CHAPTER – 19

DATA HANDING

Exercise 19.1

1. The result of a survey of 200 people about their favourite fruit is given below:

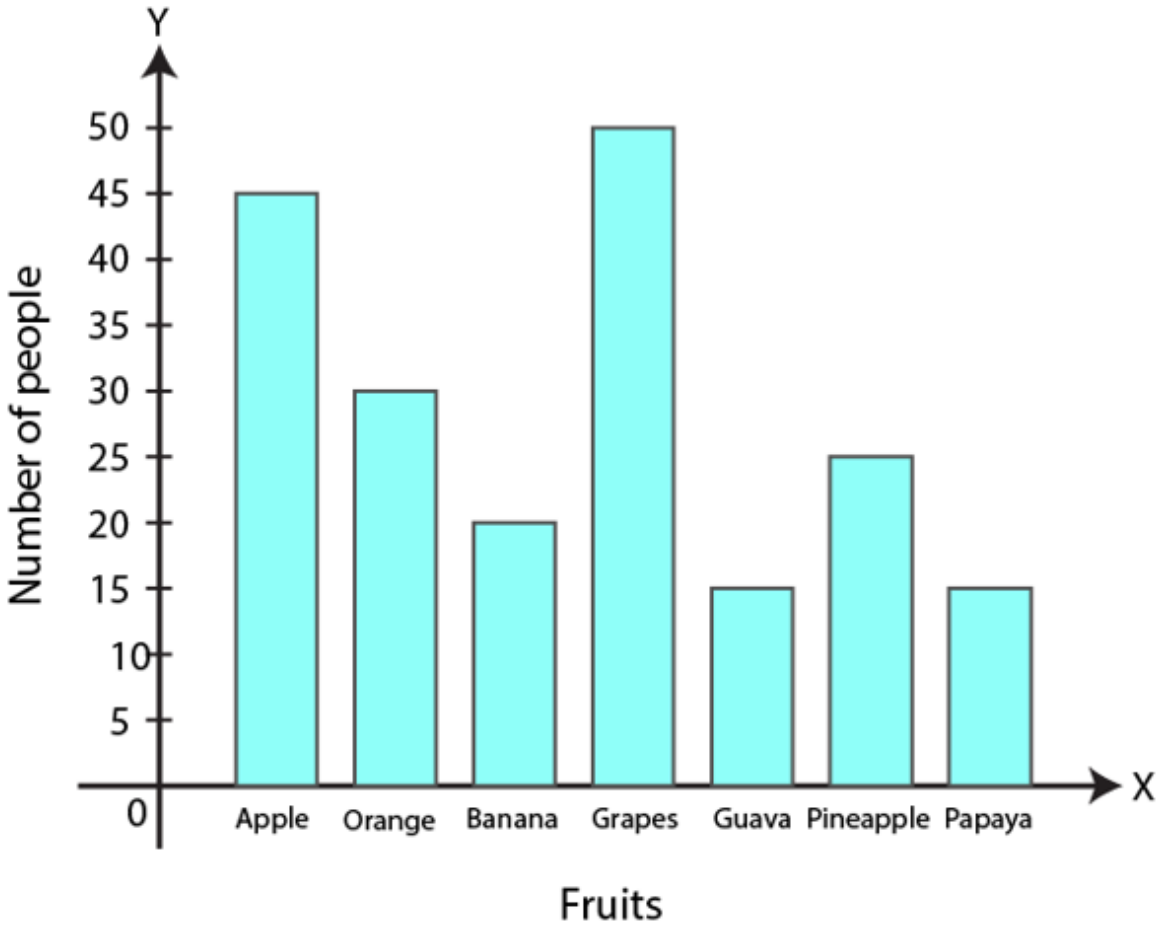
Fruit	**Apple**	**Orange**	**Banana**	**Grapes**	**Guava**	**Pineapple**	**Papaya**
Number of people	**45**	**30**	**20**	**50**	**15**	**25**	**15**

Represent the above data by a bar graph.

Solution:

Fruit	Apple	Orange	Banana	Grapes	Guava	Pineapple	Papaya
Number of people	45	30	20	50	15	25	15

The bar graph is shown below



2. Mr. Khurana has two kitchen appliance stores. He compares the sales of two stores during a month and recovered as given below

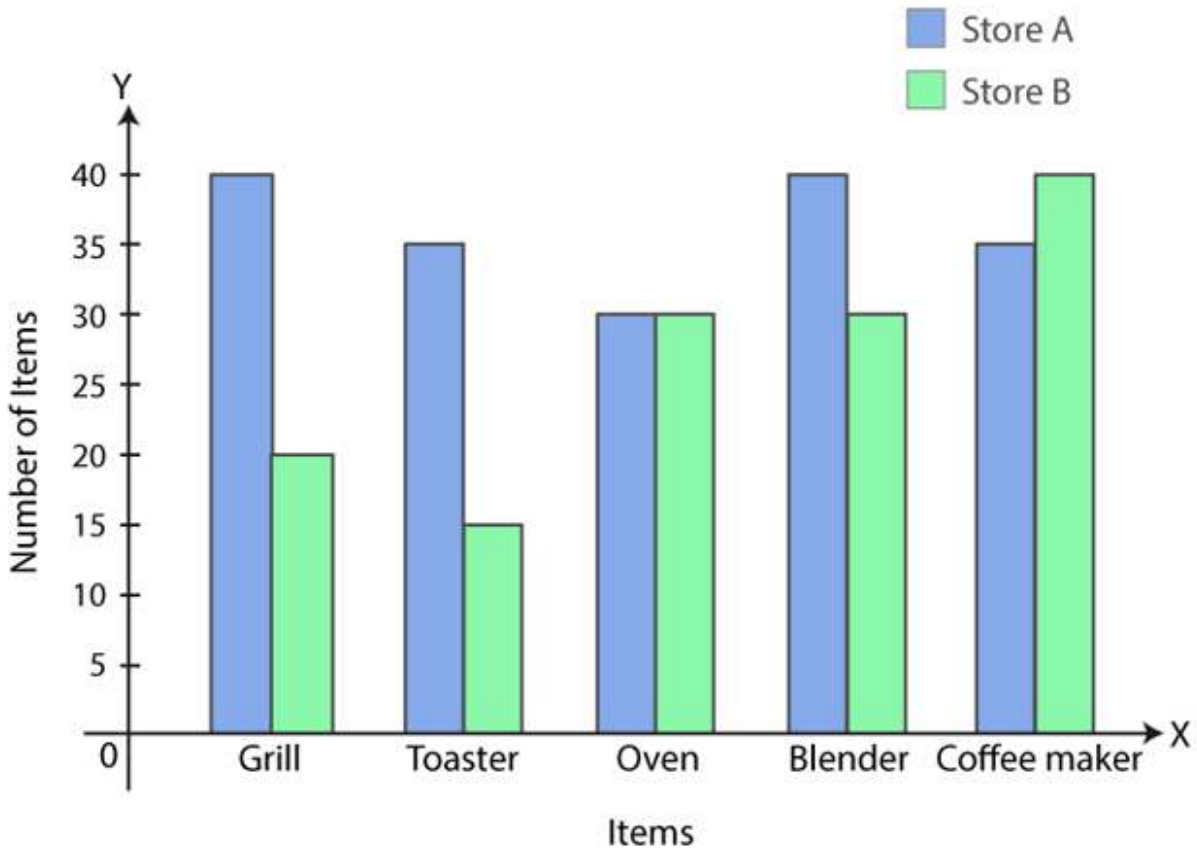
Item	Number of items sold	
	Store A	Store B
Grill	40	20
Toaster	35	15
Oven	30	30
Blender	40	30
Coffee maker	35	40

Represent the above data by a double bar graph.

