c.) What is the probability that students do not get an allowance given they do not do chores?

$$\frac{24}{42} = \frac{4}{7} = .57 = 57\%$$

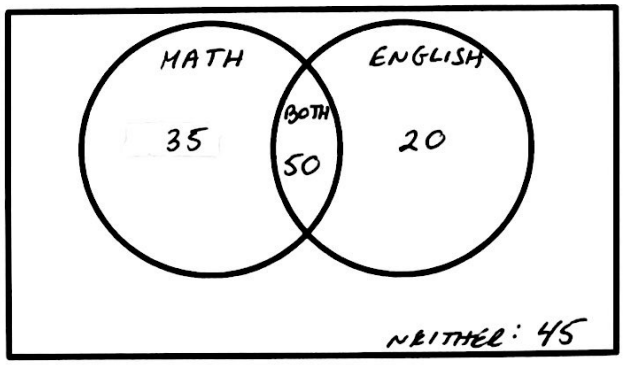
d.) We know the students do not do chores but what is the probability they get an allowance?

$$\frac{18}{42} = \frac{3}{7} = 0.43 = 43\%$$

13.) You go to a sandwich with some friends and are trying to decide what sandwich to order. There are (6) types of bread, (8) types of meat, (3) cheeses, and (12) types of vegetables. How many different types of sandwiches are there to choose from?

$$\underline{6} \cdot \underline{8} \cdot \underline{3} \cdot \underline{12} = 1728$$

14.) 150 college freshman were interviewed about their classes. Of these students, 85 were registered for a Math class, 70 were registered for an English class, and 50 students were registered for both classes.



a.) How many students only signed up for a math class?

35

b.) How many students signed up for only an English class?

20

c.) How many students signed up for Math or English?

55

d.) How many students were not signed up for either Math or English?

45

15.) Meghan has three pairs of pants, 5 shirts and 2 pairs of shoes. How many outfits can she make?

$3 \cdot 5 \cdot 2 = 30$

16.) Pennsylvania license plates have 3 letters *followed* by 4 numbers. Find the number of possibilities for license plates if the following restrictions are in place?

a.) If the same letter or number can be repeated, how many can be made?

$\underbrace{26 \cdot 26 \cdot 26}_{\text{ABC's}} \cdot \underbrace{10 \cdot 10 \cdot 10 \cdot 10}_{\text{\#'s}} = 175{,}760{,}000$

b.) If the same letter CANNOT be repeated, how many can be made?

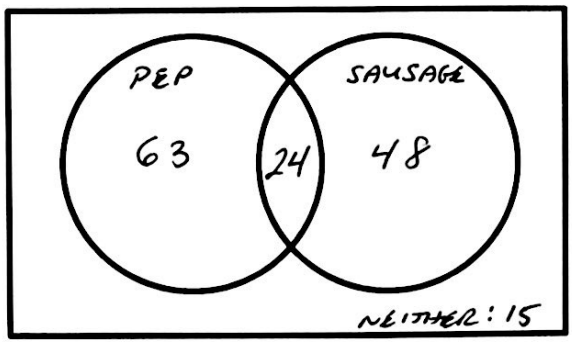
$26 \cdot 25 \cdot 24 \cdot 10 \cdot 10 \cdot 10 \cdot 10 = 156{,}000{,}000$

c.) If the first letter must be a letter between A and H.

NO REPEATS $8 \cdot 7 \cdot 6 \cdot 10 \cdot 9 \cdot 8 \cdot 7 = 1{,}693{,}440$

REPEATS $8 \cdot 8 \cdot 8 \cdot 10 \cdot 10 \cdot 10 \cdot 10 = 5{,}120{,}000$

17.) Students at Jacob's High School were asked what type of pizza they prefer. Out of the 150 students surveyed, 0.42 said they preferred pepperoni pizza, 0.32 said they preferred sausage pizza and 0.16 said they preferred both types of pizza. Use this information to fill out the venn diagram and then answer the questions below.



a.) P(only like pepperoni pizza)

$\frac{63}{150} = \frac{21}{50} = .42 = 42\%$

b.) How many students do not prefer pepperoni or sausage?

15

c.) How many students only like both pepperoni and sausage?

24

d.) P(only like sausage pizza)

$\frac{48}{150} = \frac{8}{25} = .32 = 32\%$

18.) Given a class with 10 boys and 12 girls...

a.) In how many ways can a committee of five consisting of 3 girls and 2 boys be chosen?

$_{12}C_3 \cdot {}_{10}C_2 = 220 \cdot 45 = 9900$

b.) In how many ways can a committee of five be chosen when the committee must have at least 3 boys?

$_{12}C_2 \cdot {}_{10}C_3 + {}_{12}C_1 \cdot {}_{10}C_4 + {}_{12}C_0 \cdot {}_{10}C_5 =$

$(66 \cdot 120) + (12 \cdot 210) + (1 \cdot 252) = 10,692$

c.) In how many ways can a committee of five be chosen when the committee must have at least 2 girls?

$_{12}C_2 \cdot {}_{10}C_3 + {}_{12}C_3 \cdot {}_{10}C_2 + {}_{12}C_4 \cdot {}_{10}C_1 + {}_{12}C_5 + {}_{10}C_0$

$(66 \cdot 120) + (220 \cdot 45) + (495 \cdot 10) + (792 \cdot 1) = 23,562$

d.) What is the probability that a committee of five, chosen at random from the class, consists of three girls and two boys?

$\frac{{}_{12}C_3 \cdot {}_{10}C_2}{{}_{22}C_5} = \frac{9900}{26334} = \frac{50}{133} = 0.38 = 38\%$

19.) You go to a friend's house for a movie day. Your friend has (12) Disney movies, (5) horror movies, (6) action movies, (10) comedies, and (4) dramas. You decide you both have enough time to watch 4 movies. Find each of the probabilities.

a.) P(2 Disney, 1 drama, 1 action)

$$\frac{{}_{12}C_2 \cdot {}_4C_1 \cdot {}_6C_1}{{}_{37}C_4} = \frac{1584}{66045} = 0.024 = 2.4\%$$

b.) P(4 comedies)

$$\frac{{}_{10}C_4}{{}_{37}C_4} = \frac{210}{66045} = \frac{2}{629} = 0.003 = 0.3\%$$

c.) P(2 horror, 1 Disney, 1 drama)

$$\frac{{}_5C_2 \cdot {}_{12}C_1 \cdot {}_4C_1}{{}_{37}C_4} = \frac{480}{66045} = \frac{32}{4403} = .007 = 0.7\%$$

d.) P(1 Disney, 1 comedy, 1 drama, 1 action)

$$\frac{{}_{12}C_1 \cdot {}_{10}C_1 \cdot {}_4C_1 \cdot {}_6C_1}{{}_{37}C_4} = \frac{2880}{66045} = \frac{192}{4403} = 0.044 = 4.4\%$$

20.) The students of Marvelous Middle School voted on their favorite animal and the votes were tabulated in the table to the right. Use the information to answer the questions below.

	Lions	Bears	Total
6th	78	51	129
7th	63	71	134
8th	48	86	134
Total	189	208	397

a.) Find P(6th grader likes the Bears)

$$\frac{51}{129} = 0.40 = 40\%$$

b.) Find P(Bear lover is in 8th grade)

$$\frac{86}{208} = \frac{43}{104} = 0.41 = 41\%$$

c.) Find P(a student is a 7th grader)

$$\frac{134}{397} = 0.34 = 34\%$$