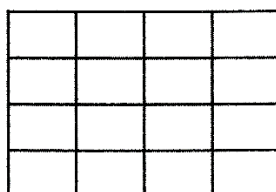


Probability

OLYMPIAD
EXCELLENCE
BOOK

QUESTIONS

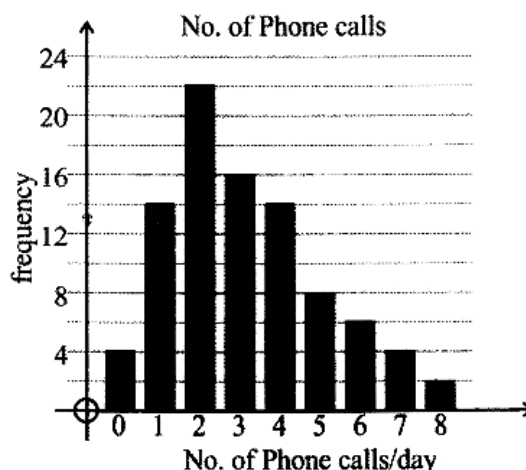
1. A shared garden area has 16 patches owned by 16 different people. The patches are separated by fences as shown. If a patch is selected at random, then what is the possibilities that it has three shared fences



- (a) $\frac{1}{3}$ (b) $\frac{1}{4}$ (c) $\frac{1}{2}$ (d) $\frac{1}{6}$
2. 100 people arriving at the beach are asked their age. The results are shown alongside. Assuming that they give honest replies. What is the possibility that a randomly selected person on the beach will be aged between 30 or more?

Age	Frequency
0-9	25
10-19	17
20-29	31
30-39	20
40	7

- (a) 0.273 (b) 0.270 (c) 0.271 (d) 0.272
3. Over a 70 days period David records the number of phone calls he receives. The graph of his data is shown alongside. The Possibility that on any day David will receive at least 3 phone calls.



- (a) 0.453 (b) 0.534 (c) 0.543 (d) 0.435
4. In a random survey of a district, people were asked whether they will vote for political Party A, B or C. The results are shown alongside. What is the possibility that a randomly chosen voter in the district will vote for A?

A	B	C
60	100	160
330	84	96

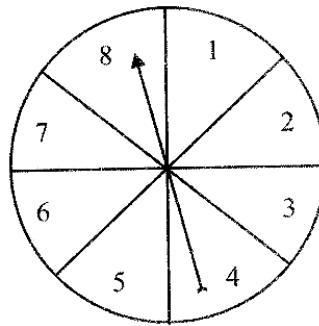
(a) 0.35

(b) 0.25

(c) 0.45

(d) 0.55

5. Tony and Hari each spins the spinner alongside. The possibility that tony spins prime number and Hari spins a multiple of 3 is



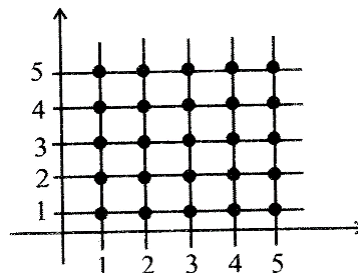
(a) $\frac{1}{8}$

(b) $\frac{1}{8}$

(c) $\frac{1}{4}$

(d) $\frac{5}{8}$

6. Suppose that a pair of dice is rolled. The 25 different possible results are illustrated on the 2-dimensional grid. The possibility of getting a sum of greater than 8 is



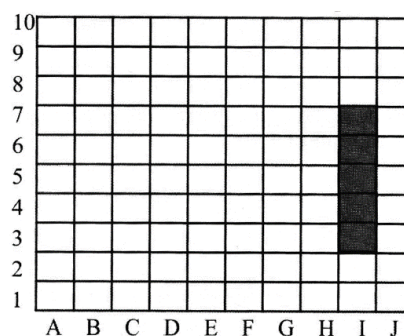
(a) $\frac{1}{12}$

(b) $\frac{5}{18}$

(c) $\frac{6}{25}$

(d) $\frac{3}{25}$

7. Robin begins a game of battleship by placing an aircraft on 10×10 grid. The aircraft carrier must be placed horizontally or vertically occupying 5 squares. One possible position is shown alongside. Robin selects one of those positions at random. What is the possibility that the aircraft carrier occupies the square B3?



