Name: KEY Per. ____

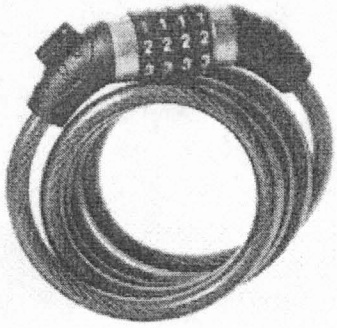
Pre-Calculus Test Chapter 9 Part 2 Form A Show ALL work!!! Step-by-step!!!

1 **License Plate Numbers** In the state of California, each standard automobile license plate number consists of three letters followed by a four-digit number. How many distinct license plate numbers can be formed in California?

26 | 26 | 26 | 10 | 10 | 10 | 10

175,760,000

2 **Combination Lock** A combination lock will open when the right choice of ~~four~~ numbers (0 to 9, inclusive) is selected. How many different lock combinations are possible?



10 | 10 | 10 | 10 10,000

Find the number of distinguishable permutations of the group of letters.

A, A, G, E, E, E, M

$$\frac{7!}{2!\,3!} = 420$$

4 **Jury Selection** From a group of 40 people, a jury of 12 people is to be selected. In how many different ways can the jury be selected?

$$_{40}C_{12} = \frac{40!}{(40-12)!\,12!}$$

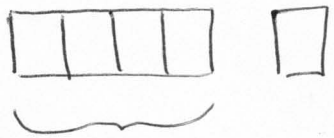
$$= 5,586,853,480$$

OR

$$_{40}P_{12} = 2.676 \times 10^{18}$$

Ambiguous Problem!

5 **Poker Hand** You are dealt five cards from an ordinary deck of 52 playing cards. In how many ways can you get a four of a kind?



$$_{13}C_1 \cdot {}_4C_4 \cdot {}_{12}C_1 \cdot {}_4C_1$$

$$= \boxed{624}$$

6 **Preparing for a Test** A class is given a list of 20 study problems, from which 10 will be part of an upcoming exam. A student knows how to solve 15 of the problems. Find the probability that the student will be able to answer at least eight questions on the exam.

P(know at least 8 P's)

8 9 10

$$\frac{{}_{15}C_8 \, {}_5C_2}{{}_{20}C_{10}} + \frac{{}_{15}C_9 \, {}_5C_1}{{}_{20}C_{10}} + \frac{{}_{15}C_{10}}{{}_{20}C_{10}}$$

$$\frac{225}{646} + \frac{175}{1,292} + \frac{21}{1,292}$$

$$= \boxed{50\%}$$

7 **Game Show** On a game show, you are given five digits to arrange in the proper order to form the price of a car. If you are correct, you win the car. What is the probability of winning, given you guess the position of each digit.

$$\left|\frac{1}{5}\right|\frac{1}{4}\left|\frac{1}{3}\right|\frac{1}{2}\left|\frac{1}{1}\right|$$

$$= \boxed{\frac{1}{120} = .0083 = .83\%}$$

8 **Poker Hand** You are given a hand of 5 cards from a standard deck of 52 cards. The probability of receiving a hand that is nothing is 51%. What is the probability of receiving a hand better than nothing?

A: Nothing

A': Not nothing

$$P(A') = 1 - P(A)$$
$$= 1 - .51$$
$$= .49$$
$$= \boxed{49\%}$$

9 **Drawing a Card** One card is selected at random from an ordinary deck of 52 playing cards. Find the probability that the card is a Jack or Heart.

$P(\text{Jack or Heart})$

$= P(\text{Jack}) + P(\text{Heart}) - P(\text{Jack and Heart})$

$= \frac{4}{52} + \frac{13}{52} - \frac{1}{52}$

$= \frac{16}{52} = \boxed{\frac{4}{13} = .308 = 30.8\%}$

10 Solve for n.

$14 \cdot {}_nP_3 = {}_{n+2}P_4$

$14 \cdot \frac{n!}{(n-3)!} = \frac{(n+2)!}{(n+2-4)!}$

$14 \cdot \frac{n(n-1)(n-2)(n-3)!}{(n-3)!} = \frac{(n+2)(n+1)n(n-1)(n-2)!}{(n-2)!}$

$14n(n-1)(n-2) = (n+2)(n+1)n(n-1)$

$14(n-2) = (n+2)(n+1)$

$14n - 28 = n^2 + 2n + n + 2$

$n^2 - 11n + 30 = 0$

$(n-5)(n-6) = 0$

$\boxed{n = 5 \text{ or } n = 6}$