

## Warm Up

Are the events independent or dependent?

1) Stacking books on a desk.

*Dependent*

2) Pulling cards from a deck, replacing  
after each draw.

*Ind.*

How many possibilities are there:

3) The top 3 finishers of 8 in a race

$${}_8P_3 = \underline{8} \cdot \underline{7} \cdot \underline{6} = \boxed{336}$$

4) Picking 5 students in a class of 20 to form a group

$${}_{20}C_5 = \boxed{15,504}$$

5) Picking one of each from a toolbox with 5 hammers, 4 drills and 7 screwdrivers

F.C.P.

$$\underline{5} \cdot \underline{4} \cdot \underline{7} = \boxed{140} \quad 5 \cdot 4 \cdot {}_7C_1$$

9. How many 7-digit phone numbers can be formed if the first digit cannot be 0 or 1, and any digit can be repeated?

8,000,000

10. How many 7-digit phone numbers can be formed if the first digit cannot be 0 or 1, and no digit can be repeated?

483,840 8 · 9 · 8 · 7 · 6 · 5 · 4

11. How many 7-digit phone numbers can be formed if all digits are odd?

78,125

12. How many 7-digit phone numbers can be formed if the first digit is odd, second digit is odd and the last digit is a 4?

250,000 5 · 5 · 10 · 10 · 10 · 10 · 1

13. How many 6 character passwords can be formed if the first character is a digit and the remaining 5 characters are letters that can be repeated?

118,813,760

14. Which security would have more possibilities and 3 letter code that cannot repeat or a 5 digit code that can repeat? What are the possibilities for each?

L → 15,600

D → 100,000

# U1: Counting

## Repetition, Multiple Combinations

F.C.P.

Ind v Dep

Permutation

Perm. w/ Repetition

Combination

# Permutations with Repetition

How many different ways can the letters of the word **BANANA** be arranged?

$$\frac{6!}{(3! 2!)} = \boxed{60}$$

$$\frac{n!}{p! q!}$$

Not Always  
2 Numbers

**Mississippi?**  $\frac{11!}{4! 4! 2!} = \boxed{34,650}$

**Proper?**  $\frac{6!}{2! 2!} = \boxed{180}$

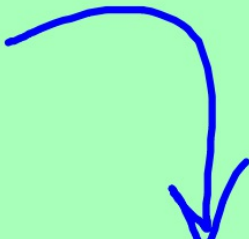
**Serene?**  $\frac{6!}{3!} = \boxed{120}$

Letters are not the only thing we can rearrange...

1) How many ways could 4 forks, 5 spoons and 4 knives be lined up on a table?

Arrange All  $\rightarrow$  Repetition  
Take One of Each  $\rightarrow$  F.C.P.

90,090


$$\frac{13!}{4!5!4!}$$

Grant HS has 15 names on a ballot for class officers. Five will be selected to form a committee;

a. How many different committees of 5 could be formed?

$${}_{15}C_5 = 3,003$$

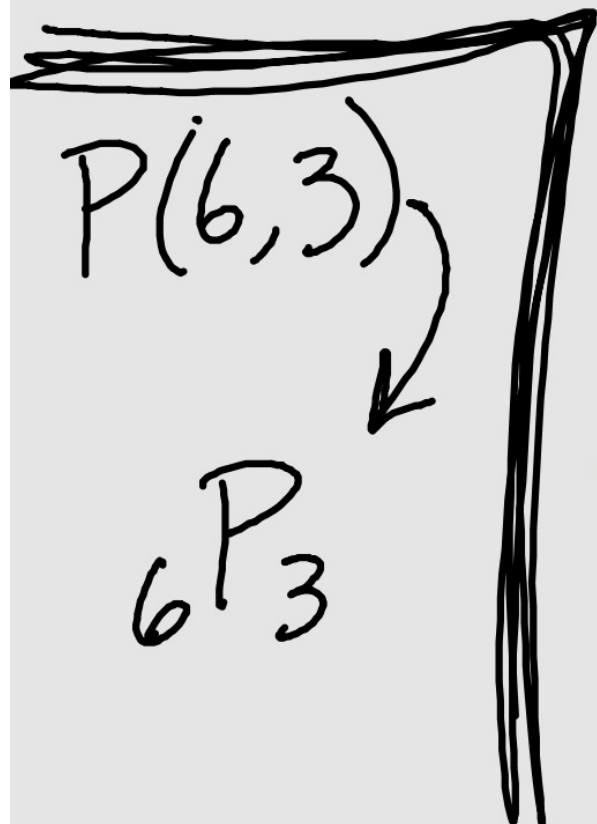
b. How many different committees of 5 could be formed if each has a different job?

$${}_{15}P_5 = \text{Order} = 360,360$$

c. If there are 8 girls and 7 boys on the ballot, how many committees of 2 boys and 3 girls can be formed?

$$\frac{{}_7C_2}{\text{boys}} \cdot \frac{{}_8C_3}{\text{girls}} = 21 \cdot 56 = 1,176$$

Kevin needs to pick 3 web sites, 1 magazine and 2 books for research sources. If there are 8 sites, 5 magazines and 6 books for him to choose from, how many different selections would be possible?


$$\begin{array}{ccc} \frac{8C_3}{\text{Web}} & \frac{5C_1}{\text{Mag}} & \frac{6C_2}{\text{Books}} \\ 56 \cdot 5 \cdot 15 = & & \boxed{4,200} \end{array}$$

$P(6,3)$   
 $6P_3$