Algebra 2 / Trig Name_____
Practice Problems for 11.4, 11.5

1. A card is drawn from a normal 52 card deck. Find:
   a. P(the card is a five or a six)
   b. P(the card is between five and ten)

a) $\frac{8}{52} = \frac{2}{13}$ b) $\frac{16}{52} = \frac{4}{13}$

2. You throw a pair of dice – one red, the other black
   a. P(the sum is at least three)
   b. P(the sum is between three and eleven, inclusive)
   c. P(the red die is a three or the black die is a four)

a) $\frac{35}{36}$ b) $\frac{34}{36} = \frac{17}{18}$ c) $\frac{11}{36}$

3. There are three roads from town A to town B and four roads from town B to town C. There are five direct routes from A to C. How many different routes are there from A to C?

$3 \cdot 4 = 12$ $12 + 5 = 17$

4. Using the letters in the word COMPUTER
   a. In how many ways could you pick a vowel and then a consonant?
   b. In how many ways could you pick a consonant or a vowel?
   c. In how many ways could you select a vowel and then another vowel?
   d. How many different four-letter "words" could you make using no letter more than once?
   e. How many different four-letter "words" could you make with repetition of the letters allowed?

$3 \cdot 5 = 15$
$3 + 5 = 8$
$3 \cdot 2 = 6$
${}_8P_4$ ← d. $8 \cdot 7 \cdot 6 \cdot 5 = 1680$
e) $8 \cdot 8 \cdot 8 \cdot 8 = 4096$
OR ${}_8P_4 = 1680$

5. How many 9-letter "words" can be formed from the letters in the word LOGARITHM? (Curiously, one such arrangement spells another word related to mathematics. Can you name it?)

ALGORITHM
$9! = {}_9P_9 = 362,880$

6. How many different "words" can be formed using all of the letters in PROBABILITY?

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

7. ${}_{12}C_5 = {}_{12}C_?$ $? = 7$

8. ${}_nC_2 = ?$ $\frac{n!}{(n-2)!2!} = \frac{n(n-1)}{2}$

9. How many ways can 8 people sit around a table? $7! = 5040$

10. If six people compete for a medal at the Olympics, how many ways can three people be chosen to win the gold, silver and bronze medals?

${}_6P_3 = 120$

11. How many bridge hands (13 cards) can be formed from a 52 card deck?

${}_{52}C_{13} = 6.35 \times 10^{11}$

12. Four students are selected from a home economics class of 16 students to form a committee to advise the cafeteria director about food. How many different committees can be formed?

${}_{16}C_4 = 1820$

13. There are four candidates for homecoming queen and three candidates for king. How many king-queen pairs are possible.

$4 \cdot 3 = 12$

14. How many 9-digit social security numbers are there?

$10^9 = 1,000,000,000$

15. How many different license plates begin with two digits, followed by two letters and then three digits if no letter or digits repeat?

$10 \cdot 9 \cdot 26 \cdot 25 \cdot 8 \cdot 7 \cdot 6 =$
$19,656,000$

16. There are 3 red pens and 5 black pens on the desk. If 4 are selected at random, what is the probability that:
   a. exactly 1 pen is red
   b. all of the pens are black

a) $\frac{{}_3C_1 \cdot {}_5C_3}{{}_8C_4} = .42857\ldots$ b) $\frac{{}_3C_0 \cdot {}_5C_4}{{}_8C_4} = .0714\ldots$

17. An ordinary deck of playing cards is used to play a game in which you are dealt a 7 card hand. Find the probability that:
   a. you have exactly three red cards and four black cards
   b. you have the ace of hearts
   c. you have all spades

a) ${}_{26}C_3 \cdot {}_{26}C_4 = .29054\ldots$ b) $\frac{{}_1C_1 \cdot {}_{51}C_6}{{}_{52}C_7} = .134615\ldots$ c) $\frac{{}_{12}C_7 \cdot {}_{39}C_0}{{}_{52}C_7} = .000128\ldots$

18. A well-known hamburger chain has 12 choices of items to put on their burgers. How many different burgers could be created by using:
   a. three of the toppings or six of the toppings?
   b. all of the toppings?
   c. zero to all of the toppings?

a) ${}_{12}C_3 + {}_{12}C_6 = 1144$ ${}_{12}C_{12} = 1$ $2^{12} = 4096$

19. On your spring break camping trip the probability of you breaking your arm is .07 and the probability of spraining your ankle is .12. What is the probability that you will:
   a. not break an arm nor sprain an ankle?
   b. Get at least a broken arm or a sprained ankle?

$(.93)(.88) = .8184$ $(.07)(.88) + (.93)(.12) + (.07)(.12) = .1816$

20. A certain part has a probability of .95 that it will work. What is the probability of 100 of these parts work all at the same time?

$.95^{100} = .0059205\ldots$ b) $x^{100} = .02$ $x = \sqrt[100]{.02}$ or $(.02)^{1/100} \approx .96163\ldots$

21. A short multiple choice test has 5 questions. Each questions has 4 choices, exactly one of which is right. Assume that you are not experienced in the subject, so you guess randomly to choose the answers.

   a. What is the probability of guessing any one answer right? Wrong?
   b. Calculate the probability of guessing 0,1,2,4, or 5 answers correct.
   c. You will pass the test is you get 4 answers right. What is the probability of passing?

22. When Ms. Elaine Eous left for college, her mom offered to reward her with further scholarship money for her grades. She agreed to pay $1000 is Elaine received all A's or $100 for each A that she makes. When Elaine arrived at her school, she chose classes in which she thought she could make A's. She estimates her probabilities of making A's to be English-0.95; Cooking-0.91; Spanish-0.99;PE-0.82

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   a. Calculate her mathematical expectation is she chooses $100 per A
   b. Calculate her probability of making all A's
   c. Calculate her mathematical expectation if she chooses $1000 for making all A's
   d. Which offer should Elaine choose?

21. a) $P(R) = .25$ $P(W) = .75$

b)
0	${}_5C_0 (.25)^0 (.75)^5$	$= 243/1024$
1	${}_5C_1 (.25)^1 (.75)^4$	$= 405/1024$
2	${}_5C_2 (.25)^2 (.75)^3$	$= 405/1024$
3	${}_5C_3 (.25)^3 (.75)^2$	$= 45/512$
4	${}_5C_4 (.25)^4 (.75)^1$	$= 15/1024$
5	${}_5C_5 (.25)^5 (.75)^0$	$= .0009765\ldots$

c) $\frac{1}{64}$

22. a)

Eng	.95	x 100	=	95
Cook	.91	x 100	=	91
Spanish	.99	x 100	=	99
PE	.82	x 100	=	82
				$367

b) $(.95)(.91)(.99)(.82) = .701801\ldots$

$\times 1000$

c) $\longrightarrow$ \$701.801...

d) $1000 offer