

Probability Most Important MCQs for NUST-NET & FAST-NU

✧ For any query to answer directly, Book 1-1 Session with me on [fakharsteinsphere.com](https://www.fakharsteinsphere.com)



playing
coin Toss, Dice Roll, 52 cards
MCQs

1. A coin is tossed 3 times. What is the probability of getting at least one head?

A) $1/8$

B) $3/8$

☒ C) $7/8$

D) $1/2$

$$P(E) = \frac{\text{Favourable outcomes}}{\text{Total outcomes}}$$

$\downarrow$
Event

Total outcome,

$$P(E) = \frac{1}{8}$$

$$\{H, T\} \Rightarrow \textcircled{2}$$

$$\left. \begin{array}{l} 2^1 = 2 \\ 2^2 = 4 \\ 2^3 = 8 \end{array} \right\}$$

$$2^n \Rightarrow n \rightarrow \# \text{ of } \underline{\text{trials}} (\underline{\text{no. of coins}})$$

$$S = \{ \textcircled{\text{TTT}}, \dots \}$$

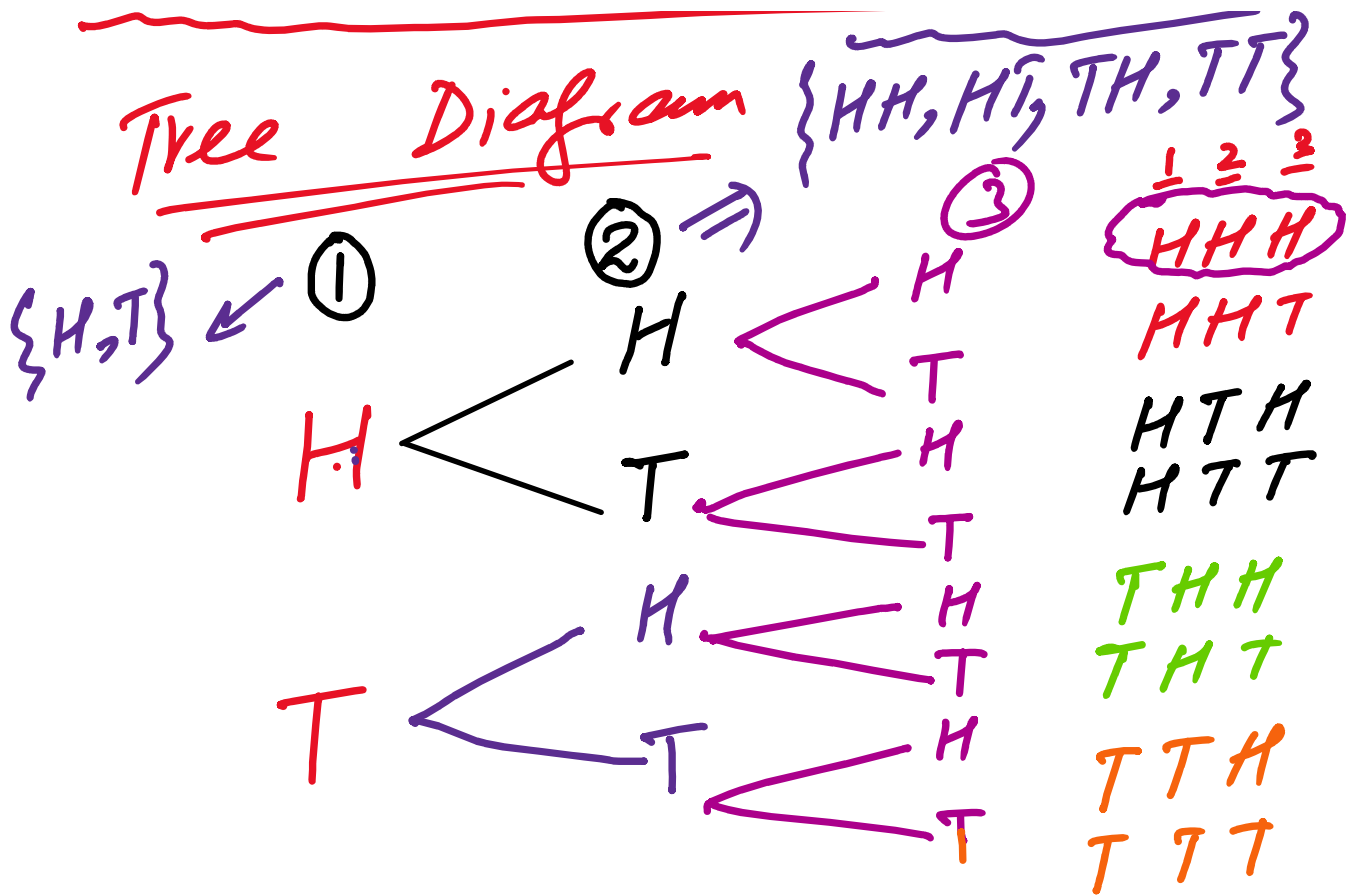
$$0 \leq P(E) \leq 1$$

$$\overline{H} \overline{T} \overline{T}, \text{ } \overline{T} H \overline{T}, \text{ } \overline{T} \overline{T} H$$

1 2 3

$$P(E) = 1 - \frac{1}{8} = \frac{7}{8}$$

$$\text{Total outcome } \{HH, HT, TH, TT\}$$



$S = \{HHH, HHT, HTH, HTT, THH, THT, TTH, TTT\}$

$P(H) = \frac{1}{2} = P(T) = \frac{1}{2}$

$n=3 \rightarrow$ Heads

MCQ: A fair coin is tossed 3 times. What is the probability of getting at least two heads?