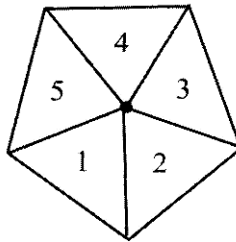
(a) $\frac{1}{4}$

(b) $\frac{1}{2}$

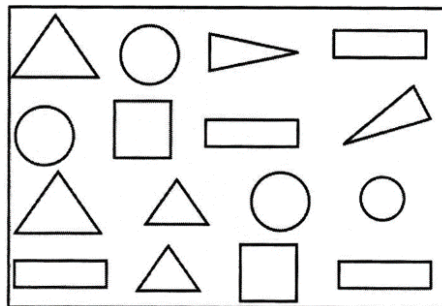
(c) $\frac{7}{60}$

(d) $\frac{1}{24}$

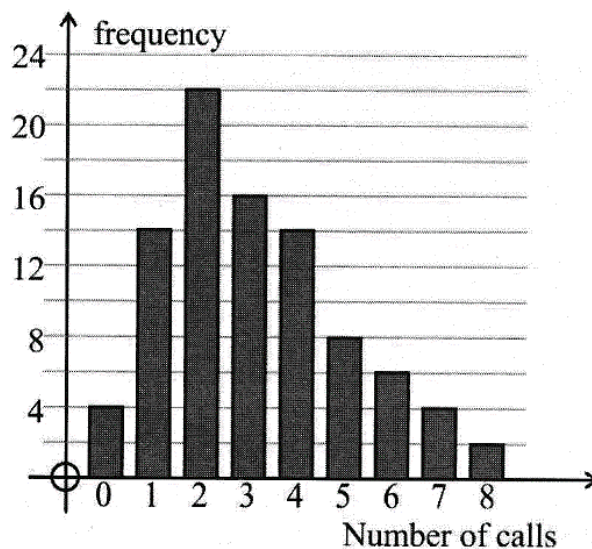
8. A spinner with the numbers 1 to 5 written on equal sectors is spin once. What is the possibility of spinning a prime number?



- (a) $\frac{1}{5}$ (b) $\frac{2}{5}$ (c) $\frac{3}{5}$ (d) $\frac{4}{5}$
9. A small child has a collection of shapes. She chooses one of the shapes at random. What is the possibility that it is a rectangle?

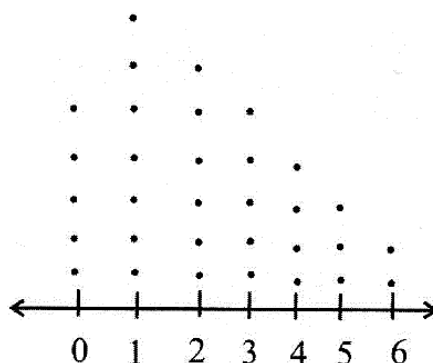


- (a) $\frac{1}{2}$ (b) $\frac{4}{13}$ (c) $\frac{1}{4}$ (d) $\frac{1}{6}$
10. Alexander records the number of phone calls he receives over a period of consecutive days. What is the probability that on a particular day Alexander will receive 5 or more phone calls?



- (a) $0.\bar{5}$ (b) $0.\bar{4}$ (c) $0.\bar{3}$ (d) $0.\bar{2}$

11. The dot plot alongside show how many times Ravindran went jogging in each of last 32 weeks. The possibility that next week Ravindaran will not go jogging.



- (a) 0.13 (b) 0.156 (c) 0.167 (d) 0.187
12. This table shows how long Naidu slept each night recently. The probability that tonight he will sleep for between 5 and 7 hours.

