

Sandwich Shoppe:

4 breads

3 cheeses

5 meats

6 other toppings

1 bread 2 cheese 3 meats 4 others
 $4C_1$ $3C_2$ $5C_3$ $6C_4$

1800 sandwiches w/ 1 bread, 2 cheese, 3 meats,
4 other toppings

If I buy a sandwich with 10 options, find the probability the options are 1 bread, 2 cheese, 3 meat, 4 others?

$$\frac{4C_1 \cdot 3C_2 \cdot 5C_3 \cdot 6C_4}{18C_{10}} = \frac{1800}{43758}$$

$$\frac{100}{2431} = 0.041 = 4.1\%$$

Combinations and Permutations

1. You are packing for a trip. You have 8 shirts, 6 pairs of pants/shorts, and 4 pairs of appropriate for the location. Because of space, you may only bring 6 shirts, 4 pairs of pants, and 2 pairs of shoes. How many different ways can you pack for the trip?

$$8C_6 \cdot 6C_4 \cdot 4C_2 = 2520$$

2. A bag has 12 glass marbles, 9 composite, and 6 plastic marbles. If 6 marbles are selected at random, find the probability of selecting:

a. 4 composite marbles and 2 plastic (fraction)

b. 6 glass or 6 composite marbles (decimal)

$$\frac{9C_4 \cdot 6C_2}{27C_6} = \frac{1890}{296016} = \frac{21}{3287}$$

$$\frac{9C_6 + 12C_6}{27C_6} = \frac{1008}{296016}$$

.003 .3%

3. You have 20 toy cars. Your friend has 28 toy cars. The two of you decide to share 18 cars with a third friend. What is the probability that exactly 10 of the cars selected belong to you? Give your answer as a decimal.

$$\frac{\text{Your } 20C_{10} \cdot \text{Friend } 28C_8}{48C_{18}} = .079$$

7.9%

4. There are 18 apples in a display at a grocery and you must select 10 to take advantage of a sale. If 12 of the apples are honey crisp, what is the probability that 6 of the selected apples are honey crisp? Give your answer as a simplified fraction.

$$\frac{12C_6 \cdot 6C_4}{18C_{10}} = \frac{70}{221}$$

Permutation/Combination Worksheet

Advanced Functions & Modeling

Name _____

1. In how many ways can you arrange 8 different shirts on hangers in the closet?

$$8! = {}_8P_8 = 40320$$

2. Six people wish to play cards, but only 4 of them at a time can play. How many different groups of 4 are possible?

$${}_6C_4 = 15$$

3. The choices for a sandwich are 4 different ^{meats}, 5 different cheeses and 3 breads. How many different sandwiches of 2 meats, 2 cheeses and 1 bread could you make?

$${}_4C_2 \cdot {}_5C_2 \cdot {}_3C_1 = 180$$

4. 5 apples, 7 oranges and 4 peaches are mixed in a fruit box. If 4 pieces of fruit are picked out at random, what is the probability of picking:

a. 2 oranges and 2 peaches

b. 4 oranges or 4 apples

$$\frac{{}_7C_2 \cdot {}_4C_2}{{}_{16}C_4} = .069$$

$$\frac{{}_7C_4 + {}_5C_4}{{}_{16}C_4} = .022$$

5. Out of 40 sketches submitted, 8 were picked at random to be displayed. If you submitted 5 sketches, what is the probability that exactly 2 of your sketches were picked?

$$\frac{{}_5C_2 \cdot {}_{35}C_6}{{}_{40}C_8} = .21$$

6. 36 boys played basketball at Honors Camp in New York and 10 of them were selected for the US Pre-Olympic training team. If Leesville Road High School sent 8 boys to Honors Camp, what is the probability that exactly 3 of them were selected for the team?

$$\frac{{}_8C_3 \cdot {}_{28}C_7}{{}_{36}C_{10}} = .26$$

7. The DJ has 25 CD's to use for the dance party, and he can put 6 of them in the disc changer. If 18 of the CD's were techno music, what is the probability that 4 techno CD's are going into the changer?

$$\frac{{}_{18}C_4 \cdot {}_7C_2}{{}_{25}C_6} = .36$$

8. A math class has 20 students. (a) In how many ways can 3 students be selected for refreshment committee? (b) In how many ways can 3 students volunteer to bring a cake, a box of cookies and a case of Pepsi?

$$a. {}_{20}C_3 = 1140 \quad b. {}_{20}P_3 = 6840$$