- A) $\frac{1}{8}$
 B) $\frac{3}{8}$
 C) $\frac{1}{2}$
 D) $\frac{7}{8}$

$P(E) = \frac{4}{8} = \frac{1}{2}$

2, 3 Heads

2nd Method

$P(E) = \frac{{}^3C_2 + {}^3C_3}{2^3} = \frac{3+1}{8}$

at least ..

$= \frac{4}{8} = \frac{1}{2}$

nC_r

at least
two heads

$$= \frac{4}{8} \times 2$$

HHH

MCQ: A fair coin is tossed 3 times. What is the probability of getting at most two heads?

- A) $\frac{1}{8}$
- B) $\frac{3}{8}$
- C) $\frac{1}{2}$
- D) $\frac{7}{8}$

$n=3$

0, 1, 2
↑ ↑ ↑

$$P(E) = \frac{{}^3C_0 + {}^3C_1 + {}^3C_2}{8}$$

$${}^nC_0 = {}^nC_n = 1$$

$${}^nC_1 = {}^nC_{n-1} = n$$

$${}^3C_1 = {}^3C_2 = 3$$

$$\frac{1 + 3 + 3}{8} = \frac{7}{8}$$

$${}^4C_3 = 4$$

2. A coin is tossed 4 times. What is the probability of getting exactly 2 heads?

- A) $\frac{1}{4}$
- B) $\frac{3}{8}$
- C) $\frac{1}{2}$
- D) $\frac{5}{8}$

$n=4$

$r=2$

$$\frac{n!}{r!(n-r)!}$$

$$4 \times 3 \times 2 \times 1 = 4!$$

$$P(E) = \frac{{}^4C_2}{2^4} = \frac{4!}{2!2!} = \frac{24}{16} = \frac{3}{2} \times \frac{1}{2} = \frac{3}{4}$$

$P(\text{Exactly } r \text{ Heads})$

$$= \frac{nCr}{2^n}$$

Check point!

Q) What is the probability of obtaining at least one head in 4 tosses of a fair coin?