Solution:

Item	Number of items sold	
	Store A	Store B
Grill	40	20
Toaster	35	15
Oven	30	30
Blender	40	30
Coffee maker	35	40

The double bar graph of the given data is shown below



3. The number of goals scored by a football team in different matches is given below:

3, 1, 0, 4, 6, 0, 0, 1, 1, 2, 2, 3, 5, 1, 2, 0, 1, 0, 2, 3, 9, 2, 0, 1, 0, 1, 4, 1, 0, 2, 5, 1, 2, 2, 3, 1, 0, 0, 0, 1, 1, 0, 2, 3, 0, 1, 5, 2, 0

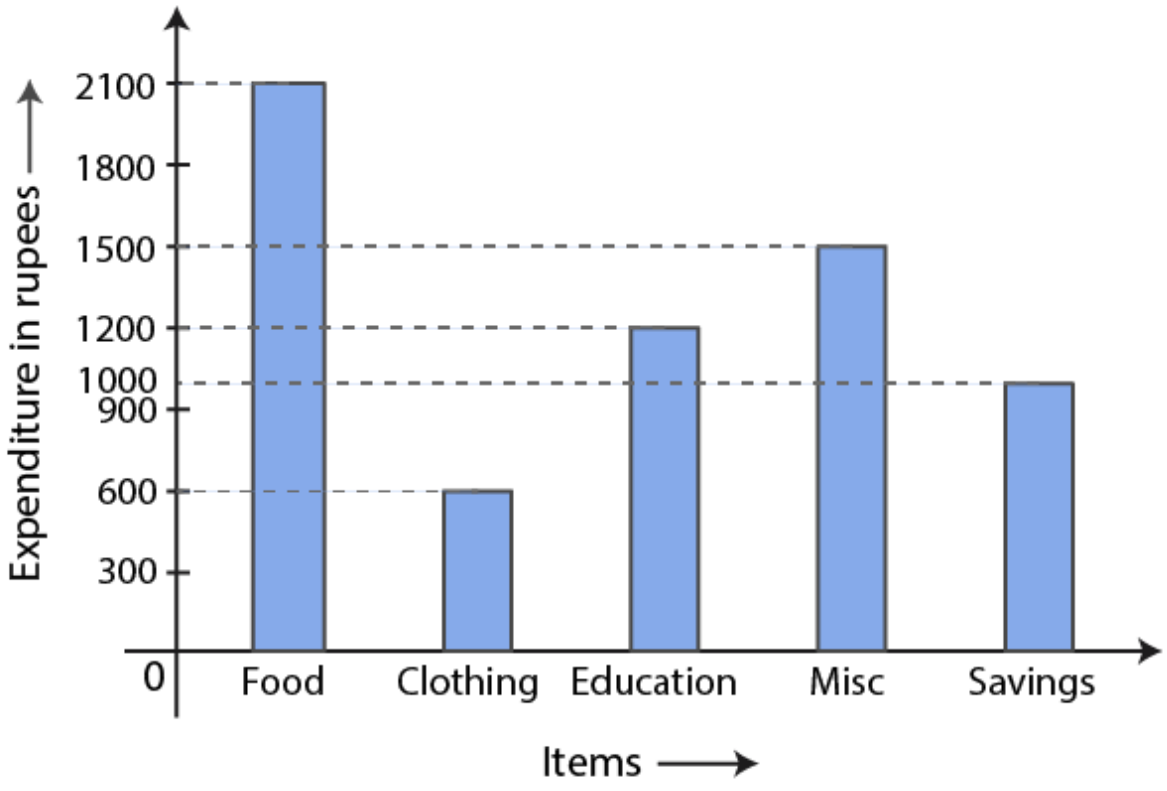
Make a frequency distribution table using tally marks

Solution:

Frequency table for the given data is as follows:

Number of goals scored	Tally Marks	Frequency of matches
0	𝍸 𝍸 ||||	14
1	𝍸 𝍸 |||	13
2	𝍸 𝍸	10
3	𝍸	5
4	||	2
5	|||	3
6	|	1
9	|	1
Total		49

4. Given below a bar graph:



Read the bar graph carefully and answer the following questions:

(i) What is the information given by the bar graph?

(ii) On which item the expenditure is maximum?

(iii) On which item the expenditure is minimum?

(iv) State whether true or false:

Expenditure on education is twice the expenditure on clothing

Solution:

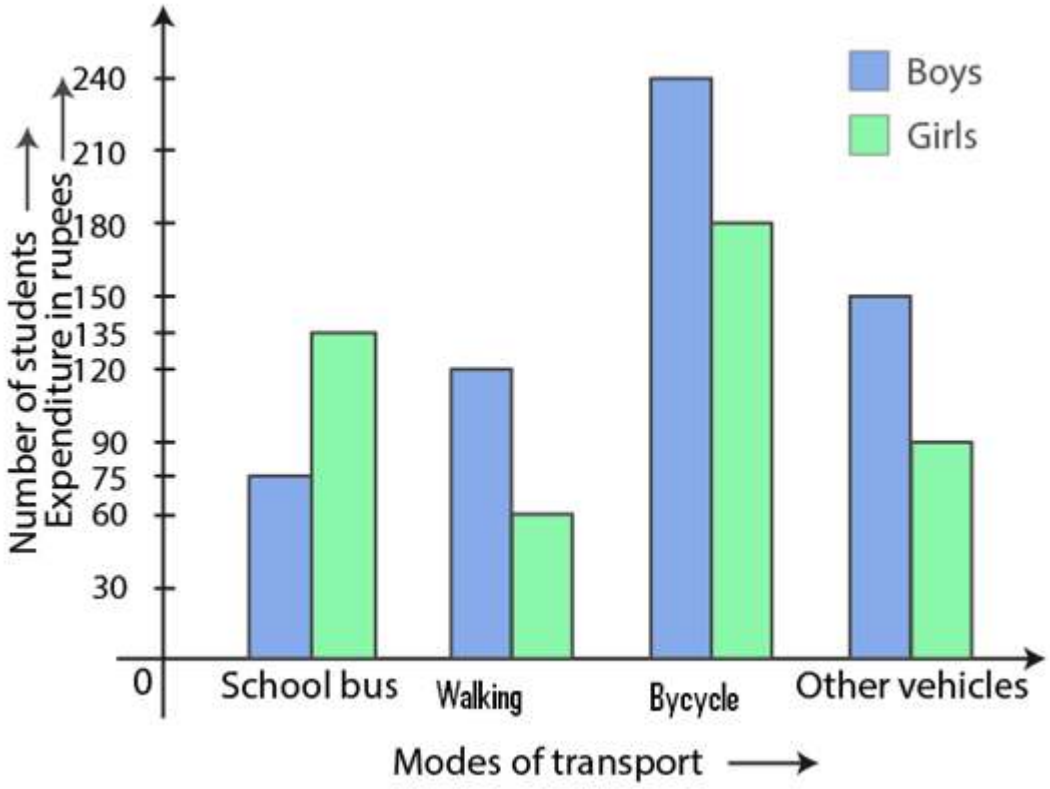
(i) Representation of the expenditure of monthly salary on different heads is the information given in the bar graph

(ii) The expenditure on food is maximum

(iii) The expenditure on clothing is minimum

(iv) Yes, the expenditure on education is twice the expenditure on clothing

5. Given below a double bar graph



Read the double bar graph carefully and answer the following questions:

(i) What is the information given by the double graph?

