PROBABILITY - CHAPTER 19

EXERCISE 19

Answer 1:

Total number of tosses = 500
Number of heads = 285
Number of tails = 215
E1 = Getting a head

$$\text{(i) P (E1)} = \frac{\text{Number of heads coming up}}{\text{Total number of trials}}$$

$$= \frac{285}{500} = 0.57$$

(ii) E2 = Getting a tail

$$\text{P (E2)} = \frac{\text{Number of tails coming up}}{\text{Total number of trials}}$$

$$= \frac{215}{500} = 0.43$$

Answer 2:

Total number of tosses = 400
Number of times 2 heads appear = 112
Number of times 1 head appears = 160
Number of times 0 head appears = 128

(i) E1 = Getting 2 head

$$\text{P (E1)} = \frac{\text{Number of times 2 heads appear}}{\text{Total number of trials}}$$

$$= \frac{112}{400} = 0.28$$

(ii) E2 = Getting 1 head

$$P(E2) = \frac{\text{Number of times 1 heads appear}}{\text{Total number of trials}}$$

$$= \frac{160}{400} = 0.4$$

(ii) E3 = Getting 0 head

$$P(E3) = \frac{\text{Number of times 0 heads appear}}{\text{Total number of trials}}$$

$$= \frac{128}{400} = 0.32$$

Answer 3:

Total number of tosses = 200
Number of times 3 heads appear = 39
Number of times 2 heads appear = 58
Number of times 1 head appears = 67
Number of times 0 head appears = 36

(i) Let event be E1= Getting 3 head

$$P(E1) = \frac{\text{Number of times 3 heads appear}}{\text{Total number of trials}}$$

$$= \frac{39}{200} = 0.195$$

(ii) Let event be E2 be Getting 1 head

$$P(E2) = \frac{\text{Number of times 1 heads appear}}{\text{Total number of trials}}$$

$$= \frac{67}{200} = 0.335$$

(iii) Let the event be E3 be Getting 0 head

$$P(E3) = \frac{\text{Number of times 0 heads appear}}{\text{Total number of trials}}$$

$$= \frac{36}{200} = 0.18$$

(iv) Let the event be E4 be Getting 2 head

$$P(E4) = \frac{\text{Number of times 2 heads appear}}{\text{Total number of trials}}$$

$$= \frac{58}{200} = 0.29$$

Answer 4:

Total number of throws = 300

(i) Let the event be E is getting 3

$$P(E) = \frac{\text{Number of times 3 appear}}{\text{Total number of trials}}$$

$$= \frac{54}{300} = 0.18$$

(ii) Let the event be F to getting 6

$$P(F) = \frac{\text{Number of times 6 appear}}{\text{Total number of trials}}$$

$$= \frac{33}{300} = 0.11$$

(iii) Let the event to getting 5 be G

$$P(G) = \frac{\text{Number of times 5 appear}}{\text{Total number of trials}}$$

$$= \frac{39}{300} = 0.13$$

(iv) let the event to getting 1 be H

$$P(H) = \frac{\text{Number of times 1 appear}}{\text{Total number of trials}}$$

$$= \frac{60}{300} = 0.20$$

Answer 5:

Total number of ladies = 200
Number of ladies who like coffee = 142

Number of ladies who dislike coffee=58

(i) Let the event E1 is lady likes coffee

$$P(E1) = \frac{\text{Number of ladies who like coffee}}{\text{Total number of ladies}}$$

$$= \frac{142}{200} = 0.71$$

(ii) Let the event be E2 is lady dislikes coffee

$$P(E2) = \frac{\text{Number of ladies who dislike coffee}}{\text{Total number of ladies}}$$

$$= \frac{58}{200} = 0.29$$

Answer 6:

Total number of unit tests = 6
Number of tests in which the student scored more than 60% marks = 2

Probability to find the event E in which number of unit tests in which he got more than 60% marks.

$$P(E) = \frac{\text{Number of unit tests in which he got more than 60\% marks}}{\text{Total number of unit tests}}$$

$$\Rightarrow \frac{2}{6} = \frac{1}{3}$$

Answer 7:

Total number of vehicles going past the crossing = 240
Number of two-wheelers = 84

Let the E be the event to find the probability of two-wheelers

Required probability = $P(E) = = \frac{84}{240} = 0.35$

Answer 8:

Total phone numbers on the directory page = 200

(i) Number of numbers with units digit 5 = 24

Let E be the event that the units digit of selected number is 5.