(A) 1/16 (B) 4/16 (C) 15/16 (D) 1/4

1, 2, 3, 4

✓ ✓ ✓ ✓

TTTT

~~TTTT~~

$$\frac{15}{2^4} = \frac{15}{16}$$

$$0 \leq P(E) \leq 1$$

Q1 Probability of an event cannot be $\frac{1}{3}, \frac{1}{5}, \frac{1}{2}, \frac{3}{2}$ 1.5

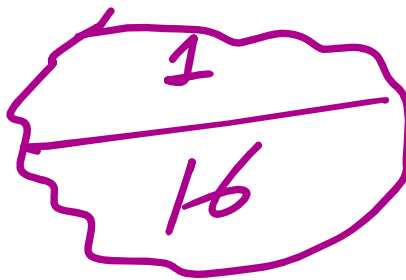
Q2 coin is tossed 4 times

$P(E) = \text{No Tail shows up.}$

~~HHHH~~

$$P(E) = \frac{1}{16}$$

=



Q3 $\Rightarrow$ Coin Tossed $\rightarrow$ 4 times.

$P(E)$ at least one tail shows up?

~~HHHH~~
X (Tail = 0)

T✓, TT✓
TTH✓, TTT✓

$$P(E) = \frac{15}{16}$$

3. A die is rolled once. What is the probability of getting a prime number?

- A) 1/6
- B) 1/3
- C) 1/2
- D) 2/3

$\Rightarrow$ $S = \{1, 2, 3, 4, 5, 6\}$ 2 facts
~~1~~

$$n(S) = 6$$

$$P(E) = \frac{n(E)}{n(S)} = \frac{3}{6} = \frac{1}{2}$$

Q) A die is rolled what is the probability that it shows greater than or equal to 5?

