

1. (a) There are 10 possible letters.

$$10 * 9 * 8 * 7 * 6 * 5 * 4 * 3 * 2 * 1$$

$$10! = 3628800$$

- (b) The 2 letters have to be next to each other, EF counts as one item and there are 9 items now that can be arranged in any order. E and F can be order of: EF or FE hence $2!$, which is just 2.

$$9! * 2! = 725760$$

- (c) There are 6 letters so $6!$ different combinations divided by the amount of combination of Ns($2!$) and As($3!$), there is only 1 B so it doesn't matter.

$$\frac{6!}{3! * 2!} = 60$$

- (d) 5 possible letters, choose 3.

$$\binom{5}{3} = 10$$

2. (a) 6 sided dice rolled 4 times.

$$6^4 = 1296$$

- (b) 4 dice, 2 of them roll a 3 and 2 roll anything other than a 3.

$$\binom{4}{2} * 5^2 = 150$$

- (c) There are 3 possible outcomes which you have to add together, a) you can have 2 3s($4C2$) and the rest of the dice can't be 3 so 5 possibilities on each, b) 3 3s($4C3$) and another dice with 5 possibilities, c) 4 4s($4C4$).

$$\binom{4}{2} * 5^2 = 150$$

$$\binom{4}{3} * 5 = 20$$

$$\binom{4}{4} = 1$$

$$150 + 20 + 1 = 171$$

3. (a) 8 different cards so $8!$, but there are 4 suits containing 2 aces each.

$$\frac{8!}{2! * 2! * 2! * 2!} = 2520$$

(b) 8 cards = 4 distinct cards, choose 2.

$$\binom{4}{2} = 6$$

(c) The good suits are half of the total suit amount. Since you still have 2 cards you can half the answer from Q3b to receive 3 as the amount of ways to get good cards.