Honors Math II
Unit 10 day 2 ws

Name Key
Period_____ Date_____

1. Twenty applicants for a secretary position are to be interviewed to narrow the list of candidates to the top five. How many possible results are there if:

A) the top five are ranked in order of preference? $_{20}P_5 = 1,860,480$

B) the top five are unranked? $_{20}C_5 = 15,504$

2. Six speakers are scheduled to address a group of College students. In how many different ways can the speakers appear?

$\underline{6} \cdot \underline{5} \cdot \underline{4} \cdot \underline{3} \cdot \underline{2} \cdot \underline{1} = 6! = 720$

1st speaker 2nd speaker . . . .

3. In how many different ways can the letters of the word HOUSE be arranged?

$5! = 120$

4. A company has divided a state into eight regions. It wishes to test a product in three of these regions. How many different ways are there to select these three regions?

$_8C_3 = 56$

5. The chocolate factory classifies its candies as caramels (10 types), chocolate (7 types), and dark chocolate (8 types). A customer has ordered an assortment to consist of six types of caramels, four types of chocolate, and five types of dark chocolates. How many such assortments are possible?

$_{10}C_6 \cdot {}_7C_4 \cdot {}_8C_5 = 411,600$

6. A five member committee is to be selected from among four Math teachers and five English teachers. In how many different ways can the committee be formed under the following circumstance?

A) Anyone is eligible to serve on the committee. $_9C_5 = 126$

B) The committee must consist of 3 Math teachers and 2 English teachers.

$_4C_3 \cdot {}_5C_2 = 40$

C) The committee must contain at least 3 Math teachers.

3 math & 2 English
or
4 math 1 English

$_5C_2 \cdot {}_4C_3 + {}_5C_1 \cdot {}_4C_4 = 45$

D) The committee must contain at least 3 English teachers.

3 English
or
4 English
or
5 English

$_5C_3 \cdot {}_4C_2 + {}_5C_4 \cdot {}_4C_1 \cdot {}_5C_5 \cdot {}_4C_0 = 81$

7. From a group of 8 teachers, a committee of at least one and at most three persons is to be formed. How many different committees can be formed?

1 person or
2 person or
3 person

$${}_8C_1 + {}_8C_2 + {}_8C_3 = 92$$

8. In Rapid City South Dakota, there are 10 dogs racing for first and second prize. How many possible outcomes are there?

$$\underline{10} \cdot \underline{9} = 90$$

1st place 2nd place

$${}_{10}P_2 = 90 \quad \text{or}$$

9. If there are 8 orange bars, 9 red bars and 5 blue bars, how many different ways are there to give a person 2 orange bars, 3 red bars and 1 blue bar?

$${}_8C_2 \cdot {}_9C_3 \cdot {}_5C_1 = 11,760$$

10. How many different ways are there to draw 6 cards from a standard deck of cards and obtain 4 kings and 2 jacks?

$${}_4C_4 \cdot {}_4C_2 = 6$$

11. How many different ways are there to draw 7 cards from a standard deck of cards and obtain 3 jacks and 4 queens?

$${}_4C_3 \cdot {}_4C_4 = 4$$

12. How many different distinguishable ways can the letters in the word Philadelphia be arranged?

$$\frac{12!}{2!2!2!2!} = 29,937,600$$

the p's are different

13. There are 5 women and 6 men in a group. From this group a committee of 4 is to be chosen. How many different ways can a committee be formed that contain 3 women and 1 man?

$${}_5C_3 \cdot {}_6C_1 = 60$$

14. There are 5 women and 6 men in a group. From this group a committee of 4 is to be chosen. How many different ways can a committee be formed that contain at least 3 women?

3W 1man or 4W 0man

$${}_5C_3 \cdot {}_6C_1 + {}_5C_4 \cdot {}_6C_0 = 65$$

15. A school has scheduled 3 volleyball games, 2 soccer games, and 4 basketball games. You have a ticket allowing you to attend 3 of the games. In how many ways can you go to 2 basketball games and 1 other event?

$${}_4C_2 \cdot {}_5C_1 = 30 \quad \text{or} \quad {}_4C_2 \cdot {}_3C_1 + {}_4C_2 \cdot {}_2C_1 = 30$$

basketball ← ${}_4C_2$; other events ← ${}_5C_1$; Volley ← ${}_3C_1$; soccer ← ${}_2C_1$

16. A certain marathon had 50 people running for first, second and third prize. How many different possible outcomes are there for the first three runners to cross the finish line?

$_{50}P_3$ or $50 \cdot 49 \cdot 48 = 117,600$

17. If the NCAA has applications from 6 universities for hosting its intercollegiate tennis championships in 2004 and 2005, how many ways may they select the hosts for these championships?

a) if they are not both to be held at the same university? $6 \cdot 5 = 30$

b) if they may both be held at the same university? $6 \cdot 6 = 36$

18. In how many ways can five people line up to get on a bus? $5! = 120$

$5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$

19. How many distinct permutations are there in the word "statistics"?

$$\frac{10!}{3!3!2!} = 50,400$$

20. How many different license plates are possible if two digits are followed by three letters?

$10 \cdot 10 \cdot 26 \cdot 26 \cdot 26 = 1,757,600$

21. Among the seven nominees for two vacancies on the city council are three men and four women. In how many ways may these vacancies be filled

a) with any two nominees? $_7C_2 = 21$

b) with any two of the women? $_4C_2 = 6$

c) with one of the men and one of the women?

$_3C_1 \cdot {}_4C_1 = 12$

22. In a primary election, there are four candidates for mayor, five candidates for city treasurer, and two candidates for county attorney. In how many ways may voters mark their ballots

a) if they vote in all three of the races?

$\underset{\text{Treasurer}}{5} \cdot \underset{\text{Mayor}}{4} \cdot \underset{\text{Attorney}}{2} = 40$

b) if they exercise their right not to vote in any or all of the races?

$6 \cdot 5 \cdot 3 = 90$

Find the number of possible 5-card hands that contain the cards specified. The cards are taken from a standard 52-card deck.

23. 5 black cards

$_{26}C_5 = 65,780$

24. 3 aces and 2 kings

$_4C_3 \cdot {}_4C_2 = 24$

25. 2 face cards and 3 cards that are not face cards

$_{12}C_2 \cdot {}_{40}C_3 = 65\,2,080$

26. 5 red cards or 5 black cards.

$_{26}C_5 + {}_{26}C_5 = 131,560$

27. At most 1 ace

0 Aces or 1 Ace

$_4C_0 \cdot {}_{48}C_5 + {}_4C_1 \cdot {}_{48}C_4 = 2,490,624$

28. At least 1 king

1 king
2 king
3 king
4 king

$_4C_1 \cdot {}_{48}C_4 + {}_4C_2 \cdot {}_{48}C_3 + {}_4C_3 \cdot {}_{48}C_2 + {}_4C_4 \cdot {}_{48}C_1 = 886,656$

29. 5 spades or 5 hearts

$_{13}C_5 + {}_{13}C_5 = 2574$

30. 5 diamonds or 5 clubs

$_{13}C_5 + {}_{13}C_5 = 2574$