FOUNDATION
class: 9th. MATHEMATICS

6. PROBABILITY

Teaching Task (Jee Mains)

01. Coin is tossed twice.

$S = \{HH, HT, TH, TT\} \rightarrow n(S) = 4$

$E = \{HT, TH\} \rightarrow n(E) = 2$

$\therefore P(E) = \frac{2}{4} = \frac{1}{2}$ Ans: B

02 $S = \{1, 2, 3, 4, 5, 6\} \rightarrow n(S) = 6$

$E = \{5, 6\} \rightarrow n(E) = 2$

$\therefore P(E) = \frac{2}{6} = \frac{1}{3}$ Ans: B

03 $n(S) = 52$

$E =$ Red King $\Rightarrow n(E) = 2$

$\therefore P(E) = \frac{2}{52} = \frac{1}{26}$ Ans: B

04. $P(\text{girl}) = \frac{4}{10} = \frac{2}{5}$ Ans: A

05 $S = \{1, 2, 3, 4, 5, 6\} \rightarrow n(S) = 6$

$E = \{2, 3, 5\} \rightarrow n(E) = 3$

$\therefore P(E) = \frac{3}{6} = \frac{1}{2}$ Ans. A

06 $S = \{HH, HT, TH, TT\} \rightarrow n(S) = 4$

$E = \{HT, TH, TT\} \rightarrow n(E) = 3$

$\therefore P(E) = \frac{3}{4}$ Ans: B

07. $S = \{1, 2, 3, \ldots 100\} \rightarrow n(S) = 100$

$E = \{5, 10, 15, \ldots 100\} \rightarrow n(E) = 20$

$\therefore P(E) = \frac{20}{100} = \frac{1}{5}$ Ans: C

08 Students = 30, Boys = 18, girls = 12

$\therefore P(E) = \frac{12}{30} = \frac{2}{5}$ Ans: A

09 $P(E) = \frac{1}{5}$ Ans: B

10 $S\{P, R, O, B, A, B, I, L, I, T, Y\} \rightarrow n(S) = 11$

$E = \{O, A, I, I\} = 4$

$\therefore P(E) = \frac{4}{11}$ Ans: B

JEE ADVANCED

01. Total No. of girls = 900 + 600 + 500 + 0 = 2000.

A) $P(\text{Age group } 0-10) = \frac{900}{2000} = \frac{9}{20}$ ✓

B) $P(\text{Age group } 11-18) = \frac{600}{2000} = \frac{3}{10}$ ✗

C) $P(\text{Age group } 0-18) = \frac{900+600}{2000} = \frac{1500}{2000} = \frac{3}{4}$ ✓

D) $P(\text{Age group } 19-25) = \frac{500}{2000} = \frac{1}{4}$ ✗

Ans: A | C

02. No. of yellow ~~strips~~ Sectors = 4

" blue ~~strips~~ Sectors = 5

" Red Sectors = 3 $\therefore$ Total = 12

A) $p(\text{yellow}) = \frac{4}{12} = \frac{1}{3}$ ✓

B) $p(\text{Red}) = \frac{3}{12} = \frac{1}{4}$ ✓

C) $p(\text{Blue}) = \frac{5}{12}$ ✓

Ans. A, B, C

3. Statement I:

We have $p(1) + p(2) + p(3) + p(4) = 1$

$\Rightarrow x + 2x + 3x + 4x = 1$

$\Rightarrow 10x = 1 \Rightarrow x = \frac{1}{10}$ (True)

Statement II: Conceptual (True)

Ans. A

04. Statement I: $S = \{1, 2, 3, \ldots 100\} \rightarrow n(S) = 100$

$E = \{4, 8, 16, \ldots 100\} \rightarrow n(E) = 25$

$\therefore p(E) = \frac{25}{100} = \frac{1}{4}$ (True)

Statement II: $p(E) = \frac{n(E)}{n(S)}$ (True)

Ans. A

05 Assertion: $S = \{H, T\}$, $E = \{H\}$

$\therefore p(E) = \frac{1}{2}$ (True)

Reason: Conceptual (True)

Ans. A

06 Assertion: $S = \{1, 2, 3, 4, 5, 6\}$

$E = \{2, 3, 5\}$

$\therefore p(E) = \frac{3}{6} = \frac{1}{2}$ (True)

Reason: Conceptual (True)

Ans. A

07. $P(\text{size } 39) = \frac{39}{200}$ Ans: B

08 $E = \{\text{size less than } 40\} = 15+25+39$
$= 79$

$\therefore P(<40) = \frac{79}{200}$ Ans: —

09 $P(30-35) = \frac{20}{100} = \frac{1}{5}$

$P(45-50) = \frac{15}{100} =$

Difference $= \frac{20}{100} - \frac{15}{100} = \frac{5}{100} = \frac{1}{20}$ Ans. D

10. $E(\text{less than 25 years}) = 8+2 = 10$

$\therefore P(\text{less than 25 years}) = \frac{10}{100} = \frac{1}{10}$ Ans. B

11. In 30 Consecutive numbers, there are 15 even numbers and 15 odd numbers.

We know, Sum of two integers is odd means

Even + odd = odd

Case(i) first no. is even

probability of this $= \frac{15}{30} = \frac{1}{2}$

So get an odd number, the second number must be odd.

probability of getting odd $= \frac{15}{29}$.