Hours Slept	Frequency
$5 \leq h < 6$	10
$6 \leq h < 7$	12
$7 \leq h < 8$	42
$8 \leq h < 9$	36

- (a) 0.248 (b) 0.224 (c) 0.213 (d) 0.220
13. Jayesh does a lot of travelling in his car. So he records how often he fills his car with CNG. The table alongside shows the frequencies of the number of days between refills. The possibility that between there is a gap of at least 5 days?

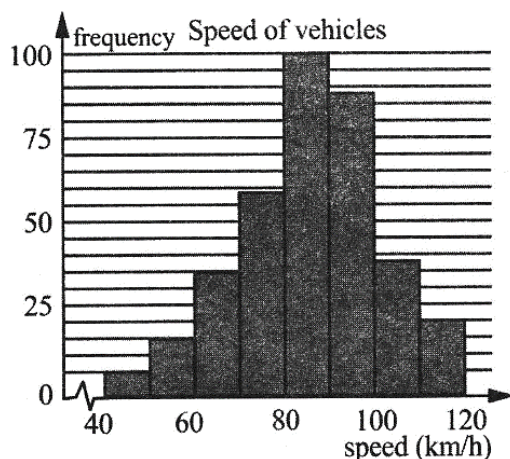
Day between refills	Frequency
1	36
2	80
3	41
4	17
5	15
6	11

- (a) 0.08 (b) 0.18 (c) 0.108 (d) 0.082
14. Robert recorded the length of TV commercial in seconds. His results are summarized in the table. The possibility that a randomly chosen TV commercial will show between 20 seconds and a minute.

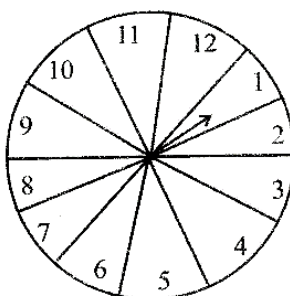
Length	Frequency
$0 \leq t < 20$	17
$20 \leq t < 40$	38
$40 \leq t < 60$	19
$t \geq 60$	4

- (a) 0.137 (b) 0.317 (c) 0.731 (d) 0.371

15. The speed of vehicles 200 travelling along a section of highway were recorded and displayed frequently alongside. What is the possibility that the vehicles were travelling at a speed between 60 kmph and 100 kmph?



- (a) $\frac{2}{7}$ (b) $\frac{3}{7}$ (c) $\frac{11}{14}$ (d) $\frac{1}{7}$
16. A game of chance consists of spinning an arrow which comes to rest pointing at one of the numbers. 1, 2, 3, _ _ _ ,12 as shown alongside and these are equally outcomes what is the probability that it will point a perfect square?



- (a) $\frac{1}{3}$ (b) $\frac{1}{4}$ (c) $\frac{1}{5}$ (d) $\frac{1}{6}$
17. To know the opinion of the students about the subject probability a survey of 500 students also was recorded in the following data. What is the possibilities that a student chosen at random has no opinion?

Opinion	Number of students
Like	145
Dislike	230
No opinion	125

- (a) $\frac{5}{9}$ (b) $\frac{1}{4}$ (c) $\frac{1}{3}$ (d) $\frac{1}{2}$

18. An organisation selected 2400 families at random and surveyed them to determine a relationship between cities and the number of vehicles in a family. The information collected is listed in the table below. What is the possibility that the family chosen in Delhi has at least 2 cars?

Cities	Vehicles per family			
	0	1	2	3
Delhi	0	160	25	0
Mumbai	0	305	27	2
Kolkata	1	535	29	1
Chennai	2	469	59	25
Bengaluru	1	579	82	88

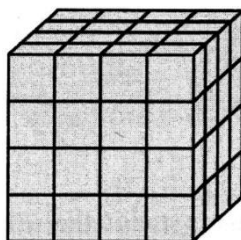
- (a) $\frac{37}{480}$ (b) $\frac{39}{240}$ (c) $\frac{37}{120}$ (d) $\frac{37}{140}$

19. 1500 families with 2 children were selected randomly and the following data were recorded. What is the possibility of a family chosen at random having at least 1 girl.