(ii) Which mode of transport girls using more than the boys?

(iii) Which mode of transport boys using the most?

(iv) In which mode of transport number of girls is half the number of boys?

Solution:

From the double bar graph:

(i) The bar graph represents number of boys and girls, going to school using different modes of transport

(ii) The mode of transport, girls using more than the boys is school bus

(iii) The mode of transport, boys using the most is bicycle

(iv) The mode of transport, number of girls is half the number of boys is walking

6. Using class intervals 0-5, 5-10, construct the frequency distribution table for the following data:

13, 6, 12, 9, 11, 14, 2, 8, 18, 16, 9, 13, 17, 11, 19, 6, 7, 12, 22, 21, 18, 1, 8, 12, 18

Solution:

The frequency table is as follows:

Class Intervals	Tally Marks	Frequency
0-5	||	2
5-10	𝍸 ||	7
10-15	𝍸 |||	8
15-20	𝍸 |	6
20-25	||	2
Total		25

7. Given below are the marks secured by 35 students in a surprise test:

41, 32, 35, 21, 11, 47, 42, 00, 05, 18, 25, 24, 29, 38, 30, 04, 14, 24, 34, 44, 48, 33, 36, 38, 41, 48, 08, 34, 39, 11, 13, 27, 26, 43, 03.

Taking class intervals 0-10, 10-20 ……. Construct frequency distribution table. Find the number of students obtaining below 20 marks.

Solution:

The frequency table of the given data is shown below:

Class	Tally Marks	Frequency
0-10	𝍸	5
10-20	𝍸	5
20-30	𝍸 ||	7
30-40	𝍸 𝍸	10
40-50	𝍸 ||	8
Total		35

Number of students obtaining below 20 marks = 5 + 5

= 10

Hence, 10 students are getting below 20 marks

8. The electricity bills (in?) of 40 houses in a locality are given below:

78, 87, 81, 52, 59, 65, 101, 108, 115, 95, 98, 65, 62, 121, 128, 63, 76, 84, 89, 91, 65, 101, 95, 81, 87, 105, 129, 92, 75, 105, 78, 72, 107, 116, 127, 100, 80, 82, 61, 118. Construct a grouped frequency distribution table of class size 10.

Solution:

The frequency distribution table for the given data is as follows:

Class Intervals (Electricity bill in Rs)	Tally Marks	Frequency (Number of houses)
50-60	||	2
60-70	𝍸 |	6
70-80	𝍸	5
80-90	𝍸 |||	8
90-100	𝍸	5
100-110	𝍸 ||	7
110-120	|||	3
120-130	||||	4
Total		40

9. Draw a histogram for the frequency table made for data in Question 8, and answer the following questions:

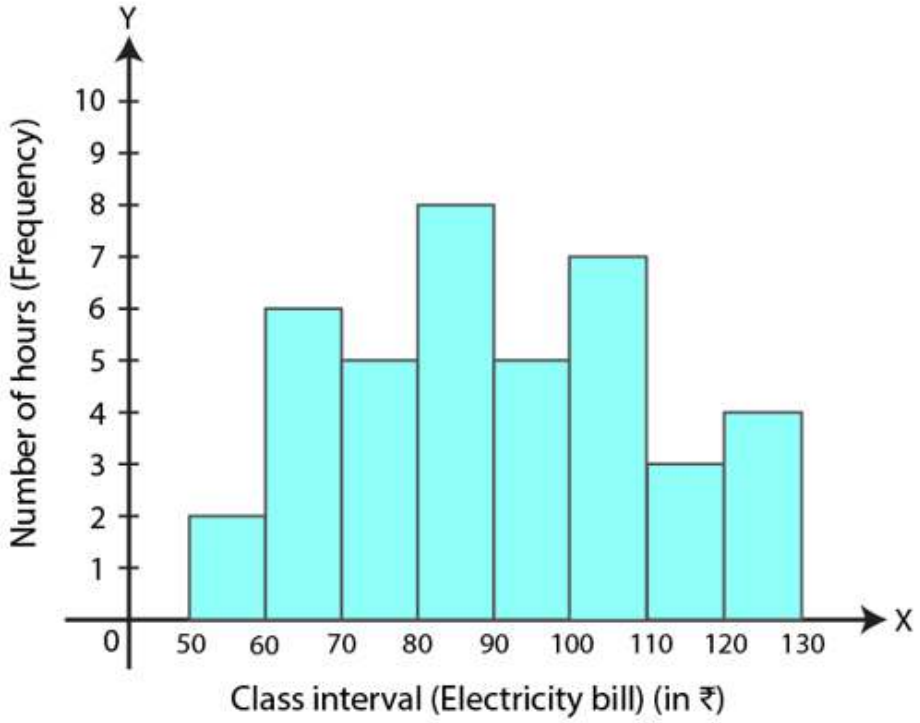
(i) Which group has the maximum number of houses?

(ii) How many houses pay less than Rs 100?

(iii) How many houses pay Rs 100 or more?

Solution:

Histogram of the given data in Question 8 is as follows:



(i) Group 80-90 has maximum number of house

(ii) Number of houses who pay less than Rs 100 = 2 + 6 + 5 + 8 + 5

= 26

Hence, 26 houses pay less than Rs 100

(iii) Number of houses who pay Rs 100 or more = 7 + 3 + 4 = 14

Hence, 14 houses pay Rs 100 or more

10. The weights of 29 patients in a hospital were recorded as follows:

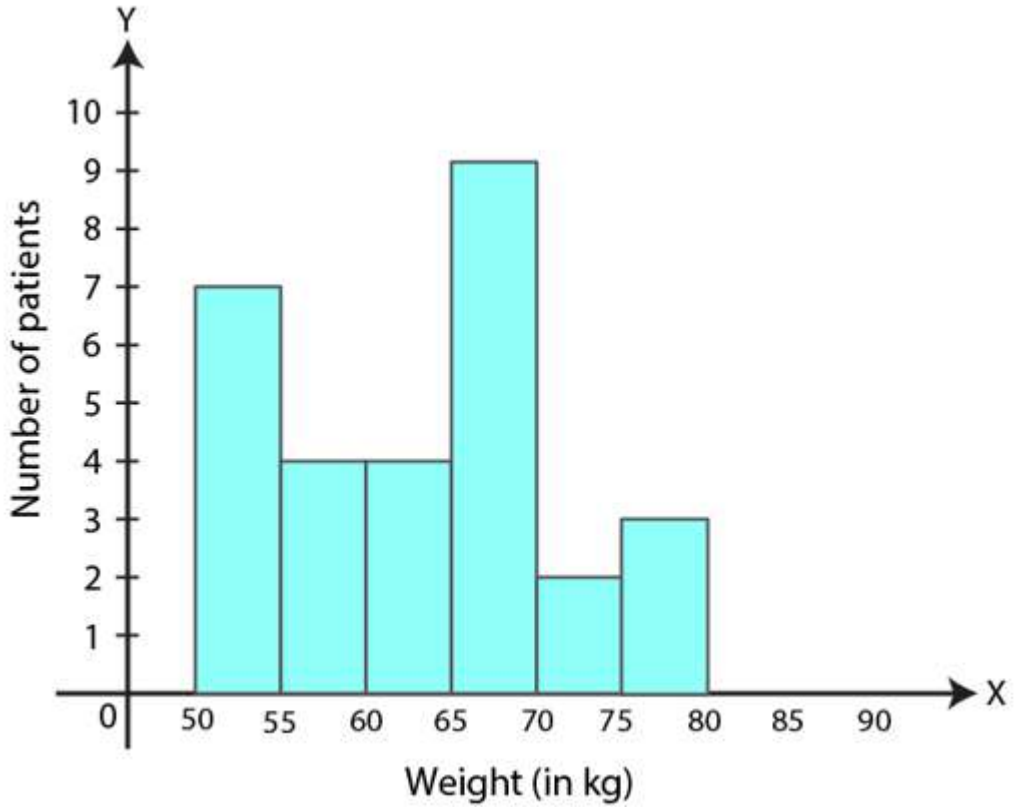
Weight (in kg)	**50-55**	**55-60**	**60-65**	**65-70**	**70-75**	**75-80**
Number of patients	**7**	**4**	**4**	**9**	**2**	**3**