$\therefore$ Required probability = P(E) = $\frac{24}{200} = 0.12$

(ii) Number of numbers with units digit 8 = 16

Let F be the event that the units digit of selected number is 8.

$\therefore$ Required probability = $P(F) = \frac{16}{200} = 0.08$

Answer 9:

Total number of students = 40

(i) Number of students with blood group O = 14

Let E be the event that the selected student's blood group is O.

$\therefore$ Required probability = $P(E) = \frac{14}{40} = 0.35$

(ii) Number of students with blood group AB = 6

Let F be the event that the selected student's blood group is AB.

$\therefore$ Required probability = $P(F) = \frac{6}{40} = 0.15$

Answer 10:

Total number of salt packets = 12
Number of packets which contains more than 2 kg of salt = 5

Let the Chosen packet contains more than 2 kg of salt event be E

$$P(E) = \frac{\text{Number of packets which contains more than 2 kg of salt}}{\text{Total number of salt packets}}$$

$$= \frac{5}{12}$$

Thus, the probability that the chosen packet contains more than 2 kg of salt is $\frac{5}{12}$.

Answer 11:

Number of balls played by the batsman = 30
Number of balls in which he hits boundaries = 6
∴ Number of balls in which he did not hit a boundary = 30 − 6 = 24

Let event F be the Batsman did not hit a boundary

$$P(F) = \frac{\text{Number of balls in which he did not hit a boundary}}{\text{Number of balls played by batsman}}$$

$$= \frac{24}{30} = \frac{4}{5}$$

Thus, the probability that he did not hit a boundary is $\frac{4}{5}$.

Answer 12:

Number of families surveyed = 2400

(i) Let the event be E of Family chosen is earning 25000 – 30000 per month and owning exactly 2 vehicles.

Number of families earning 25000 – 30000 per month and owning exactly 2 vehicles = 27

$$P(E) = \frac{\text{Number of families earning 25000 – 30000 per month and owning exactly 2 vehicles}}{\text{Number of families surveyed}}$$

$$= \frac{27}{2400} = \frac{9}{800}$$

(ii) Number of families earning 40000 or more per month and owning exactly 1 vehicle = 579

Let the event be F Family chosen is earning 40000 or more per month and owning exactly 1 vehicle

$$P(F) = \frac{\text{Family chosen is earning 40000 or more per month and owning exactly 1 vehicle}}{\text{Number of families surveyed}}$$

$= \frac{579}{2400} = \frac{193}{800}$

(iii) Let the event G be Family chosen is earning less than 25000 per month and not owning any vehicle .

Number of families earning less than 25000 per month and not owning any vehicle = 10

$$P(G) = \frac{\text{Family chosen is earning less than 25000 per month and not owning any vehicle}}{\text{Number of families surveyed}}$$

$= \frac{10}{2400} = \frac{1}{240}$

(iv) Let the event be E1 of Number of families earning 35000 – 40000 per month and owning 2 or more vehicles

$\Rightarrow 59 + 25 = 84$

$$P(E1) = \frac{\text{Family chosen is earning 35000 – 40000 per month and owning 2 or more vehicles}}{\text{Number of families surveyed}}$$

$= \frac{84}{2400} = \frac{7}{200}$

(v) Let the event E2 be Number of families owning not more than 1 vehicle

= Number of families owning 0 vehicle + Number of families owning 1 vehicle
= 10 + 0 + 1 + 2 + 1 + 160 + 305 + 535 + 469 + 579 = 2062

$$P(E2) = \frac{\text{Family chosen is owning not more than 1 vehicle}}{\text{Number of families surveyed}}$$

$= \frac{2062}{2400} = \frac{1031}{1200}$

Answer 13:

Total number of students = 30
(i) let the W be event of Number of students whose marks are 30 or less = 7 + 10 + 6 = 23

$$P(W) = \frac{\text{Marks of the chosen student are 30 or less}}{\text{Total number of students}} = \frac{23}{30}$$

(ii) let the event F be Number of students whose marks are 31 or more = 4 + 3 = 7

$$P(F) = \frac{\text{Marks of the chosen student are 31 or more}}{\text{Total number of students}} = \frac{7}{30}$$

(iii) let the event the E Number of students whose marks lie in the interval 21–30 = 6

$$P(E) = \frac{\text{Marks of the chosen student lie in the interval 21–30}}{\text{Total number of students}} = \frac{1}{5}$$

Answer 14:

