

Name: _____

Period: _____

DUE THE DAY OF THE TEST!!!
You MAY write on this sheet.

SECTION 15-5: Fundamental Counting Principles. You must show a complete setup to receive credit. You may use a calculator for any arithmetic.

1. How many odd numbers less than 10,000 can you make using only the digits 0, 3, 4, and 7?

$$\begin{aligned} \underline{2} &= 2 \\ \underline{3} \cdot \underline{2} &= 6 \\ \underline{3} \cdot \underline{4} \cdot \underline{2} &= 24 \\ \underline{3} \cdot \underline{4} \cdot \underline{4} \cdot \underline{2} &= 96 \\ & \boxed{128} \end{aligned}$$

OR

$$\underline{4} \cdot \underline{4} \cdot \underline{4} \cdot \underline{2} = 128$$

2. In how many different ways can you answer a 12-question multiple choice test if each question has four choices and you can leave questions blank?

$$\begin{aligned} & Q1 \quad Q2 \quad Q3 \quad \dots \quad Q12 \\ & \boxed{5} \cdot \boxed{5} \cdot \boxed{5} \text{ etc } \dots \boxed{5} = 5^{12} \\ & \boxed{244,140,625} \end{aligned}$$

3. How many license plates having 3 symbols (letters and digits) can you make that have at least one digit?

LLD LDD DDD
 LDL DLD
 DLL DDL

$$3(26 \cdot 26 \cdot 10) + 3(26 \cdot 10 \cdot 10) + (10^3)$$

$$\boxed{29,080}$$

4. How many three-letter "words" can you make if at least one of the letters must be a vowel? (do not count y as a vowel)

5 vowels, 21 consonants

VCC VVC VVV
 CVC VCV
 CCV CVV

$$3(5 \cdot 21 \cdot 21) + 3(5 \cdot 5 \cdot 21) + (5)^3$$

$$6615 + 1575 + 125$$

$$\boxed{8315}$$

SECTION 15-6: Permutations. Make sure to show a complete setup using "P" notation and all relevant factorials identified. You may use a calculator for any multiplication or division.

5. Evaluate $\frac{1000!}{995!}$

$$\frac{1000 \cdot 999 \cdot 998 \cdot 997 \cdot 996 \cdot \cancel{995!}}{\cancel{995!}}$$

$$\cancel{995!}$$

$$\boxed{9.9 \times 10^{14}}$$

6. Evaluate ${}_{100}P_2$.

$$\frac{100!}{98!} = \frac{100 \cdot \cancel{99} \cdot \cancel{98!}}{\cancel{98!}}$$

$$\boxed{9900}$$

7. In how many ways can you arrange the letters in the word UNCOPYRIGHTABLE?

*no repeats

$$15! = 1.30767 \times 10^{12}$$

8. How many seven letter words can you make from the letters in AMBIDEXTROUSLY?

*arranged

$${}_{14}P_7 = \frac{14!}{7!} = 17,297,280$$

9. In how many ways can you arrange the letters in SESQUIPEDALIOPHOBIA?

S → 2 E → 2 I → 3 19 total

P → 2 A → 2 O → 2

$$\frac{19!}{2!2!3!2!2!2!} = 6.3357 \times 10^{14}$$

$$6.3357 \times 10^{14}$$

10. A box contains 8 identical red pens, 6 identical blue pens, and 10 other pens, all different.

How many different ways are there of handing out those pens to a class of 24 students?

$$\frac{24!}{8!6!} \approx 2.1372 \times 10^{16}$$

What is the meaning of sesquipedaliophobia?