Number of girls in a family	2	1	0
Number of families	475	825	200

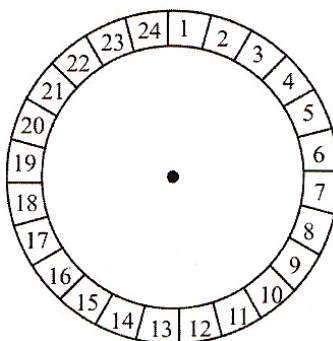
- (a) $\frac{11}{15}$ (b) $\frac{11}{15}$ (c) $\frac{2}{15}$ (d) $\frac{13}{15}$

20. A coloured cube is cut into 64 equal cubes as shown alongside. What is the probability that a cube selected randomly has one face painted?



- (a) $\frac{9}{16}$ (b) $\frac{3}{16}$ (c) $\frac{3}{8}$ (d) $\frac{2}{5}$

21. A wheel with sectors numbered 1 to 24 is spin once as shown alongside. What is the possibility that the number is a composite number?



- (a) $\frac{1}{2}$ (b) $\frac{7}{12}$ (c) $\frac{1}{4}$ (d) $\frac{1}{6}$

22. Different choices made by a group of 200 students are given below. On the basis of given data, what is the possibility that a randomly selected student who has neither taken science nor commerce?

Streams	No. of students
Science	62
Arts	58
Commerce	58
Home Science	12
Other	10

- (a) 0.33 (b) 0.51 (c) 0.42 (d) 0.40

23. A summery was conducted on a group of students on their IQ score. The data recorded are given below. On the basis of given data the possibility of a student selected randomly whose IQ 100 and more is

IQ score	80-90	90-100	100-110	110-120	120-130
No. of students	6	9	16	13	4

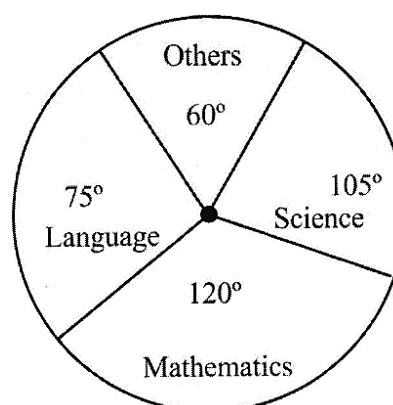
- (a) 0.6 (b) 0.5 (c) 0.8 (d) 0.9

24. On the basis of date given alongside what is the possibility that a girl chosen randomly whose height is less than 150 cm?

Height (in cm)	Number of girls
Less than 140	20
Less than 145	11
Less than 150	29
Less than 155	40
Less than 160	49
Less than 165	51

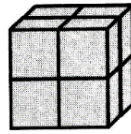
- (a) 0.3 (b) 0.33 (c) 0.4 (d) 0.44

25. The following chart shows the number of students who failed in different subjects in an examination. What is the probability that a student chosen randomly failed in Mathematics?

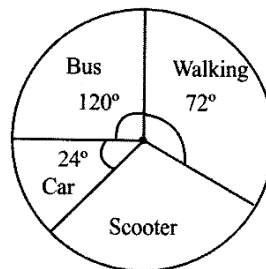


- (a) 0.38 (b) 0.33 (c) 0.23 (d) 0.32

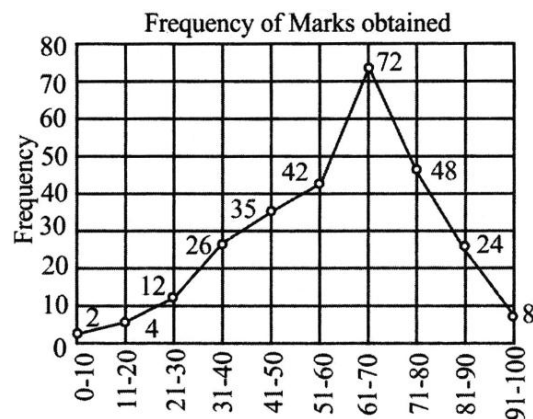
26. A coloured cube is cut into 8 small equal cubes as show alongside. What is the possibility that a cube selected randomly has no face painted?



