HW 4 - Combinations HW NAME_____

Determine whether the following is a permutation (P) or a combination (C).

1. Deciding the batting order of the FVHS baseball team P
2. Arranging 7 friends around a table at a birthday party P
3. Arranging 6 different books on a shelf P
4. Selecting 6 books from 20 to read C
5. 4 students standing in line at a water fountain P

Solve the following:

6. From a group of 8 people, 5 will each win $1000. How many different winning groups are possible?

$C(8,5) = \frac{8!}{3!5!} = 56$

7. Of a classroom of 20 students, 2 will be selected to teach for the day. How many combinations are possible?

$C(20,2) = \frac{20!}{18!\,2!} = 190$

8. Eight toppings for a pizza are offered. How many ways can Arnold choose 3 toppings?

$C(8,3) = \frac{8!}{5!3!} = 56$

9. A test is administered with 15 questions. You may omit 5. How many possible combinations are there for *questions answered?*

*So you're choosing 10 Questions! $C(15,10) = \frac{15!}{5!10!} = 3003$

10. You decide that you are going to spend Saturday night at the movie theater. There are 15 movies playing, and you want to see 4.

a) In how many ways can you choose your movies if you do not consider order to be important?

$C(15,4) = \frac{15!}{11!4!} = 1365$

b) You're really sleepy and are afraid you may fall asleep for the last few movies… if you want to make sure you're awake for the movies you want to see most, how many ways can you choose 4 movies?

$P(15,4) = \frac{15!}{11!}$ or $15 \cdot 14 \cdot 13 \cdot 12 = 32760$

*now order matters!

11. There are 20 juniors and 16 seniors in AFM. In how many ways can we select 5 seniors and 3 juniors to go to the math competition?

$C(20,3) \cdot C(16,5)$ $\frac{20!}{17!3!} \cdot \frac{16!}{11!5!}$

juniors seniors

$1140 \cdot 4368 = 4,979,520$

12. Buffalo Wild Wings has 6 flavors of buffalo wings and 10 fountain soda choices. If you are ordering 3 orders of wings and 3 sodas, how many combinations are possible?

$C(6,3) \cdot C(10,3) = \frac{6!}{3!3!} \cdot \frac{10!}{7!3!}$

$20 \cdot 120 = 2400$

13. The prom committee has 20 seniors and 15 juniors. Within the prom committee there is a subcommittee that plans all floral arrangements. If this subcommittee is comprised on 4 juniors and 5 seniors, how many different subcommittees are possible?

$C(20,5) \cdot C(15,4) = \frac{20!}{15!5!} \cdot \frac{15!}{11!4!}$

$15504 \cdot 1365 = 21{,}162{,}960$

UNIT REVIEW – ANSWER THE FOLLOWING USING FCP, PERMUTATIONS, OR COMBINATIONS

14. In how many ways can the 1st, 2nd, and 3rd place trophies be given out at a race of 16 cars?

$16 \cdot 15 \cdot 14$ or $P(16,3) = \frac{16!}{13!} = 3360$

15. In how many ways can the letters in the word "COMBINATION" be arranged? 11 total letters

$\frac{11!}{2!2!2!} = 4{,}989{,}600$

O → 2
I → 2
N → 2

16. Ms. Norris is selecting 15 students for a competitive math team. If 35 students try out, how many ways can she choose the team?

$C(35,15) = \frac{35!}{20!15!} = 3{,}247{,}943{,}160$

17. How many ways can 6 people sit around a circular table that is relative to the door? this makes it linear!

$6! = 720$

18. How many ways can 7 charms be arranged on a bracelet that has no clasp? circular, reflective

$\frac{(7-1)!}{2} = 360$

19. How many ways can 7 charms be arranged on a bracelet if the bracelet has a clasp? linear, reflective

$\frac{7!}{2} = 2520$

20. On the track team there are 30 boys and 33 girls. If the coach must pick 5 boys and 5 girls to send to the regional meet, how many ways can he select a regional team?

$C(30,5) \cdot C(33,5)$

$\frac{30!}{25!5!} \cdot \frac{33!}{28!5!}$

$142506 \cdot 237336 = 3.382180402 \times 10^{10}$

$33{,}821{,}804{,}020$