Draw a histogram to represent this data visually

Solution:

Weight (in kg)	50-55	55-60	60-65	65-70	70-75	75-80
Number of patients	7	4	4	9	2	3

The histogram for the given data is shown below:



11. In a study of diabetic patients, the following data was obtained:

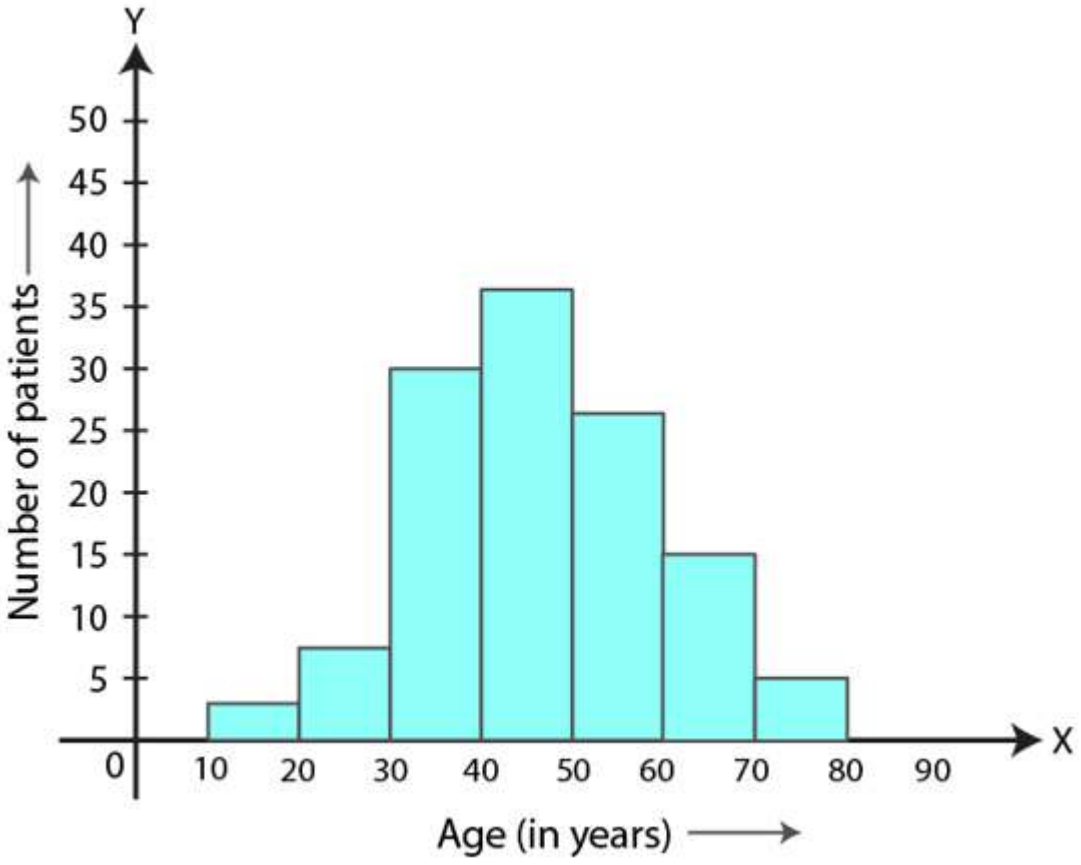
Age (in years)	**10-20**	**20-30**	**30-40**	**40-50**	**50-60**	**60-70**	**70-80**
Number of patients	**3**	**8**	**30**	**36**	**27**	**15**	**6**

Represent the above data by a histogram

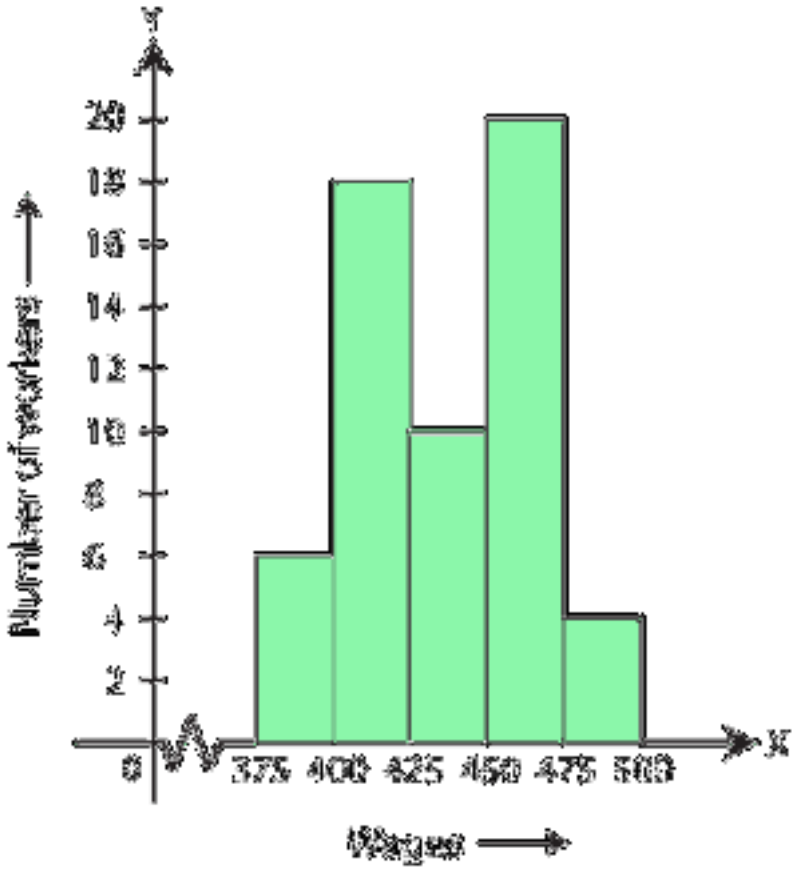
Solution:

Age (in years)	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Number of patients	3	8	30	36	27	15	6

The histogram representing the above given data is as follows:



12. The histogram showing the weekly wages (in Rs) of workers in a factory is given alongside:



Answer the following:

(i) What is the frequency of class 400-425?

(ii) What is the class having a minimum frequency?

(iii) How many workers get more than Rs 425?

(iv) How many workers get less than Rs 475?