a) $\frac{1}{3}$

b) 0

c) $\frac{1}{2}$

d) $\frac{1}{4}$

e) 1

$$P(E) = \frac{2}{6} = \frac{1}{3}$$

4. Two dice are rolled. What is the probability that the sum is 7?

A) $\frac{1}{12}$

B) $\frac{1}{9}$

C) $\frac{1}{6}$

D) $\frac{1}{3}$

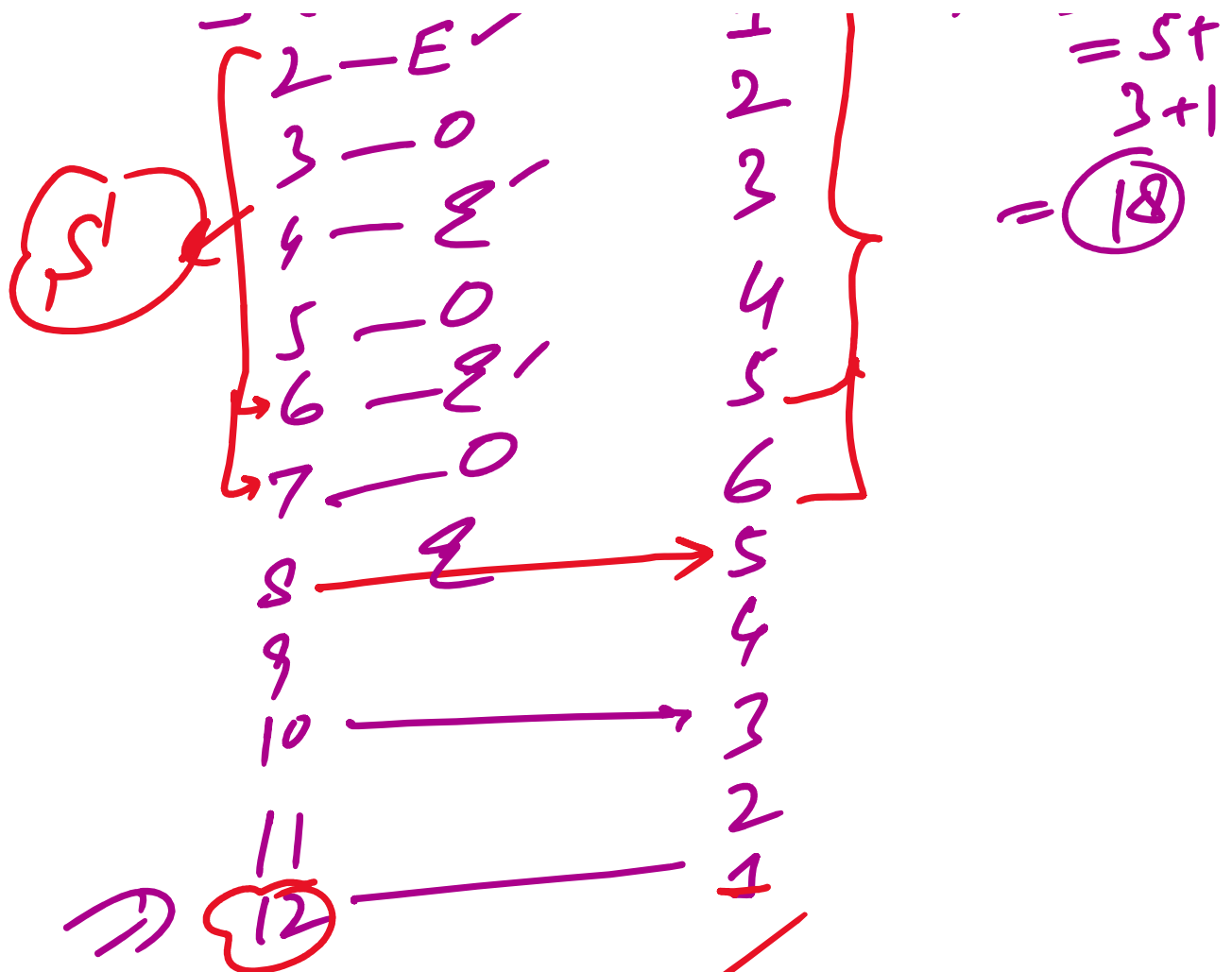
$$P(E) = \frac{6}{36} = \frac{1}{6}$$

	1	2	3	4	5	6	
1	2	3	4	5	6	7	(1, 6)
2	3	4	5	6	7	8	(2, 5)
3	4	5	6	7	8	9	(3, 4)
4	5	6	7	8	9	10	(4, 3)
5	6	7	8	9	10	11	(5, 2)
6	7	8	9	10	11	12	(6, 1)

$$6^2 = 36 \rightarrow \text{"No. of Rolls"}$$

$$6^3 = 216$$

Sum of 2 dice - Favourable outcomes
 $1 + 3 + 5 = 9$



Favourable outcomes =

$$\begin{cases} S-1 & 2 \leq S \leq 7 \\ 13-S & S \geq 7 \end{cases}$$

Handwritten note: $S = \text{Sum}$ is circled. Below the cases, $6^2 = 36$ is written.

5. Two dice are rolled. What is the probability that the sum is 8?

- A) 5/36
- B) 1/6
- C) 7/36
- D) 1/9

$$P(E) = \frac{13-8}{36} = \frac{5}{36} \checkmark$$

Q

Two dice are rolled. What is the probability that the sum is odd number?

$$P(E) = \frac{18}{36} = \frac{1}{2}$$

Two dice are rolled. What is the probability that the sum is prime number?