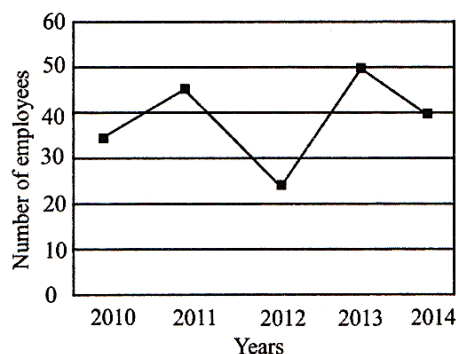
- (a) 1 (b) 0 (c) 0.33 (d) 0.22
27. A pie chart given alongside shows the mode of transport uses by a man. On the basis of data given in pie chart, what is the possibility that a man chooses scooter as a mode of transport?



- (a) $\frac{2}{5}$ (b) $\frac{3}{5}$ (c) $\frac{4}{5}$ (d) $\frac{1}{5}$
28. The marks obtained by 273 examiners shown by the frequency polygon given below. The possibility of a student selected randomly gets more than 80% marks is

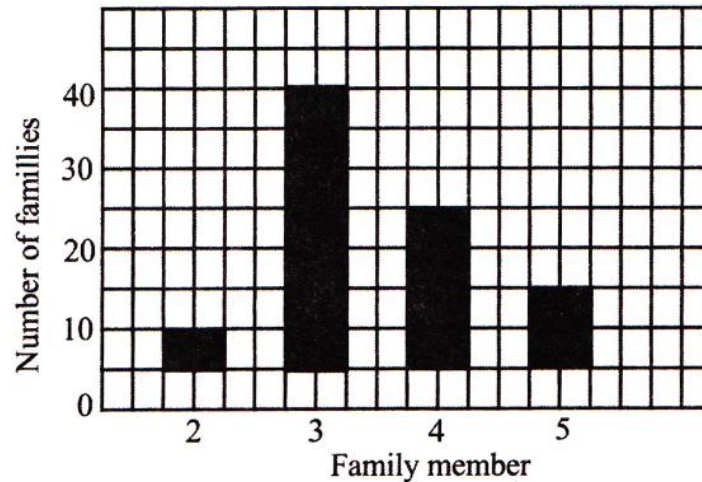


- (a) 0.123 (b) 0.112 (c) 0.113 (d) 0.117
29. The line graph given below represents the number of employees recruited in different years in a company. The probability of a employee selected randomly in 2011 is



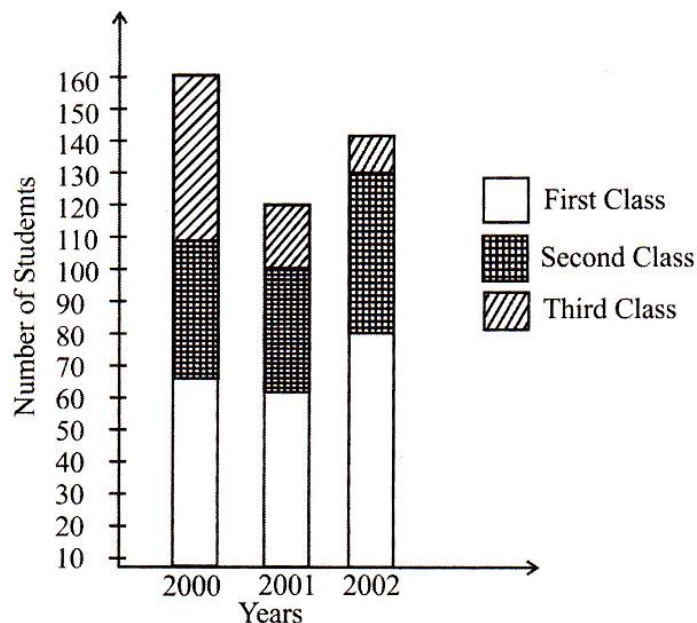
- (a) 0.230 (b) 0.235 (c) 0.245 (d) 0.225

