

1. How many different 3-letter initials are possible?
2. How many lowercase strings of 4 or less letters?
3. How many license plates can be made using either 2 letters followed by 4 digits or 2 digits followed by 4 letters.
4. Show that for 6 classes that meet once a during a weekday, at least two must meet on the day.

A drawer has 12 red and 12 blue socks, the lights fail:

5. How many socks must be removed to ensure getting 2 of the same color?
6. How many must be removed to ensure getting 2 red socks?

7. List all permutations of  $\{r,g,b\}$
8. How many permutations of  $\{a,b,c,d,e\}$ ?
9. How many permutations of  $\{a,b,c,d,e\}$  end in  $a$ ?
10. What is the value of:  $P(6,2)$ ?
11. What is the value of:  $C(6,2)$ ?
12. How many different orders of finish are there for 6 dance partners if no ties are allowed?
13. How many ways can 4 letters be chosen?

A coin is flipped 10 times.

14. How many possible outcomes?

15. How many outcomes have exactly 2 heads?

A club has 10 members.

16. How many ways to chose 4 committee members?

17. How many ways to choose president, VP, secretary and treasurer?

1. How many different 3-letter initials are possible?  
 $26^3$
2. How many lowercase strings of 4 or less letters?  
 $26^0 + 26^1 + 26^2 + 26^3$
3. How many license plates can be made using either 2 letters followed by 4 digits or 2 digits followed by 4 letters.  
 $26^2 * 10^4 + 10^2 * 26^4$
4. Show that for 6 classes that meet once a during a weekday, at least two must meet on the day.  
By Generalized Pigeonhole Principle,  $\lceil 6/5 \rceil = 2$

A drawer has 12 red and 12 blue socks, the lights fail:

5. How many socks must be removed to ensure getting 2 of the same color? **3**
  
6. How many must be removed to ensure getting 2 red socks? **14**

7. List all permutations of  $\{r,g,b\}$   
 $\{r,g,b\}, \{r,b,g\}, \{g,r,b\}, \{g,b,r\}, \{b,g,r\}, \{b,r,g\}$
8. How many permutations of  $\{a,b,c,d,e\}$ ?  $5!=120$
9. How many permutations of  $\{a,b,c,d,e\}$  end in  $a$ ?  $4!$
10. What is the value of:  $P(6,2)$ ?  
 $6!/(6-2)! = 6*5*4!/4! = 30$
11. What is the value of:  $C(6,2)$ ?  
 $6!/2!(6-2)! = 6*5*4!/2*4! = 3*5 = 15$
12. How many different orders of finish are there for 6 dance partners if no ties are allowed?  
 $P(6,6) = 6!/(6-6)! = 6!/1 = 6!$
13. How many ways can 4 letters be chosen?  
 $C(26,4) = 26!/4!(26-4)! = 26*25*24*23*22!/26*22!$   
 $= 25*24*23 = 13,800$

A coin is flipped 10 times.

14. How many possible outcomes?  $2^{10}=1024$

15. How many outcomes have exactly 2 heads?

$$C(10,2)=10!/2!8!=45$$

A club has 10 members.

16. How many ways to chose 4 committee members?

$$C(10,4)=210$$

17. How many ways to choose president, VP, secretary and treasurer?

$$P(10,4)=5040$$