Sum (S) for

2, 3, 5, 7, 11

1, 2, 4, 6, 2

$P(E) = \frac{15}{36}$

$\frac{5}{12}$

(S-1)

(13-1)

6. Two dice are rolled. What is the probability of getting a double?

A) 1/3

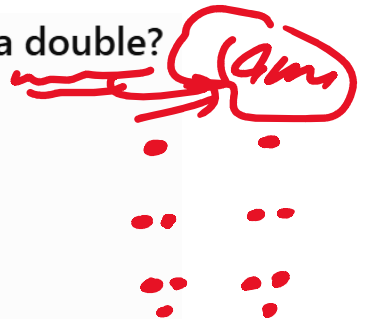
B) 1/6

C) 1/12

D) 1/36

(1,1), (2,2), (3,3), (4,4), (5,5), (6,6)

$$P = \frac{6}{36} = \frac{1}{6}$$



7. Two dice are rolled. What is the probability that the sum is greater than 9?

A) 1/12

B) 1/6

C) 1/4

D) 5/18

S = 10, 11, 12

7, 7, 1

(S=7)

~~(5, 7, 1)~~
13-1

$\{2, 2, 1\}$
 $P = \frac{6}{36} = \frac{1}{6}$

Q) Two dice are thrown simultaneously if the event A is that the sum of dots appearing on them is greater than 6 and event B is that sum of dots is even. $P(A \cap B)$ equals to

- a) 5/6.
- b) 1/2.
- c) 9/36.
- d) 21/36

Common

$P(A \cap B) = P(A) \times P(B)$

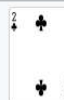
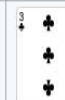
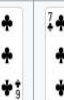
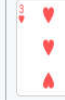
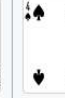
A = 5, 7, 6

B = Even

S = 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
 Outcomes = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
 fav.

$P(E) = \frac{5+3+1}{36} = \frac{9}{36} = \frac{1}{4}$

Example set of 52 playing cards; 13 of each suit: clubs, diamonds, hearts, and spades

	Ace (1)	2	3	4	5	6	7	8	9	10	Jack (11)	Queen (12)	King (13)
Clubs													
Diamonds													
Hearts													
Spades													

52 cards/outcomes

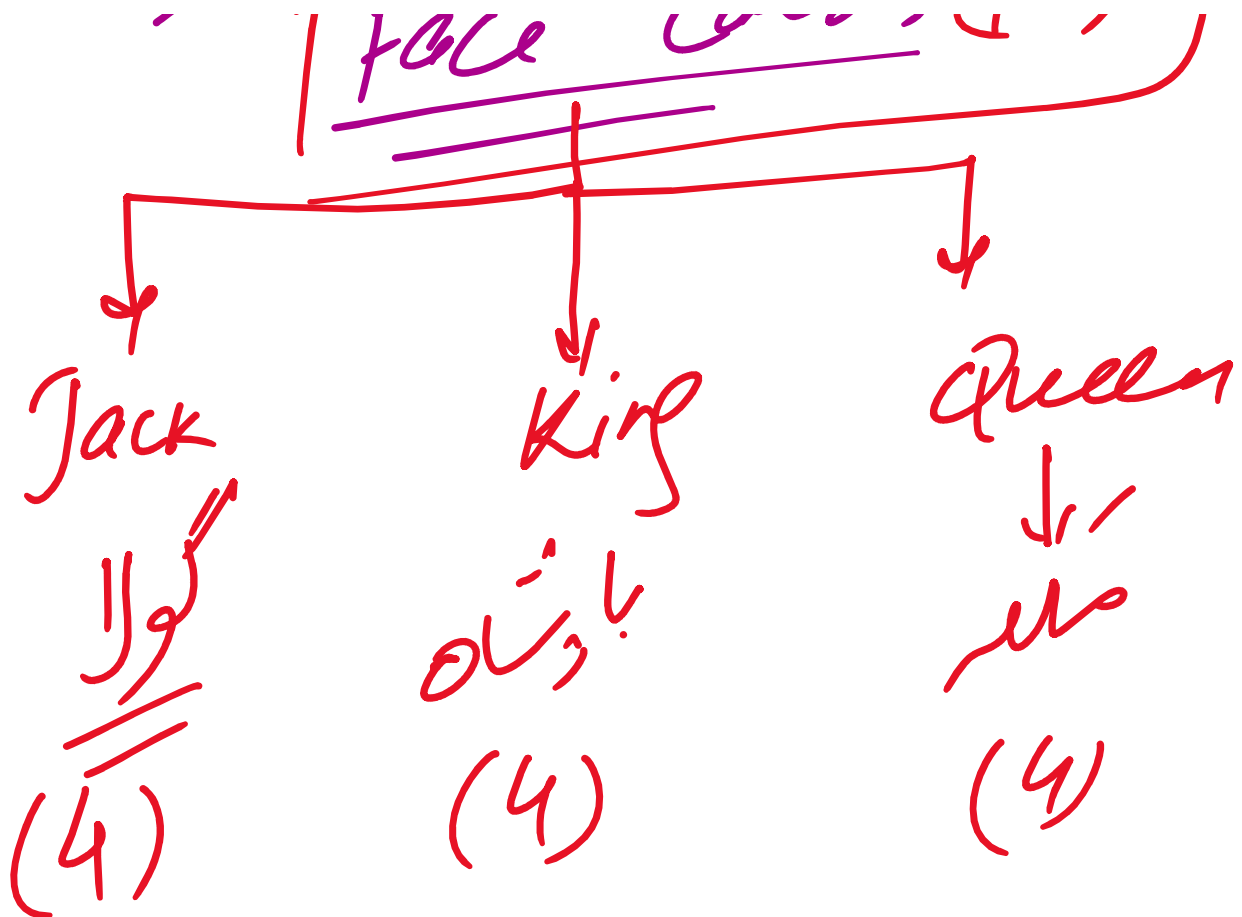
↓ $\clubsuit$
 Club (13)
 ↓ $\spadesuit$
 Spade (13)
 ↓ $\diamondsuit$
 Diamond (13)
 ↓ $\heartsuit$
 Heart (13)