(v) Number of workers whose weekly wages are more than or equal to Rs 400 but less than Rs 450

Solution:

The weekly wages of workers in a factory is shown in the given histogram:

(i) The frequency of class 400-425 is 18

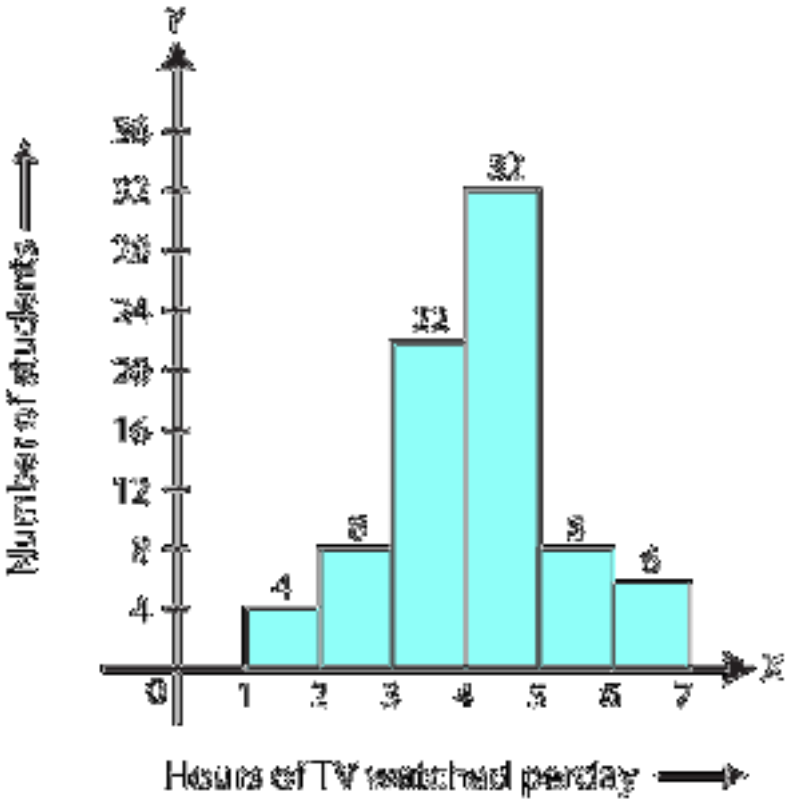
(ii) The class having the minimum frequency is 475-500

(iii) 34 workers are getting more than Rs 425

(iv) 54 workers are getting less than Rs 475

(v) Number of workers whose weekly wages are more than or equal to Rs 400 but less than Rs 450 is 28

13. The number of hours for which students of a particular class watched television during holidays is shown in the histogram below.



Answer the following:

(i) For how many hours did the maximum number of students watch T.V.?

(ii) How many students watched T.V. for less than 4 hours?

(iii) How many students spent more than 5 hours in watching T.V.?

(iv) How many students spent more than 2 hours but less than 4 hours in watching T.V.?

Solution:

From the given histogram,

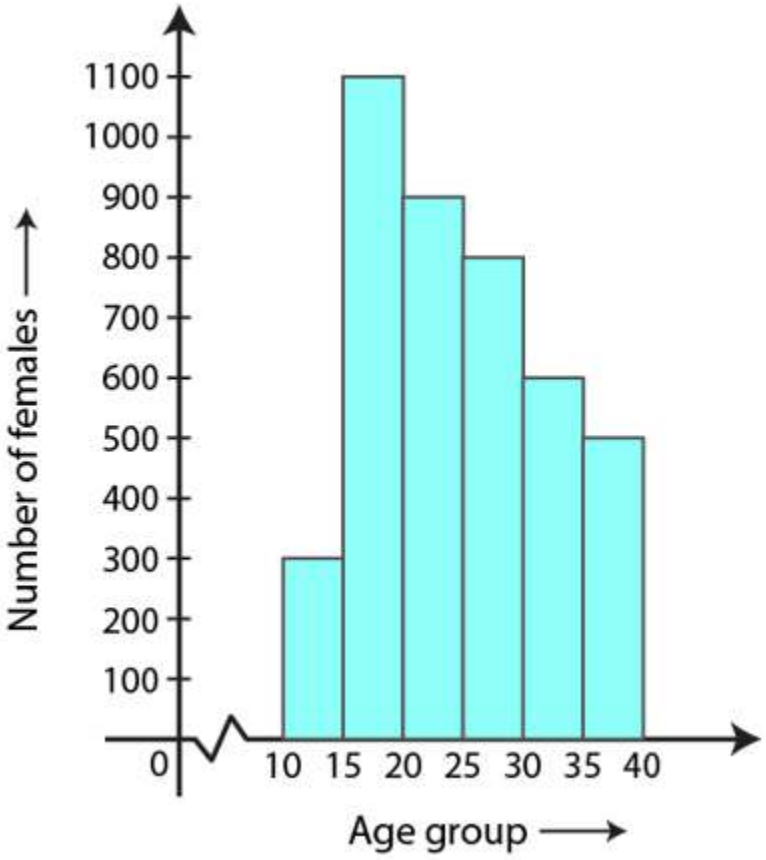
(i) Maximum number of students watch T.V for 4-5 hours

(ii) 34 students watch T.V. for less than 4 hours

(iii) 14 students spent more than 5 hours in watching T.V.

(iv) 30 students spent more than 2 hours but less than 4 hours in watching T.V.

14. The number of literate females in the age group of 10 to 40 years in a town is shown in the histogram alongside.



Answer the following questions:

(i) Write the classes assuming all the classes are of equal width.

(ii) What is the class size?

(iii) In which age group are the literate females the least?

(iv) In which age group is the number of literate females the highest?

Solution:

(i) From the given histogram, the classes having equal width are 10-15, 15-20, 20-25, 25-30, 30-35, 35-40

(ii) In the given histogram, the class size is 5

(iii) In 10-15 age group, the literate females are the least

(iv) In 15-20 age group, the literate females are the highest

Exercise 19.2

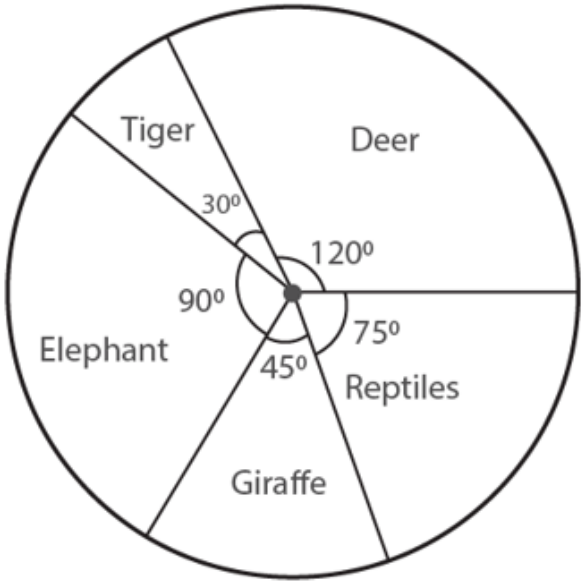
1. The following data represents the different number of animals in a zoo. Prepare a pie chart for the given data.

Animals	**Deer**	**Tiger**	**Elephant**	**Giraffe**	**Reptiles**
Number of animals	**40**	**10**	**30**	**15**	**25**

Solution:

Animals	**Number of animals**	**Central degree**
Deer	40	$\frac{(360° \times 40)}{120} = 120^0$
Tiger	10	$\frac{(360° \times 10)}{120} = 30^0$
Elephant	30	$\frac{(360° \times 30)}{120} = 90^0$
Giraffe	15	$\frac{(360° \times 15)}{120} = 45^0$
Reptiles	25	$\frac{(360° \times 25)}{120} = 75^0$
Total	120	360^0

Pie chart for the given data is shown below



2. The following data represents the monthly expenditure of a family (in T) on various items. Draw a pie chart to represent this data.

