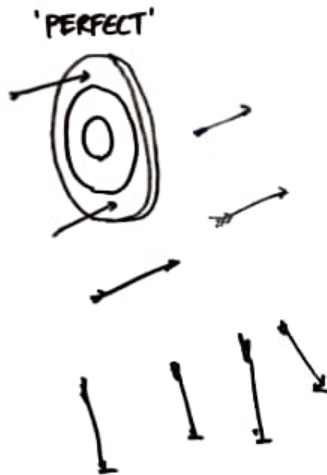


• Practice:

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?

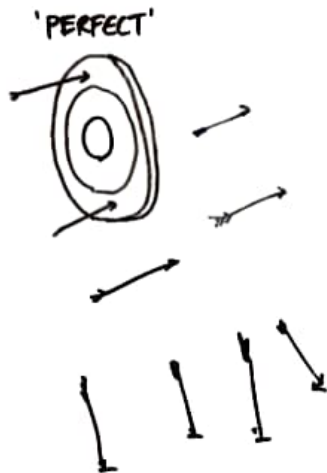


PRACTICE



• 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?



Probability

1. 3 → blue
4 → red
6 → green
2 → yellow

atleast 1 green

$$\frac{6 \times 14}{15} = \frac{14}{5}$$

$$= 1 - \text{none green}$$

$$= 1 - \frac{{}^9C_2}{{}^{15}C_2}$$

$$= 1 - \frac{3 \times 8 \times 4}{15 \times 14 \times 5}$$

$$= 1 - \frac{12}{35}$$

$$= \frac{23}{35}$$

$$2. \frac{{}^3C_2 + {}^2C_2 + {}^3C_1 \times {}^2C_1}{{}^{15}C_2}$$

$$= \frac{3 + 1 + 3 \times 2}{15 \times 14 / 2} = \frac{10 \times 2}{15 \times 7} = \frac{2}{21}$$

$$\begin{aligned}
 \text{3) None blue} &= \frac{15C_4}{\frac{12 \times 11 \times 10 \times 9}{3 \times 7}} \\
 &= \frac{15 \times 14 \times 13 \times 12}{3 \times 7} \\
 &= \frac{33}{91}
 \end{aligned}$$

$$\begin{aligned}
 \text{4) } &12, 23, 34, 45, 56, 67, 78, 89, 910 \\
 &\frac{9}{10C_2} = \frac{9 \times 2}{10 \times 9} = 2 \left(\frac{1}{5} \right)
 \end{aligned}$$

$$\begin{aligned}
 \text{5) Leap year} \rightarrow & \begin{array}{l} \text{Sat, Sun} \rightarrow 53 \\ \text{Sun, Mon} \rightarrow 53 \\ \text{Mon, Tue} \rightarrow 53 \\ \text{Tue, Wed} \rightarrow 53 \\ \text{Wed, Thu} \rightarrow 53 \\ \text{Thu, Fri} \rightarrow 53 \\ \text{Fri, Sat} \rightarrow 53 \end{array} \left. \vphantom{\begin{array}{l} \text{Sat, Sun} \\ \text{Sun, Mon} \\ \text{Mon, Tue} \\ \text{Tue, Wed} \\ \text{Wed, Thu} \\ \text{Thu, Fri} \\ \text{Fri, Sat} \end{array}} \right\} 7 \text{ case}
 \end{aligned}$$

$$\Rightarrow \frac{1}{7}$$

6) 10 odds 10 even

Sum = odd = 1 odd, 1 even

$$\text{Prob} = \frac{10C_1 \times 10C_1}{20C_2} = \frac{10 \times 10 \times 2}{20 \times 19} = \frac{10}{19}$$

$$\frac{{}^8C_1 \times {}^4C_2}{{}^{15}C_3}$$

$$\frac{2 \times 4 \times 3 \times 3 \times 2 \times 1}{2 \times 15 \times 14 \times 13} = \frac{12}{455}$$

2] 6 → Not graduated

4 → Graduated

Atleast 1 graduated = 1 - None graduated

$$= 1 - \frac{{}^6C_3}{{}^{10}C_3}$$

$$= 1 - \frac{{}^6P_3}{{}^{10}P_3} = \frac{1}{6}$$

$$= \left(\frac{5}{6} \right)$$

$$\frac{{}^5C_2 \times {}^6C_1}{{}^{10}C_5}$$

$$= \frac{5 \times 4 \times 6 \times 5 \times 4 \times 3 \times 2}{2 \times 10 \times 9 \times 8 \times 7 \times 6} = \frac{5}{21}$$

$$= \frac{5 \times 4 \times 6 \times 5 \times 4 \times 3 \times 2}{2 \times 10 \times 9 \times 8 \times 7 \times 6}$$

$$= \frac{5}{21}$$

10 winning prob = $\frac{1}{5}$

~~1000~~ Probability of no prize = 0.8

For 4 ticket = $(0.8)^4 = 0.4096$

\therefore Atleast 1 = $1 - 0.4096$
 $= 0.5904$

11 Box A \rightarrow 1 red ball

Box B \rightarrow 38 red + 26 green

\therefore Max prob = $\frac{1}{2} \times 1 + \frac{1}{2} \times \frac{38}{64}$

= ~~0.507~~ $\frac{32 + 19}{64}$

= $\frac{51}{64}$

12 $\frac{{}^6C_3 \times {}^{18}C_2}{{}^{21}C_5}$

$$= \frac{6 \times 5 \times 4 \times 18 \times 17 \times \cancel{16 \times 15 \times 14 \times 13 \times 12}}{3 \times 2 \times \cancel{1} \times 21 \times 20 \times 19 \times 18 \times 17}$$

$$= \frac{30}{133}$$