Red Colored cards = 26

Black Color = 26

Ace → 4
 "ألف"

Face cards (12)



8. One card is drawn from a deck of 52 cards. What is the probability of getting a king?

- A) 1/52
B) 1/26
C) 1/13
D) 4/13

0 $P(K) = \frac{4}{52} = \left(\frac{1}{13}\right)$

9. One card is drawn from a deck. What is the probability of getting a queen or a spade?

- A) 4/13
B) 1/4
C) 5/13
D) 3/13

OR → Union → Addition

$$P(A \cup B) = P(A) + P(B) - \underbrace{P(A \cap B)}_{\text{Queen Comm}}$$

$$P(\underline{Q \text{ or Spade}}) = \frac{4}{52} + \frac{13}{52} - \frac{1}{52}$$

$$\checkmark = \frac{(4 + 13 - 1)}{52} = \frac{16}{52}$$

$$= \frac{4}{13}$$

10. One card is drawn from a deck. What is the probability of getting a red king or a black ace?

A) 1/26

B) 1/13

C) 2/13

D) 4/13

$$P(A \cup B) = \frac{(2 + 2)}{52} = \frac{4}{52} = \frac{1}{13}$$

MCQ: A card is drawn at random from a standard deck of 52 cards. What is the probability of picking a diamond card?

a) $\frac{1}{52}$

b) $\frac{1}{4}$

c) $\frac{1}{2}$

d) $\frac{1}{13}$

$$\frac{13}{52} = \frac{1}{4}$$

J, K, Q
12

MCQ: One card is drawn at random from a standard deck of 52 cards. What is the probability of getting a queen or a face card?

a) $\frac{1}{13}$

b) $\frac{3}{13}$

c) $\frac{4}{13}$

d) $\frac{1}{4}$

Q → 1

A ∪ B ⇒ $\frac{4 + 12 - 4}{52} = \frac{12}{52} = \frac{3}{13}$

(A ∩ B)

$$= \frac{52}{54}$$



11. A bag contains 5 red balls and 3 blue balls. Two balls are drawn without replacement. What is the probability that both are red?