30. On the basis a bar graph given alongside what is the possibility that a randomly selected family has 4 or more family members?



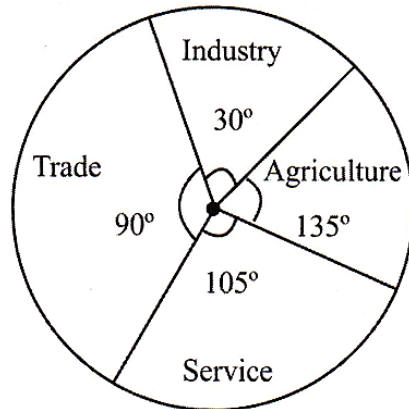
- (a) $0.\bar{3}$ (b) $0.\bar{6}$ (c) $0.\bar{4}$ (d) $0.\bar{9}$

31. The sub-divided bar diagram given below depicts the result of class 10 students of a school for three years. On the basis of given data what is the possibility that a student selected in 2001 passed with first class?



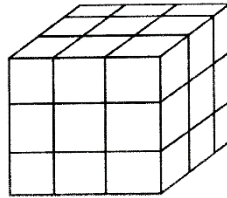
- (a) $\frac{1}{4}$ (b) $\frac{1}{3}$ (c) $\frac{1}{5}$ (d) $\frac{1}{2}$

32. The pie chart given below represents the percentage of people in various occupations. On the basis of data given in the Pie-chart. What is the possibility that a person selected randomly chooses agriculture as a occupation?



- (a) $\frac{1}{8}$ (b) $\frac{3}{8}$ (c) $\frac{5}{8}$ (d) $\frac{7}{8}$

33. A coloured cube as shown alongside cut into 27 small cubes. What is the probability that a cube selected randomly have at least two faces painted?



- (a) $\frac{12}{27}$ (b) $\frac{8}{27}$ (c) $\frac{1}{9}$ (d) $\frac{20}{27}$

34. Three unbiased coins are tossed. What is the probability of getting at least 2 heads?

- (a) $\frac{1}{4}$ (b) $\frac{1}{2}$ (c) $\frac{1}{3}$ (d) $\frac{1}{8}$

35. In a simultaneous throw of two dice, what is the probability of getting a total of 10 or 11?

- (a) $\frac{1}{4}$ (b) $\frac{1}{6}$ (c) $\frac{7}{12}$ (d) $\frac{5}{36}$

36. Two dice are thrown simultaneously. What is the probability of getting two numbers whose product is composite?

- (a) $\frac{1}{3}$ (b) $\frac{1}{4}$ (c) $\frac{3}{8}$ (d) $\frac{29}{36}$

37. A die is rolled 100 times and the data is recorded as given in the table

Outcomes	1	2	3	4	5	6
Frequency	22	13	20	10	25	10

Which of the following is the probability of getting an odd number in a trial?

- (a) $\frac{11}{50}$ (b) $\frac{1}{5}$ (c) $\frac{67}{100}$ (d) $\frac{1}{4}$

38. In a lottery, there are 10 prizes and 45 blanks. A lottery is drawn at random. What is the probability of getting a prize?