$\therefore$ Total probability $= \frac{1}{2} \times \frac{15}{29} = \frac{15}{58}$

Case(ii) First number is odd

Probability of this $= \frac{15}{30} =$

Second number must be Even

probability of this $= \frac{15}{29}$

Total probability $= \frac{1}{2} \times \frac{15}{29} = \frac{15}{58}$

$\therefore$ Required probability $= \frac{15}{58} + \frac{15}{58} = \frac{15}{29}$

$\therefore \frac{p}{q} = \frac{15}{29} \Rightarrow p+q = 15+29 = 44$

Ans. 44

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12. PROBABILITY.

$P(\text{vowel}) = \frac{4}{11} = \frac{p}{q}$

$\therefore q = 4 \times 11 = 44$

Ans. 44

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13 a) $S = \{1, 2, 3, \ldots 50\} \rightarrow n(S) = 50$

$E = \{5, 10, 15, \ldots 50\} = n(E) = 10$

$\therefore P(E) = \frac{10}{50} = \frac{1}{5}$ (P)

b) $S = \{1, 2, 3, \ldots 30\} \rightarrow n(S) = 30$

$E = \{3, 6, 9, \ldots 30\} \rightarrow n(E) = 10$

$\therefore P(E) = \frac{10}{30} = \frac{1}{3}$ (q)

c) $S = \{1, 2, 3, 4, 5 \ldots 10\} \Rightarrow n(S) = 10$

$E = \{2, 3, 5, 7\} \rightarrow n(E) = 4$

$\therefore P(E) = \frac{4}{10}$ (r)

d) $S = \{1, 2, 3 \ldots 20\} \rightarrow n(S) = 20$

$E = \{2, 4, 6 \ldots 20\} \rightarrow n(E) = 10$

$\therefore P(E) = \frac{10}{20} = \frac{1}{2}$ (s)

Ans: p, q, r, s

14 a) $P(\text{King}) = \frac{4}{52} = \frac{1}{13}$ (p)

b) $P(\text{Red Card}) = \frac{26}{52} = \frac{1}{2}$ (q)

c) $S = \{S, T, A, T, I, S, T, I, C, S\} \rightarrow n(S) = 10$

$E = \{A, I, I\} \rightarrow n(E) = 3$

$\therefore P(E) = \frac{3}{10}$ (r)

d) $P(E) = \frac{1}{10}$ (s)

Ans.. p, q, r, s

LEARNERS TASK (CW's)

01. Conceptual — Ans: C

02 Conceptual — Ans: C

03 Conceptual — Ans. B

04. Conceptual — Ans: A

05 Conceptual — Ans. D

06. Conceptual — Ans. B

07. $2^3 = 8$ — Ans. B

08 $S = \{H, T\}$ — Ans.. A

09 $S = \{HH, HT, TH, TT\} \rightarrow n(S) = 4$

$E = \{HT, TH\} \rightarrow n(E) = 2$

$\therefore P(E) = \frac{2}{4} = \frac{1}{2}$ — Ans. D

10. Conceptual — Ans: D

01. $S = \{H, T\} \rightarrow n(S) = 2$

$E = \{T\} \rightarrow n(E) = 1$

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

Ans: B

02 $S = \{1, 2, 3, 4, \ldots 20\} \rightarrow n(S) = 20$

$E = \{4, 8, 12, 16, \ldots 20\} \rightarrow n(E) = 5$

$\therefore P(E) = \frac{5}{20} = \frac{1}{4}$

Ans: A

03 $S = \{HH, HT, TH, TT\} \rightarrow n(S) = 4$

$E = \{HT, TH, HH\} \rightarrow n(E) = 3$

$\therefore P(E) = \frac{3}{4}$

Ans: C

04 $S = \{1, 2, 3, 4, 5, 6\} \rightarrow n(S) = 6$

$E = \{1, 4, 6\} \rightarrow n(E) = 3$

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

Ans: B

05 Total $= 5 + 3 = 8$

girls $= 3$

$\therefore P(\text{girls}) = \frac{3}{8}$

Ans: C

06. $S = \{BB, BG, GB, GG\}$

Given one of the child is Boy, Now ~~we~~ have to eliminate GG.

Now, our sample space is

$\therefore S = \{BB, BG, GB\} \rightarrow n(S) = 3$

$E = \{BB\} \rightarrow n(E) = 1$

$\therefore P(E) = \frac{1}{3}$ Ans B

07 Given No. of girls = 2

No. of Boys = 3

A Committee of 3 is to be selected, so that all 3 members should by Boys.

Case(i) probability that the first person selected being a boy = $\frac{3}{5}$

Case(ii) Probability that the second person (being first one boy) is a boys = $\frac{2}{4}$

Case(iii) probability that the third person (first two are boys) is a boy = $\frac{1}{3}$.