A) 5/14

B) 5/8

C) 1/4

D) 3/14

$$\text{Total Balls} = 5 + 3 = 8$$

$$P(R_1 \cap R_2) = \frac{5}{8} \times \frac{4}{7}$$

$$R \quad T = 8 - 1 = 7$$

$$5 - 1 = 4$$

$$= \frac{5}{14}$$

$$P(E) = \frac{5C_2}{8C_2} = \frac{10}{28} = \frac{5}{14}$$

$$\frac{5!}{2! \times 3!} = \frac{5 \times 4 \times 3!}{2 \times 3!}$$

$$\frac{4! \times 7! \times 6!}{7! \times 4!}$$

MCQ: A bag contains 8 red, 5 white, and 7 black balls. Three balls are drawn one by one with replacement. What is the probability that the first ball is red, the second ball is white, and the third ball is black?

- a) $\frac{7}{200}$
- b) $\frac{7}{20}$
- c) $\frac{21}{200}$
- d) $\frac{1}{20}$

$$\text{Total} = 8 + 5 + 7 = 20$$



$$P(R_1 W_2 B_3) = \frac{8}{20} \times \frac{5}{20} \times \frac{7}{20} = \frac{7}{200}$$

12. A bag contains 3 red, 4 green, and 5 blue balls. Two balls are drawn without replacement. What is the probability that both balls are of the same color?

- A) 19/66
- B) 17/66
- C) 1/3
- D) 5/22



$$\text{Total} = 12$$

Rule same color → Balls

$$P(\{R_1 R_2\} \cup \{G_1 G_2\} \cup \{B_1 B_2\})$$

$$= \frac{{}^3C_2 + {}^4C_2 + {}^5C_2}{{}^{12}C_2}$$

$$= \frac{3 + 6 + 10}{66}$$

$$= \frac{19}{66}$$

⑥
 $\frac{12 \times 11 \times 10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}{2 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1}$

Coin, Die, Cards, Box, Groups

13. From a group of 5 boys and 4 girls, two students are selected. What is the probability that one is a boy and one is a girl?

- ⓐ
 A) 5/9
 B) 4/9
 C) 1/2
 D) 2/3

total = 5 + 4 = ⑨

$$\frac{{}^5C_1 \times {}^4C_1}{{}^9C_2} = \frac{5 \times 4 \times 1}{3 \times 6 \times 9}$$

$$= \frac{5}{9}$$

ⓐ
 $\frac{9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}{2 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1}$

14. A committee of 3 is selected from 4 boys and 3 girls. What is the probability that exactly 2 boys and 1 girl are selected?

- A) 18/35
B) 12/35
C) 3/7
D) 2/5

total = 7

$${}^4C_2 \times {}^3C_1$$

P =

$$\frac{{}^4C_2 \times {}^3C_1}{{}^7C_3}$$

~~$\frac{6 \times 5 \times 4}{3 \times 2 \times 1} \times \frac{3 \times 2 \times 1}{1 \times 1 \times 1}$~~