Items	**Food**	**House rent**	**Education**	**Savings**	**Health**	**Others**
Expenditure (in Rs)	**12500**	**5000**	**7500**	**10000**	**5000**	**10000**

Solution:

Items	Expenditure (in Rs)	Central angles
Food	12500	$\frac{(12500 \times 360°)}{50000} = 90^0$
House rent	5000	$\frac{(5000 \times 360°)}{50000} = 36^0$
Education	7500	$\frac{(7500 \times 360°)}{50000} = 54^0$
Savings	10000	$\frac{(10000 \times 360°)}{50000} = 72^0$
Health	5000	$\frac{(5000 \times 360°)}{50000} = 36^0$
Others	10000	$\frac{(10000 \times 360°)}{50000} = 72^0$
Total	50000	360^0

Pie chart for the given data is shown below

3. The following data represents the percentage distribution of the expenditure incurred in publishing a book.

Items	**Paper cost**	**Printing cost**	**Binding**	**Royality**	**Transportation cost**	**Promotion cost**
Expenditure (in %)	**25%**	**20%**	**20%**	**10%**	**15%**	**10%**

Solution:

Items	Expenditure	Central angles
Paper cost	25%	$\frac{(360°\times 25)}{100} = 90^0$
Printing cost	20%	$\frac{(360°\times 20)}{100} = 72^0$
Binding	20%	$\frac{(360°\times 20)}{100} = 72^0$
Royality	10%	$\frac{(360°\times 10)}{100} = 36^0$
Transportation cost	15%	$\frac{(360°\times 15)}{100} = 54^0$
Promotion cost	10%	$\frac{(360°\times 10)}{100} = 36^0$
Total	100%	360^0

Pie chart representing the given data is as follows:

4. The following data represents the number of students got admission in different streams of a college:

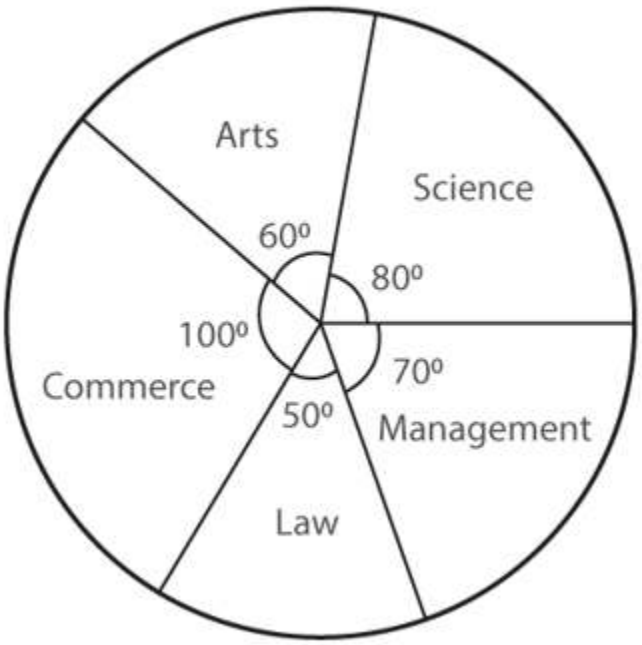
Stream	**Science**	**Arts**	**Commerce**	**Law**	**Management**
Number of students	**400**	**300**	**500**	**250**	**350**

Draw a pie chart to represent this data

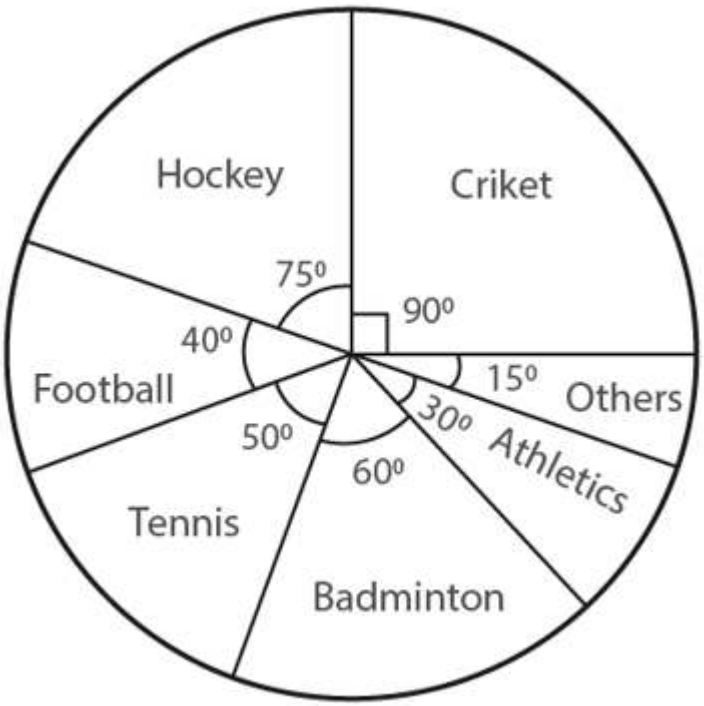
Solution:

Stream	**Number of students**	**Central angle**
Science	400	$\frac{(400 \times 360°)}{1800} = 80^0$
Arts	300	$\frac{(300 \times 360°)}{1800} = 60^0$
Commerce	500	$\frac{(500 \times 360°)}{1800} = 100^0$
Law	250	$\frac{(250 \times 360°)}{1800} = 50^0$
Management	350	$\frac{(350 \times 360°)}{1800} = 70^0$
Total	1800	360^0

Pie chart representing the above given data is shown below:



5. The adjoining pie chart shows the expenditure of a country on various sports during year 2012. Study the pie chart carefully and answer the following questions:



(i) What percent of total expenditure is spent on cricket?

(ii) How much percent more is spent on hockey than that on tennis?

(iii) If the total amount spent on sports in 2012 is Rs 1, 80, 00, 000 then find the amount spent on Badminton

(iv) If the total amount spent on sports in 2012 is Rs 2, 40, 00, 000 then find the amount spent on cricket and hockey together.

Solution:

The given pie chart represents the expenditure of a country on various sports during year 2012

(i) Given that expenditure on a cricket = 90^0

So,

$\left(\frac{90}{360°}\right) \times 100\% = 25\%$

Therefore, 25% expenditure is spent on cricket

(ii) Given that expenditure on a hockey = 75^0

So,

$\left(\frac{70}{360°}\right) \times 100\% = \left(\frac{125}{6}\right)\% = 20\frac{5}{6}\%$

Expenditure on tennis = 50^0

Hence, $\left(\frac{50}{360°}\right) \times 100\% = \left(\frac{125}{9}\right)\% = 13.9\%$

So,

$\left(\frac{125}{6}\right) - \left(\frac{125}{9}\right) = \frac{125}{18}$

$= \frac{(375 - 250)}{18}$

$= \frac{125}{18}$

= 6.95% more

Therefore, 6.95% more is spent on hockey than that on tennis

(iii) Total amount spent on sports = Rs 1, 80, 00, 000

Total amount spent on Badminton = Rs 1, 80, 00,000 × $\left(\frac{60}{360°}\right)$