$\therefore P(\text{All boys}) = \frac{3}{5} \times \frac{2}{4} \times \frac{1}{3} = \frac{1}{10}$ Ans: A

08 $P(Q \cup K) = P(Q) + P(K)$ $\quad Q \cap K = \phi$

$= \frac{4}{52} + \frac{4}{52}$

$= \frac{8}{52} = \frac{2}{13}$

Ans: C

09. $S = \{2R, 3G, 5B\} \rightarrow n(S) = 10$

$E = \{2R, 3G\} \rightarrow n(E) = 5$

$\therefore P(E) = \frac{5}{10} = \frac{1}{2}$

Ans: A

10 $S = \{S, T, A, T, I, S, T, I, C, S\} \Rightarrow n(S) = 10$

$E = \{S, S, S\} \rightarrow n(E) = 3$

$\therefore P(E) = \frac{3}{10}$

Ans: A

01 $S = \{-3, -2, -1, 0, 1, 2, 3\} \rightarrow n(S) = 7$

Now $(1)^2 = 1 \leq 1$ ✓

$0^2 = 0 \leq 1$ ✓

$1^2 = 1 \leq 1$ ✓

$\therefore E = \{-1, 0, 1\} \rightarrow n(E) = 3$

$\therefore p(E) = \frac{3}{7}$ or

Ans: B

02 $p(\text{Not rain}) = 1 - p(\text{rain})$

$= 1 - 0.75$

$= 0.25 = \frac{25}{100} = \frac{1}{4}$

Ans: B, C

03 Statement I:

$p(\text{bad egg}) = 0.028$

$\Rightarrow \frac{\text{bad Eggs}}{500} = 0.028$

$\Rightarrow$ bad Eggs $= 0.028 \times 500 = 14$

$\Rightarrow$ good Eggs $= 500 - 14 = 486$ (True)

$\therefore$ Statement II: Conceptual (False)

Ans: C

04 Statement I:

$S = \{\text{pack of cards}\} \Rightarrow n(S) = 52$

$E = \{\text{Red face cards}\} \Rightarrow n(E) = 6$

$\therefore p(E) = \frac{6}{52} = \frac{3}{26}$ (True)

Statement II: Conceptual (True)

Ans. A

05 Assertion (A) (10)

$S = \{HH, HT, TH, TT\} \rightarrow n(S) = 4$

$E = \{TT\} \rightarrow n(E) = 1$

$\therefore P(E) = \frac{1}{4}$ (True)

Ans: A

Reason: Conceptual (True)

06 Assertion:

$S = \{3 \text{ girls}, 2 \text{ Boys}\} \Rightarrow n(S) = 3+2 = 5$

$E = \{\text{Boy}\} \Rightarrow n(E) = 2$

$\therefore P(E) = \frac{2}{5}$ (False)

Ans: D

Reason: Conceptual (True)

07 Total no. of bulb = 500

$\therefore n(S) = 500$

$E = \{\text{less than 1500 hours}\} \Rightarrow n(E) = 10$

$\therefore P(E) = \frac{10}{500} = \frac{1}{50} = \frac{2}{100} = 0.02$ Ans: D

08 $E = \{\text{more than 2500 hours}\} = 250 + 90 = 340$

$\therefore P(E) = \frac{340}{500} = \frac{680}{1000} = 0.68$ Ans: D

09. $S = \{51, 52, 53, \ldots 100\} \Rightarrow n(S) = 50$

$E = \{\text{not prime number}\}$

$E' = \{\text{prime numbers}\} = \{53, 59, 61, 67, 71, 73, 79, 83, 89, 97\}$

$\therefore n(E') = 10$

$\therefore P(E') = \frac{10}{50} = \frac{1}{5}$

$\therefore P(E) = 1 - P(E') = 1 - \frac{1}{5} = \frac{4}{5}$

Ans: D

10. $S = \{M, O, B, I, L, E\} \rightarrow n(S) = 6$

$E = \{O, I, E\} \rightarrow n(E) = 3$

$\therefore P(E) = \frac{3}{6} = \frac{1}{2}$ Ans.. D

11. Total No. of tosses = 1000

Head = 625

$\therefore$ Tail = $1000 - 625 = 375$

$\therefore P(\text{Tail}) = \frac{375}{1000} = \frac{3}{8} = \frac{a}{b} \Rightarrow a+b = 11$

Ans. 11

12 $S = \{100, 101, 102, \ldots 999\}$

$\Rightarrow n(S) = 900$

$E = \{100, 102, 104, \ldots 998\}$

$n(E) = 450$ ✓

$\therefore P(E) = \frac{450}{900} = \frac{1}{2}$ Ans- 450

13 a) $S = \{M, A, T, H, E, M, A, T, I, C, S\}$, $n(S) = 11$

$E = \{A, E, A, I\}$, $n(E) = 4$

$\therefore P(E) = \frac{4}{11}$ (p)

b) $P(E) = \frac{3}{9}$ (q)

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

d) Impossible Even $\Rightarrow P(I) = 0$ (s)

Ans. p, q, r, s

14 a) Conceptual (p)

b) Conceptual (q)

c) Conceptual (r)

d) Conceptual (s)

Ans.. p, q, r, s

$\Rightarrow$ THE END $\in$