$20 \rightarrow 15$
 $3, 6, 9, 12, 15, 18$
 $5, 10, 15$

$$\frac{6 \times 3}{35} = \frac{18}{35}$$

$1 \rightarrow 10$

15. A number is selected from 1 to 20. What is the probability that it is divisible by 3 or 5?

- A) 7/20
B) 2/5
C) 9/20
D) 1/2

$20 - 1 + 1 = 20$

$0 \sim 9 \Rightarrow 9 - 0 + 1 = 10$

$$A \cup B = A + B - A \cap B$$

$N = 20$

$$P = \frac{\frac{20}{3} + \frac{20}{5} - \frac{20}{LCM(3,5)}}{20}$$

6
 20
 $3) 15$
 $\swarrow$

$D = 6 + 4 - \frac{20}{15} = 1$

11/12
3,5

LCM=15

Quotient

$$P = \frac{6+4-\cancel{15}^2}{20}$$

$$= \frac{6+4-1}{20}$$

$$= \frac{9}{20}$$

16. A number is selected from 1 to 100. What is the probability that it is divisible by 2 or 5?

- A) 3/5
B) 11/20
C) 7/10
D) 1/2

↓

$N = 100$

$LCM(2,5) = 10$

$$P = \frac{\frac{100}{2} + \frac{100}{5} - \frac{100}{10}}{100}$$

$$= \frac{50 + 20 - 10}{100} = \frac{60}{100} = \frac{3}{5}$$

MCQ: Tickets numbered 1 to 20 are mixed up, and one ticket is drawn at random. What is the probability that the ticket drawn has a number which is a multiple of 3 or 5?

- a) $\frac{1}{2}$
b) $\frac{2}{5}$
c) $\frac{8}{15}$
d) $\frac{9}{20}$

↪ P =

$$P = \frac{\frac{20}{3} + \frac{20}{5} - \frac{20}{15}}{20}$$

$$= \frac{4+4-1}{5} = \frac{7}{5}$$

$$= \frac{6+4-1}{20} = \frac{11}{20}$$

MCQ: The probability of picking a rotten apple from a box is $\frac{1}{100}$. If there are 6 boxes containing a total of 1200 apples, then how many rotten apples would be expected?

a) 2

b) 24

c) 6

d) 12

100 Apple

rotten 1.

1 Apple $\rightarrow \frac{1}{100}$

1200 "

$\rightarrow$

$\frac{1200}{100} = 12$

19. A family has two children. Given that at least one child is a boy, what is the probability that both children are boys?

A) $\frac{1}{2}$

B) $\frac{1}{3}$

C) $\frac{1}{4}$

D) $\frac{2}{3}$

~~GG~~, GB, BG, BB

$\frac{1}{3}$

Total outcomes = 3

20. What is the probability that a leap year has 53 Sundays?

A) $\frac{1}{7}$

B) $\frac{2}{7}$

C) $\frac{3}{7}$

D) $\frac{5}{7}$

365 days

1 leap year = 366 days

$5\frac{2}{7}$ ①
 $\text{Leap Year} = 360 \text{ days}$
 $= 364 + \frac{2 \text{ days}}{\text{extra}}$
 $\frac{2}{7}$
 $5\frac{2}{7}$

Mon, Tues
 Tues, wed
 wed, Thurs
 Thurs, Frid

Frid, Sat.
 Sat, Sun
 Sun, Mon
 GDI, 1, 2, 3, 4, 5, 6

Q) The probability that person A is alive is $\frac{5}{7}$ and the probability that person B is alive is $\frac{7}{9}$. Assuming their survival is independent, what is the probability that both are alive?

- (A) $\frac{5}{9}$ (B) $\frac{12}{16}$ (C) $\frac{35}{63}$ (D) $\frac{2}{7}$

$$\begin{aligned}
 P(A \cap B) &= P(A) \times P(B) \\
 &= \frac{5}{7} \times \frac{7}{9} = \frac{5}{9}
 \end{aligned}$$

Q) The letters of the word "MISSISSIPPI" are put into a box. What is the probability of selecting the letter 'M' first and then, without replacement, selecting the letter 'P'?

- (A) $\frac{2}{121}$ (B) $\frac{2}{110}$ (C) $\frac{1}{110}$ (D) $\frac{1}{121}$

selecting the letter 'M' first and then, without replacement, selecting the letter 'P'?

- (A) 2/121 (B) 2/110 (C) 1/110 (D) 1/121

Handwritten calculations and notes:

$$\left(\frac{1}{11}\right) \times \frac{2}{10} = \frac{2}{110}$$

11 → 10

~~$\frac{1}{51}$~~

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12