= Rs 30,00,000

(iv) If the total amount spent on sports = 2,40,00,000

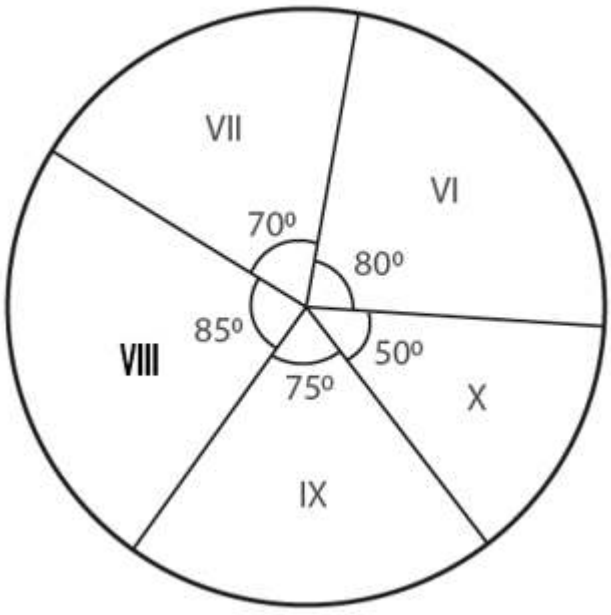
Total amount spent on cricket and hockey together = $90^0 + 75^0$

= 165^0

= $\left(\frac{165°}{360°}\right)$ × 2, 40, 00,000

= 1, 10, 00, 000

6. The adjoining pie chart shows the number of students enrolled in class VI to class X of a school.



If 1440 students are enrolled from VI to X, then answer the following questions:

(i) How many students are enrolled in class VIII?

(ii) How many students are more in class IX than in class X?

(iii) What is the sum of students enrolled in VII and VIII?

(iv) Find the ratio of students enrolled in VI to students enrolled in X

Solution:

The given pie chart represents the enrolment of students from class VI to class X in a school.

Total number of students enrolled from VI to X = 1440 students

(i) Enrolment of class VIII = $\left(\frac{85}{360°}\right)$ × 1440 = 340 students

(ii) Difference in X and IX class enrolment = $75^0 - 50^0 = 25^0$

$\left(\frac{25}{360°}\right)$ × 1440 = 100 students

Therefore, 100 students are more in class IX than in class X

(iii) Sum of students enrolled in VII and VIII classes = $70^0 + 85^0 = 155^0$

$\left(\frac{155}{360°}\right)$ × 1440 = 620 students

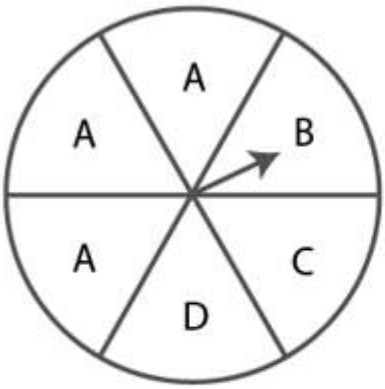
Therefore, the sum of students enrolled in class VI and VIII = 620 students

(iv) Ratio between the students enrolled in VI to students enrolled in X classes = 80^0: 50^0 = 8: 5

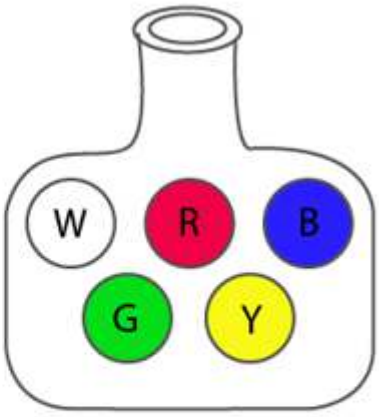
Therefore, the ratio between the students enrolled in VI to students enrolled in X classes is 8: 5

Exercise 19.3

1. List the outcomes you can see in these experiments



(i) Spinning a wheel



(ii) Drawing a ball from the containing 5 identical ball of different colours

Solution:

(i) The outcomes in spinning wheel = A, A, A, B, C, D

(ii) The outcomes in drawing a ball from a bag containing 5 identical balls of different colours = White, Red, Blue, Green, Yellow

2. A die is rolled once. Find the probability of getting

(i) an even number

(ii) a multiple of 3

(iii) not a multiple of 3

Solution:

Total outcomes of a die when rolled once:

1, 2, 3, 4, 5, 6 = 6

(i) An even number: 2, 4, 6

i.e., Favourable outcomes = 3

Therefore,

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

(ii) Multiple of 3 = 3, 6

i.e., Favourable outcomes = 2

Therefore,

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

(iii) Not a multiple of 3 = 1, 2, 4, 5

i.e. Favourable outcomes = 4

Therefore,

Probability P(E) = $\frac{4}{6} = \frac{2}{3}$

3. Two coins are tossed together. Find the probability of getting

(i) Two tails

(ii) At least one tail

(iii) No tail

Solution:

The total outcomes, when two coins are tossed together = 2 × 2 = 4

Therefore, outcomes are,

HH, HT, TH, TT

(i) Favourable outcomes of getting two tails = 1

Hence,

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

(ii) Favourable outcomes of getting at least one tail = TH, HT, TT = 3

Hence,

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

(iii) Favourable outcomes of getting no tail = HH = 1

Hence,

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

4. Three coins are tossed together. Find the probability of getting

(i) At least two heads

(ii) At least one tail

(iii) At most one tail

Solution:

Three coins are tossed together

Hence,

Total outcomes = 8

= HHH, HHT, HTH, THH, HTT, TTH, TTT, THT

(i) Favourable outcomes of getting at least two heads = HHH, HHT, HTH, THH

= 4 in numbers

Therefore,

Probability P(E) = $\frac{\text{(Number of favourable outcome)}}{\text{(Number of possible outcome)}}$

= $\frac{4}{8}$

= $\frac{1}{2}$

(ii) Favourable outcomes of getting at least one tail = HHT, HTH, HTT, TTT, THH, THT, TTH

= 7 in numbers

Therefore,

Probability P(E)

= (Number of favourable outcome) / (Number of possible outcome)

= $\frac{7}{8}$

(iii) Favorable outcomes of getting at most one tail = HHH, HHT, HTH, THH

= 4 in numbers

Therefore,

Probability P(E) = $\frac{\text{(Number of favourable outcome)}}{\text{(Number of possible outcome)}}$

= $\frac{4}{8}$

= $\frac{1}{2}$

5. Two dice are rolled simultaneously. Find the probability of getting

(i) The sum as 7

(ii) The sum as 3 or 4

(iii) Prime numbers on both the dice.

Solution:

Two dice are rolled simultaneously, then

Total outcomes = 6 × 6 = 36

(i) Sum as 7 = (1, 6), (2, 5), (3, 4), (4, 3), (5, 2), (6, 1) = 6

Therefore,

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

= $\frac{6}{36}$

= $\frac{1}{6}$

(ii) The sum as 3 or 4 = (1, 2), (1, 3), (2, 1), (2, 2), (3, 1) = 5

Therefore,

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

= $\frac{5}{36}$

(iii) Prime numbers on both the side

= (2, 2), (2, 3), (2, 5), (3, 2), (3, 3), (3, 5), (5, 2), (5, 3), (5, 5)

= 9

Therefore,

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

= $\frac{9}{36}$

= $\frac{1}{4}$

6. A box contains 600 screws, one tenth are rusted. One screw is taken out at random from the box. Find the probability that it is

(i) a rusted screw

(ii) not a rusted screw

Solution:

Given

Rusted screw = $\left(\frac{1}{10}\right)$ of 600

= $\left(\frac{1}{10}\right) \times 600$

= 60 seconds

(i) Favourable outcomes of picking rusted screw = 60

Therefore,

Probability P(E) = $\frac{60}{600}$

= $\frac{1}{10}$

(ii) Probability (of not rusted screw) = 1 – Probability (of rusted screw)

= $1 - \frac{1}{10}$

= $\frac{(10 - 1)}{10}$

= $\frac{9}{10}$

7. A letter is chosen from the word 'TRIANGLE'. What is the probability that it is a vowel?

Solution:

Given word,

'TRIANGLE'

Total number of outcomes = 8

Vowels = I, A, E = 3

Therefore,

Probability P(E) = $\frac{3}{8}$

Hence, the probability of vowel in 'TRIANGLE' is $\frac{3}{8}$

8. A bag contains 5 red, 6 black and 4 white balls. A ball is drawn at random from the bag, find the probability the ball is drawn is

(i) White

(ii) Not black

(iii) Red or black

(iv) Neither red nor black

Solution:

Given

In a bag, there are 5 red, 6 black and 4 white balls.

