Today's Agenda

- Section 10.4 - Fundamental Counting Principle and Permutations

- Classwork / Homework

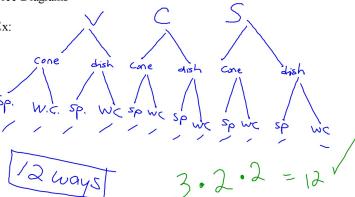_____

Tree Diagrams

Ex:

12 ways

$3 \cdot 2 \cdot 2 = 12$ ✓

Fundamental Counting Principle WS

1. $4 \cdot 2 = 8$

S1 S2 S3 S4

IT L IT L IT L IT L

2. $4 \cdot 3 = 12$

Teams   PE   Lifetime   Aqu.

Cer Digit Ph.   C.D. P C D P C D F

3.

$3 \cdot 2 = 6$ salads

4. $9 \cdot 7 = 63$ meals

5. $2 \cdot 3 \cdot 4 = 24$ cars

6. $26 \cdot 43 \cdot 7 \cdot 2 = 15,652$

$$\frac{\div 184}{\approx 85 \text{ yrs}}$$

7. $\underline{1} \cdot \underline{1} \cdot \underline{1} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10}$

$\boxed{10,000}$

8. $\underline{8} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10}$

anything except 0,1

$\boxed{8,000,000}$

9. (a) $\underset{\#}{\underline{10}} \cdot \underset{\#}{\underline{10}} \cdot \underset{\#}{\underline{10}} \cdot \underset{L}{\underline{26}} \cdot \underset{L}{\underline{26}} \cdot \underset{L}{\underline{26}}$

$\boxed{17,576,000}$

(b) $\underline{10} \cdot \underline{10} \cdot \underline{10} \cdot \underline{26} \cdot \underline{25} \cdot \underline{24}$

$\boxed{15,600,000}$

(c) $\underline{10} \cdot \underline{9} \cdot \underline{8} \cdot \underline{24} \cdot \underline{24} \cdot \underline{24}$

$\boxed{9,953,280}$

(d) $\underline{5} \cdot \underline{4} \cdot \underline{3} \cdot \underline{26} \cdot \underline{25} \cdot \underline{24}$

$\boxed{936,000}$

10. (a) $\underline{1} \cdot \underline{5} \cdot \underline{4} \cdot \underline{3} \cdot \underline{2} \cdot \underline{1}$

$= \boxed{120}$

(b) $\underset{E \text{ or } I}{\underline{2}} \cdot \underline{5} \cdot \underline{4} \cdot \underline{3} \cdot \underline{2} \cdot \underline{1}$ VOWELS

$\overline{A\ E\ I\ O\ U}$

$\boxed{240}$

(c) $\underline{1} \cdot \underline{4} \cdot \underline{3} \cdot \underline{2} \cdot \underline{1} \cdot \underline{1}$

$= \boxed{24}$

11. (a) $\underline{26} \ \ \text{------} \rightarrow$

$26^7 = 8,031,810,176$

(b) $\underline{26} \cdot \underline{25} \cdot \underline{24} \cdot \underline{23} \cdot \underline{22} \cdot \underline{21} \cdot \underline{20}$

$3,315,312,000$

Factorials!

12. $5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = \boxed{120}$

13. $7! = 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$

```
7!
          5040
```

Type the number first, then go to....

PRB --> !

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Permutations - A permutation is an ordering of a set of objects where the ORDER MATTERS. Objects CANNOT be repeated.

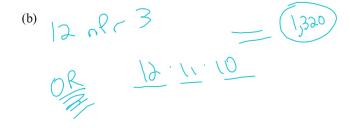14. $\dfrac{3 \cdot 2 \cdot 1}{3!} = \boxed{6}$ $\dfrac{4 \cdot 3 \cdot 2 \cdot 1}{} = 4! = \boxed{24}$

15. $7! \xleftarrow{PRB \to !} = \boxed{5040}$

16. $6! = \boxed{720}$

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17. (a) $8! = \boxed{40,320}$

(b) $\underline{8 \cdot 7 \cdot 6} = \boxed{336}$

OR $8 \; nPr \; 3 =$
   total   pick
   Permutation

```
8 nPr 3
          336
```

18. $6 \; nPr \; 4 = \boxed{360}$

OR $\underline{6 \cdot 5 \cdot 4 \cdot 3}$

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19. $6 \; nPr \; 3$

OR $\underline{6 \cdot 5 \cdot 4} = \boxed{120}$

20. $\dfrac{4}{6} \cdot \underline{6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} \cdot \dfrac{4}{B} \; \boxed{11,520}$

21. $8 \; nPr \; 5$

OR $\underline{8 \cdot 7 \cdot 6 \cdot 5 \cdot 4} = \boxed{6,720}$

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22.   (a) $12! = \boxed{479,001,600}$

(b) $12 \; nPr \; 3 = \boxed{1,320}$

OR $12 \cdot 11 \cdot 10$

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63. Multiple Choice Your class is voting for class officers. There are 5 candidates for president, 3 for vice-president, and 6 for treasurer. How many different ways can a president, a vice-president, and a treasurer be chosen?

(A) 14   (B) 60   (C) 90   (D) 846

64. Multiple Choice You are choosing a 5-digit password. The digits cannot be repeated. How many passwords are possible?

53931
not allowed

27805
allowed

(F) 25   (G) 3125   (H) 5040   (J) 30,240

65. Multiple Choice How many permutations are there of 7 objects taken 3 at a time?

(A) 21   (B) 210   (C) 343   (D) 2187

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Classwork/Homework: p.542: #16, 21-26, 59-60

16. Passwords You choose a password with 4 letters followed by 3 digits for your e-mail account. How many different passwords are possible (a) if letters and digits can be repeated, and (b) if letters and digits cannot be repeated?

21. Tree Diagram Make a tree diagram to show all the possible combinations of class and time if you can take one of three sports classes (tennis, dance, or weight training) in one of first period, second period, or third period.

22. Voting There are 6 candidates for student council president, 3 candidates for vice-president, and 4 candidates for treasurer. In how many different ways can a president, vice-president, and treasurer be chosen?

23. Pizza You are ordering a pizza. You choose one of 3 sizes of pizza, one of 3 types of crust, one of 6 types of meat topping, and one of 5 types of vegetable topping. In how many different ways can you choose your pizza?

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24. License Plates In some states you can choose a personalized license plate. Find how many different personalized license plates are possible (a) if the plate has 3 digits followed by 3 letters, and (b) if the plate has 2 digits followed by 4 letters.

Passwords Find how many different passwords are possible for the given configuration if (a) digits and letters can be repeated, and (b) digits and letters cannot be repeated.

25. 1 letter followed by 4 digits   **26.** 3 digits followed by 2 letters

59. Movies You and a group of friends have a total of 45 movies. You decide to watch 3 of the movies together. Write and evaluate an expression that represents the number of ways you can select and watch 3 movies.

60. School A teacher selects 5 students from a class of 20 students to present their book reports next Monday. Write and evaluate an expression that represents the number of orders 5 students can be assigned to present their reports.