- (a) $\frac{1}{10}$ (b) $\frac{2}{5}$ (c) $\frac{2}{11}$ (d) $\frac{5}{7}$

39. A card is drawn from a pack of 52 cards. What is the probability that the card drawn is a face card?

- (a) $\frac{1}{13}$ (b) $\frac{2}{13}$ (c) $\frac{3}{13}$ (d) $\frac{1}{52}$

40. Card is drawn at random from a pocket of 200 cards numbered 1 to 200. The probability of drawing a number which is a cube is

- (a) $1/100$ (b) $2/100$ (c) $1/40$ (d) $3/10$

ANSWER KEY & HINTS

1. (c): No. of patches have three shared fences $= 8 = n(E)$

$$\text{Total patches} = 16 = n(S)$$

$$n(P) = \frac{n(E)}{n(S)} = \frac{8}{16} = \frac{1}{2}$$

2. (b): No. of person aged 30 or more $= 27 = n(E)$

$$\text{Total} = 100 = n(S)$$

$$n(P) = \frac{n(E)}{n(S)} = \frac{27}{100} = 0.27$$

3. (b): $n(E) = 46$

$$n(S) = 86$$

$$n(P) = \frac{46}{86} = 0.534$$

4. (a): $n(E) = 390, n(S) = 930$

$$n(P) = \frac{390}{930} = 0.35$$

5. (a): $n(E) = \{3\} = 1$

$$n(S) = \{1, 2, 3, 4, 5, 6, 7, 8\} = 8$$

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

6. (d): $n(E) = \{(4+5), (5+4), (5+5)\} = 3$

$$n(S) = 25$$

$$n(P) = \frac{3}{25}$$

7. (d): $n(E) = 5 \quad n(S) = 120$

$$n(P) = \frac{5}{120} = \frac{1}{24}$$

8. (c): Not Available

9. (c): No. of rectangle = 4 = $n(E)$

Total shapes = 16 = $n(S)$

$$\therefore n(P) = \frac{4}{16} = \frac{1}{4}$$

10. (d): $n(E) = 20, n(S) = 90$

$$n(P) = \frac{20}{90} = \frac{2}{9} = 0.222\dots = 0.\bar{2}$$

11. (b): $n(E) = 5$ $n(S) = 32$

$$n(P) = \frac{5}{32} = 0.156$$

12. (d): Naidu slept between 5 to 7 hours (No. of days)

$$= 22 = n(E)$$

Total Days = 100 = $n(S)$

$$n(P) = \frac{n(E)}{n(S)} = \frac{22}{100} = 0.22$$

13. (a): $n(E) = 16, n(S) = 200$

$$n(P) = \frac{16}{200} = 0.08$$

14. (c): TV commercial show between 20 seconds and 1 minute = 57 times

Total = 78

$$n(P) = \frac{57}{78} = 0.731$$

15. (c): No. of vehicles running between 60 and 100 *kmph* = 200 = $n(E)$

Total vehicles = 350 = $n(S)$

$$n(P) = \frac{275}{350} = \frac{11}{14}$$

16. (b) : $n(E) = \{1, 4, 9\}$ $n(S) = \{1, 2, 3, \dots, 12\}$

$$n(P) = \frac{3}{12} = \frac{1}{4}$$

17. (b): No. of student chosen No. opinion option = 125

Total students = 500

$$n(P) = \frac{125}{500} = \frac{1}{4}$$

18. (a): Not Available

19. (d): No. of families who have at least one girl = 1300 = $n(E)$

Total families = 1500

$$n(p) = \frac{1300}{1500} = \frac{13}{15}$$

20. (c): No. of cubes having one face pointed = 24 = $n(E)$

Total cubes = 64 = $n(S)$

$$n(P) = \frac{24}{64} = \frac{3}{8}$$

21. (b): $n(E) = \{4, 6, 8, 9, 10, 12, 14, 15, 16, 18, 20, 21, 22, 24\}$ $n(S) = \{1, 2, 3, \dots, 24\}$