Total number of teachers = 75
(i) let the event E1 Number of teachers who are 40 or more than 40 years old = 37 + 8 = 45

$$P(E1) = \frac{\text{Selected teacher is 40 or more than 40 years old}}{\text{Total number of teachers}} = \frac{3}{5}$$

(ii) Let the event be E2 of Number of teachers of an age lying between 30 – 39 years (including both) = 27

$$P(E2) = \frac{\text{Selected teacher is of an age lying between 30 – 39 years (including both))}}{\text{Total number of teachers}} = \frac{9}{25}$$

(iii) let the event be E3 of Number of teachers 18 years or more and 49 years or less

= 3 + 27 + 37 = 67

$$P(E3) = \frac{\text{Selected teacher is 18 years or more and 49 years or less*}}{\text{Total number of teachers}} = \frac{67}{75}$$

(iv) let the event be E4 of Number of teachers 18 years or more old = 3 + 27 + 37 + 8 = 75

$$P(E4) = \frac{\text{Selected teacher is 18 years or more old}}{\text{Total number of teachers}} = \frac{75}{75} = 1$$

(v) Let the event be E5 Number of teachers above 60 years of age = 0

$$P(E5) = \frac{\text{Selected teacher is above 60 years of age}}{\text{Total number of teachers}} = \frac{0}{75} = 0$$

Answer 15:

Total number of patients = 360

(i) Number of patients whose age is 30 years or more but less than 40 years = 60

Let E_1 be the event that the selected patient's age is in between 30 - 40.

$$P(E1) = \frac{60}{360} = \frac{1}{6}$$

(ii) Number of patients whose age is 50 years or more but less than 70 years = (50 +30) = 80

Let E_2 be the event that the selected patient's age is in between 50 - 70.

$$P(E2) = \frac{80}{360} = \frac{2}{9}$$

(iii) Let E_3 be the event that the selected patient is 10 years or more but less than 40 years.

Number of patients whose age is 10 years or more but less than 40 years = 90 + 50 + 60 = 200

$$P(E3) = \frac{200}{360} = \frac{5}{9}$$

(iv) Number of patients whose age is 10 years or more = 90 + 50 + 60 + 80 + 50 + 30 = 360

Let E_4 be the event that the selected patient's age is 10 years or more. Then

$$P(E4) = \frac{360}{360} = 1$$

(v) Number of patients whose age is less than 10 years = 0

Let E_5 be the event that the selected patient's age is less than 0.

$$P(E5) = \frac{0}{360} = 0$$

Answer 16:

Total number of students = 90
(i) Number of students who gets 20% or less marks = Number of students who gets 20 or less marks = 7

$$P(\text{Student gets 20\% or less marks}) = \frac{\text{Student gets 20\% or less marks}}{\text{Total number of students}}$$

$$= \frac{7}{90}$$

(ii) Number of students who gets 60% or more marks = Number of students who gets 60 or more marks = 10 + 9 = 19

$$P(\text{Student gets 60\% or more marks}) = \frac{\text{Student gets 60\% or more marks}}{\text{Total number of students}}$$

$$= \frac{19}{90}$$

Answer 17:

Total number of electric bulbs in the box = 800
Number of defective electric bulbs in the box = 36
∴ Let the event of E if Number of non-defective electric bulbs in the box = 800 − 36 = 764

$$P(E) = \frac{\text{Number of non defective electric bulbs in the box}}{\text{Total number of bulbs}}$$

$$= \frac{764}{800} = \frac{191}{200}$$

Thus, the probability that the bulb chosen is non-defective is $\frac{191}{200}$.

Answer 18:

(i) Probability of an impossible event = __0__
(ii) Probability of a sure event = __1__
(iii) Let E be an event. Then, $P(\text{not } E)$ = __1 − P(E)__.
(iv) $P(E) + P(\text{not } E)$ = __1__
(v) __0__ ≤ $P(E)$ ≤ __1__

MULTIPLE CHOICE QUESTIONS

Answer 1 :

(d) $\frac{4}{5}$
Total number of people surveyed = 645
Number of people who have a high school certificate = 516

P (Person has a high school certificate) $= \frac{\text{Number of people who have a high school certificate}}{\text{Total number of people surveyed}}$

$$= \frac{516}{645} = \frac{4}{5}$$

Answer 2:

(c) $\frac{1}{5}$

Total number of students = 40
Number of students with blood group AB = 8

$\therefore$ Required probability = $P(E) = \frac{8}{40} = \frac{1}{5}$

Answer 3:

(d) 0
Maximum lifetime a bulb has is 1100 hours. There is no bulb with lifetime 1150 hours.

