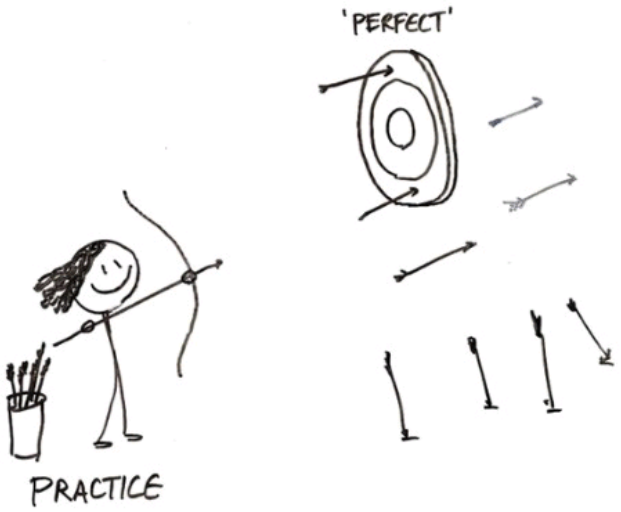
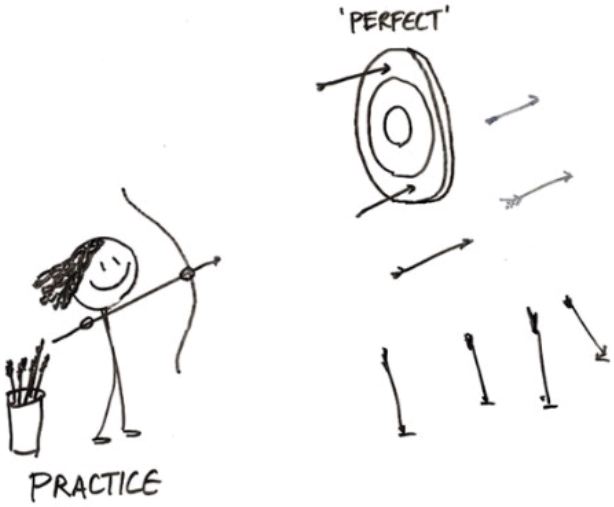
- Practice:

1. A box contains 3 blue marbles, 4 red, 6 green marbles and 2 yellow marbles. If two marbles are drawn at random, what is the probability that at least one is green?
2. A box contains 3 blue marbles, 4 red, 6 green marbles and 2 yellow marbles. If two marbles are picked at random, what is the probability that they are either blue or yellow?
3. A box contains 3 blue marbles, 4 red, 6 green marbles and 2 yellow marbles. If four marbles are picked at random, what is the probability that none is blue?
4. 10 books are placed at random in a shelf. The probability that a pair of books will always be together is?
5. What is the probability that a leap year has 53 Sundays and 52 Mondays?
6. Out of 20 consecutive integers, two are chosen at random. The probability that their sum is odd is?
7. A box contains 3 blue marbles, 4 red, 6 green marbles and 2 yellow marbles. If three marbles are drawn what is the probability that one is yellow and two are red?



- Practice:

8. Out of 10 persons working on a project, 4 are graduates. If 3 are selected, what is the probability that there is at least one graduate among them?
9. In a party there are 5 couples. Out of them 5 people are chosen at random. Find the probability that there are at the least two couples?
10. The probability of a lottery ticket being a prized ticket is 0.2. When 4 tickets are purchased, the probability of winning a prize on atleast one ticket is?
11. There are two boxes, one containing 39 red balls & the other containing 26 green balls. You are allowed to move the balls between the boxes so that when you choose a box random & a ball at random from the chosen box, the probability of getting a red ball is maximized. This maximum probability is
12. There are 6 red balls, 8 blue balls and 7 green balls in a bag. If 5 are drawn with replacement, what is the probability at least three are red?



1. Total marbles = 15

Green marbles = 6

$9/15$, $8/14$

$P(\text{none green}) = (9/15) \times (8/14) = {}^{12}72/{}_{35}210 = 12/35$

& $P(\text{at least one green}) = 1 - 12/35 = \underline{23/35}$.

2. Blue = 3, Yellow = 2 = 5 => Total

Total marbles = 15.

$= {}^{15}C_2 = \frac{15 \times 14}{2 \times 1} = 105$

From 5 marbles $= {}^{5}C_2 = \frac{5 \times 4}{2 \times 1} = 10$

${}^{2}10/{}_{21}105 = 2/21$

3. Total marbles = 15, Blue = 3 - Non blue = 12

${}^{15}C_4 = \frac{15 \times 14 \times 13 \times 12}{4 \times 3 \times 2 \times 1} = 1365$

${}^{12}C_4 = \frac{12 \times 11 \times 10 \times 9}{4 \times 3 \times 2 \times 1} = 495$

$\frac{495}{1365} = 1/3$

4. Total arrangements $= 10!$

man 9 units -> $9!$

$9! \times 2$

$\frac{(9! \times 2)}{10!} = {}^{1}2/{}_{5}10 = 1/5$.

5. Leap year = 366 days = 52 weeks + 2 extra days.

Sm MT TW WTh ThFr FrSa SaSu → 7 Cases.

$= 1/7$

6. Odd + Even = Odd

10 even, 10 odd

$10 \times 10 = 100$

(even, odd)

Total ways do choose 2 from 20 = 190

$\frac{100}{190} = \frac{10}{19}$

7. Yellow = 2, Red = 4

Choose 1 Yellow : $^2C_1 = 2$

2 Red : $^4C_2 = 6$

$2 \times 6 = 12$

$^{15}C_3 = \frac{15 \times 14 \times 13}{3 \times 2 \times 1} = 455$

$= \frac{12}{455}$

8. Graduate = 4. Non graduate = 6.

Total : $\binom{10}{3} = 120$

Unfavourable : $\binom{6}{3} = 20$

at least one graduate : $120 - 20 = 100$

$\frac{100}{120} = \frac{5}{6}$

9. $C(5,2) = 10$

$$P = \frac{10 \times 6}{\binom{10}{5}} = \frac{60}{252} = \frac{5}{21}$$

10. $P(\text{no fruit win}) = (0.8)^4$

$= 0.4096$

So, $P(\text{at least one win}) = 1 - 0.4096$

$= \underline{0.5904}$

11. Box A: 3 red

B: 1 red + 26 green = 27 balls

$P(\text{select Box A}) = 1/2$, $P(\text{select Box B}) = 1/2$

$P(\text{red} \mid A) = 1$

$P(\text{red} \mid B) = 1/27$

$$= \frac{1}{2} \cdot 1 + \frac{1}{2} \cdot \frac{1}{27} = \frac{27+1}{54} = \frac{14}{27}$$

12. Let red: $8/2\frac{1}{2} = 2/7$

$P(X \geq 3) = P(3) + P(4) + P(5)$

$P(3) = \binom{5}{3} \cdot \left(\frac{2}{7}\right)^3 \cdot \left(\frac{5}{7}\right)^2 = 10 \cdot \frac{8}{343} \cdot \frac{25}{49} = \frac{2000}{16807}$

$P(4) = \binom{5}{4} \cdot \left(\frac{2}{7}\right)^4 \cdot \left(\frac{5}{7}\right) = 5 \cdot \frac{16}{2401} \cdot \frac{5}{7} = \frac{400}{16807}$

$P(5) = \binom{5}{5} \cdot \left(\frac{2}{7}\right)^5 = \frac{32}{16807}$

$$P = \frac{2000 + 400 + 32}{16807} = \frac{2432}{16807}$$