Name _____

Permutation/Combination Worksheet
Advanced Functions & Modeling

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

$_8P_8 = 40320$

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?

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

(meat · Cheese · Bread)

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

Combinations of what you want → / Total Possible Combinations →

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

b. 4 oranges or 4 apples

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

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?

yours → $\frac{{}_5C_2 \cdot {}_{35}C_6}{{}_{40}C_8} = .21$ ← leftover

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) $_{20}C_3 = 1140$ b) $_{20}P_3 = 6840$

5. Ten band directors at a summer band camp are planning to give a performance. One of the pieces they want to play calls for a flute, an oboe, a bassoon, and a clarinet. Each of the band directors can play all four instruments. How many different quartets can they have?

$P(10,4) = 5040$

6. A pizza parlor offers a selection of 3 different cheeses and 9 different meats. In how many ways can a pizza be made with the following ingredients?

   a) 1 cheese and 3 meats $C(3,1) \cdot C(9,3) = 252$

   b) 2 cheese and 5 meats $C(3,2) \cdot C(9,5) = 378$

   c) 3 cheese and no meat $C(3,3) \cdot C(9,0) = 1$

7. For each of the following, determine whether each situation involves a permutation or a combination.

   a) Four recipes were selected for publication our of the 302 recipes that were submitted. C

   b) Nine players are selected from a team of 15 to start the softball game. C

   c) Four out of 200 contestants were awarded prizes of $100, $75, $50 and $25. P

   d) The batting order for the 9 starting players is announced. P

   e) The winner and first, second, and third runners-up in a contest with 10 finalists. P

   f) An arrangement of the letters in the word *HAWAIIAN*. P

   g) Selecting three of fifteen flavors of ice cream at the grocery store. C

   h) Selecting nine books to check out of the media center from a reading list of twelve. C

   i) Selecting three students from our class to go get breakfast at Bojangles. C

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

$C(32,12) = 225792840$

9. A test consists of 20 questions, and students are told to answer 15 of them. In how many different ways can they choose the 15 questions? $C(20,15) = 15504$

10. How many different ways are there to purchase 2 CDs, 3 DVDs, and 1 VHS tape if there are 7 CD titles, 5 DVD titles, and 3 VHS titles?

$C(7,2) \cdot C(5,3) \cdot C(3,1) = 630$

21 10 3

11. How many ways are there to choose a committee of 3 people from a group of 7 people?

$C(7,3) = 35$

12. How many ways are there to choose a chairperson, secretary, and treasurer, from a group of 7 people?

$P(7,3) = 210$

13. Kerry Oki can do his homework in pencil or pen, using lined or unlined paper, and on one or both sides of each page. How many different ways can Kerry prepare his homework?

$C(2,1) \cdot C(2,1) \cdot C(2,1) = 8$

2 2 2

14. A customer in an ice cream shop can order a sundae with a choice of 10 flavors, a choice of 4 flavors of sauce, 3 flavors of whipped cream, and with or without a cherry on top. How many different sundaes are possible?

$10 \times 4 \times 3 \times 2 = 240$

15. In how many orders can eight actors be listed in the opening credits of a movie if the leading actor must be listed first or last?

$1 \cdot 6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 \cdot 1$

46656