Answer 4:

(c) $\frac{3}{4}$

Total number of children surveyed = 364
Number of children who liked to eat potato chips = 91
Number of children who do not liked to eat potato chips = 364 − 91 = 273

P (Child does not like to eat potato chips)
$= \frac{\text{Number of children who do not liked to eat potato chips}}{\text{Total number of children surveyed}}$

$= \frac{279}{364} = \frac{3}{4}$

Answer 5:

(b) $\frac{4}{5}$

Total number of times two coins are tossed = 1000
Number of times of getting at most one head = Number of times of getting 0 heads + Number of times of getting 1 head = 250 + 550 = 800

$$P(\text{Getting at most one head}) = \frac{\text{Number of times of getting at most one head}}{\text{Total number of times two coins are tossed}}$$

$$= \frac{800}{1000} = \frac{4}{5}$$

Answer 6:

(b) $\frac{29}{40}$

Total number of bulbs in the lot = 80
Number of bulbs with life time of more than 500 hours = (23 + 25 + 10) = 58

$\therefore$ Required probability = $P(E) = \frac{58}{80} = \frac{29}{40}$

Answer 7:

(c) $\frac{13}{40}$

Total number of students surveyed = 200

Number of students who does not like the subject Sanskrit = 65

$$P(\text{Student chosen at random does not like the subject Sanskrit}) = \frac{\text{Number of students who does not like the subject Sanskrit}}{\text{Total number of students}}$$

$$= \frac{65}{200} = \frac{13}{40}$$

Answer 8:

(c) $\frac{5}{12}$

Total number of trials = 60

Number of times tail appears = 35

Number of times head appears = 60 − 35 = 25

$$P(\text{getting a head}) = \frac{\text{Number of times head appears}}{\text{Total number of trials}}$$

$$= \frac{25}{60} = \frac{5}{12}$$

Answer 9:

(b) 0.3

Let E be the event of winning the game. Then,

$P(E) = 0.7$

$P(\text{not E}) = P(\text{losing the game}) = 1 - P(E) \Rightarrow 1 - 0.7 = 0.3$

Answer 10:

(c) $\frac{4}{5}$

Total number of balls faced = 30

Number of times the ball hits the boundary = 6

Number of times the ball does not hit the boundary = (30 − 6)= 24

$$P(E) = \frac{\text{Number of times ball does not hit the boundary}}{\text{Total number of balls}}$$

$$= \frac{24}{30} = \frac{4}{5}$$

Answer 11:

(b) $\frac{5}{16}$

Total number of cards in the bag = 16

Number of cards with numbers divisible by 3 = 5

$\therefore$ Required probability $= P(E) = \frac{5}{16}$

Answer 12:

(b) $\frac{2}{5}$

Total number of balls in the bag = 5 + 8 + 7 = 20

Number of black balls = 8

$\therefore$ Required probability $= P(E) = \frac{8}{20} = \frac{2}{5}$

Answer 13:

(c) $\frac{31}{65}$

Total number of throws = 65

Let E be the event of getting a prime number.

$$P(\text{Getting a prime number}) = \frac{\text{Number of times prime numbers occur}}{\text{Total number of throws}}$$

$$= \frac{10+12+9}{65} = \frac{31}{65}$$

Answer 14:

(a) $\frac{12}{25}$

Total number of trials = 50

Let E be the event of getting an even number.

$$P(\text{Getting a even number}) = \frac{\text{Number of times even numbers occur}}{\text{Total number of throws}}$$

$$= \frac{8+7+9}{50} = \frac{12}{25}$$

Answer 15:

(d) $\frac{1}{12}$

Total number of students = 36

Number of students born in October = 3

$P(E)$ = (Number of students born in October)/(Total number of students) = 3/36 = 1/12

$$P(E) = \frac{\text{Number of students born in October}}{\text{Total number of students}}$$

$$= \frac{3}{36} = \frac{1}{12}$$

Answer 16:

$(c)\ \frac{11}{15}$

Number of times two coins are tossed simultaneously = 600

Number of times of getting at least one head = Number of times of getting 1 head + Number of times of getting 2 heads = 206 + 234 = 440

$$P(\text{Getting at least one head}) = \frac{\text{Number of times of getting at least one head}}{\text{Number of times two coins are tossed simultaneously}}$$

$$= \frac{440}{600} = \frac{11}{15}$$