$$n(P) = \frac{14}{24} = \frac{7}{12}$$

22. (d): Number of students who have neither science nor commerce = 80 = $n(E)$

Total students = 200 = $n(S)$

$$n(P) = \frac{n(E)}{n(S)} = \frac{80}{200} = 0.4$$

23. (b): Number of students whose score is 100 and more = 25

Total students = 50

$$n(p) = \frac{25}{50} = \frac{1}{2} = 0.5$$

24. (a): Number of girls whose height is less than 150cm = 60 = $n(E)$

$$\text{Total Girls} = 200 = n(P)$$

$$12(P) = \frac{n(E)}{n(S)} = \frac{60}{200} = 0.3$$

25. (b): $n(P) = \frac{120^\circ}{360^\circ} = \frac{1}{3} = 0.33$

26. (b): Number of cubes having no three painted 0 = $n(E)$

$$\text{Total cubes} = 8 = n(S)$$

$$n(P) = \frac{0}{8} = 0$$

27. (a): Corresponding angle to scooter = $360^\circ - (120^\circ + 72^\circ - 24^\circ) = 144^\circ$

$$n(P) = \frac{144}{360^\circ} = \frac{2}{5}$$

28. (d): Number of students whose marks is more than 80% = 32

$$\text{Total students} = 273$$

$$n(E) = \frac{32}{273} = 0.117$$

29. (a): Number of employees selected in 2011 = 45 = $n(E)$

$$\text{Total employees} = 200 = n(S)$$

$$n(P) = \frac{45}{195} = 0.230$$

30. (c): Number of families who have 3 or four family member = 40

$$\text{Total families} = 90$$

$$n(P) = \frac{40}{90} = .\bar{4}$$

31. (d): Not Available

32. (b): Corresponding angle to agriculture = $135^\circ = n(E)$

$$n(S) = 360^\circ$$

$$n(P) = \frac{135^\circ}{360^\circ} = \frac{3}{8}$$

33. (d): Number of two faces painted cubes = 52

No. of three faces painted cubes = 8

$$n(E) = 12 + 8 = 20$$

$$n(S) = 27$$

$$n(P) = \frac{20}{27}$$

34. (b): Here $S = \{TTT, TTH, THT, HTT, THH, HTH, HHT, HHH\}$

Let E = event of getting at least two heads = $\{THH, HTH, HHT, HHH\}$.

$$\therefore p(E) = \frac{n(E)}{n(S)} = \frac{4}{8} = \frac{1}{2}$$

35. (d): In a simultaneous throw of two dice, $n(S) = (6 \times 6) = 36$.

Let E = event of getting a total of 10 or 11 = $\{(4, 6), (6, 4), (5, 5), (5, 6), (6, 5)\}$.

$$\therefore p(E) = \frac{n(E)}{n(S)} = \frac{5}{36}$$

36. (d): In a simultaneous throw of two dice, we have $n(S) = (6 \times 6) = 36$.

Let E = event of getting two numbers whose product is composite.

Then, $E = (1, 4), (1, 6), (2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6), (3, 2), (3, 4), (3, 5),$

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

$(6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)\}$.

$$\therefore n(E) = 29.$$

$$p(E) = \frac{n(E)}{n(S)} = \frac{29}{36}$$

$$P(\text{an even number}) = \frac{67}{100}$$

37. (c): In 100 trials, total number of even number = 67

$$= \frac{67}{100}$$

38. (c): $P(\text{getting a prize}) = \frac{10}{(10+45)} = \frac{10}{55} = \frac{2}{11}.$

Let E = event of getting a face card.

Then, $n(E) = 12.$

$$\therefore p(E) = \frac{n(E)}{n(S)} = \frac{12}{200} = \frac{3}{50}$$

39. (c): Not Available

40. (c): $n(S) = 200, n(E) = \{1^3, 2^3, 3^3, 4^3, 5^3\} \Rightarrow n(E) = 5. \therefore n(P) = \frac{n(E)}{n(S)} = \frac{5}{200} = \frac{1}{40}$