Then, total number of outcomes = 5 + 6 + 4 = 15

(i) Probability of white ball = $\frac{4}{15}$

(ii) Probability of not black = 5 + 4 = 9 balls

Therefore,

Probability of not black = $\frac{9}{15} = \frac{3}{5}$

(iii) Probability of red or black = 5 + 6 = 11

Therefore,

Probability of red or black = $\frac{11}{15}$

(iv) Probability of ball which is neither red nor black, i.e., white ball = 4

Therefore,

Probability of ball which is neither red nor black = $\frac{4}{15}$

9. A box contains 17 cards numbered 1, 2, 3….. 17 and are mixed thoroughly. A card is drawn at random from the box. Find the probability that the number on that card is

(i) Odd

(ii) Even

(iii) Prime

(iv) Divisible by 3

(v) Divisible by 2 and 3 both

Solution:

Given

A box contains 17 cards numbered 1 to 17

So, total number of outcomes = 17

(i) Card bearing odd number

(1, 3, 5, 7, 9, 11, 13, 15, 17) = 9

Therefore,

Probability P(E) = $\frac{9}{17}$

(ii) Even number

(2, 4, 6, 8, 10, 12, 14, 16) = 8

Therefore,

Probability P(E) = $\frac{8}{17}$

(iii) Prime numbers

(2, 3, 5, 7, 11, 13, 17) = 7

Therefore,

Probability P(E) = $\frac{7}{17}$

(iv) Numbers divisible by 3

3, 6, 9, 12, 15 = 5

Therefore,

Probability P(E) = $\frac{5}{17}$

(v) Numbers divisible by 2 and 3 both

6, 12 = 2

Therefore,

Probability P(E) = $\frac{2}{17}$

10. A card is drawn from a well-shuffled pack of 52 cards. Find the probability that the card drawn is:

(i) An ace

(ii) A red card

(iii) Neither a king nor a queen

(iv) A red face card or an ace

(v) A card of spade

(vi) Non-face card of red colour

Solution:

Total number of playing cards = 52

One card is drawn

(i) An ace = 4

Therefore,

Probability P(E) = $\frac{4}{52} = \frac{1}{13}$

(ii) A red card = 13 + 13 = 26

Therefore,

Probability P(E) = $\frac{26}{52} = \frac{1}{2}$

(iii) Neither a king nor a queen

Number of cards = 52 – (4 + 4)

= 52 – 8

= 44

Therefore,

Probability P(E) = $\frac{44}{52} = \frac{11}{13}$

(iv) A red face card = 6

Therefore,

Probability P(E) = $\frac{6}{52} = \frac{3}{26}$

(v) A card of spade or an ace = 13 + 3

= 16

Therefore,

Probability P(E) = $\frac{16}{52} = \frac{4}{13}$

(vi) Non-face card of red colour = 26 – 6 = 20

Therefore,

Probability P(E) = $\frac{20}{52} = \frac{5}{13}$

11. In a lottery, there are 5 prized tickets and 995 blank tickets. A person buys a lottery ticket. Find the probability of his winning a prize.

Solution:

Given

Number of prized tickets = 5

Number of blank tickets = 995

So, total number of tickets = 5 + 995 = 1000

Probability of prized ticket P(E) = $\frac{(\text{Number of favourable outcome})}{(\text{Number of possible outcome})}$

= $\frac{5}{1000}$

= $\frac{1}{200}$

Therefore, the probability of his winning prize is $\frac{1}{200}$

Mental Maths

Question 1: Fill in the blanks:
(i) Bar graphs are …….. representation of ungrouped data.
(ii) In a grouped frequency distribution, the difference between lower limit and upper limit of a class is called ……..
(iii) The mid-point of the class interval is called ……..
(iv) Bar graphs of grouped data are called ……..
(v) The circle graphs are commonly called ……..
(vi) An experiment which has more than one possible outcomes and it is not possible to predict the outcome in advance is called ……..
(vii) The outcomes which ensures the occurrence of an event are called …….
(viii) An event which never happens is called ……..
Solution:
(i) Bar graphs are visual representation of ungrouped data.
(ii) In a grouped frequency distribution, the difference between lower limit
and upper limit of a class is called class size or class width.
(iii) The mid-point of the class interval is called class mark.
(iv) Bar graphs of grouped data are called histogram.
(v) The circle graphs are commonly called pie chart or pie diagram.
(vi) An experiment which has more than one possible outcomes
and it is not possible to predict the outcome in advance
is called random experiment.
(vii) The outcomes which ensures the occurrence of
an event are called favourable outcomes.
(viii) An event which never happens is called impossible event.

Question 2: State whether the following statements are true (T) or false (F):

(i) The data arranged in ascending or descending order of size is called data array.
(ii) The lower limit of class 10-20 is 20.
(iii) The class size of class 20-30 is 10.
(iv) The class mark of 25-35 is 30.
(v) There is no difference between bar graphs and histograms.
(vi) In histograms the breadth of a rectangle is meaningless.
(vii) In histograms, there is no gap between two adjacent rectangle.
(viii) In a pie chart, size of each sector is proportional to the value of item represented by it.
(ix) In a pie chai angle of sector
= value of item sum of values of all items ×180∘
(x) In tossing a coin getting head or tail are equally likely events.
(xi) Probability of an event E satisfies $0 \leq P(E) \leq 1$.
(xii) P(occurrence of an event) = P(non occurence of an event).
(xiii) Total number of outcomes when two dice are rolled together = 6 + 6.
Solution:
(i) The data arranged in ascending or descending
order of size is called data array. True
(ii) The lower limit of class 10-20 is 20. False
Correct: Lower limit is 10.
(iii) The class size of class 20-30 is 10. True
(iv) The class mark of 25-35 is 30. True
(v) There is no difference between bar graphs and histograms. False
Correct:
Histogram is for continued classed and in
bar graph there is gap between the two bars.
(vi) In histograms the breadth of a rectangle is meaningless. False
Correct:
The rectangles are of equal width.
(vii) In histograms, there is no gap between two adjacent rectangle. True

(viii) In a pie chart, size of each sector is proportional to the value of item represented by it. True
(ix) In a pie chart, angle of sector = value of item sum of values of all items ×180∘ False
Correct:
It is value of item sum of values of all items × 360°
(x) In tossing a coin getting head or tail are equally likely events. True
(xi) Probability of an event E satisfies $0 \leq P(E) \leq 1$. True
(xii) P(occurrence of an event) = P(non-occurence of an event). False
Correct:
Probability is of occurence of an event.
(xiii) Total number of outcomes when two dice are rolled together = 6 + 6. False
Correct: It is $6 \times 6 = 36$

Multiple Choice Questions

Study the following frequency distribution table:

The table shows the pocket money (in?) per month of 50 students. Choose the correct answer from the given four options for questions 3 to 7;

Class interval (Pocket money in T)	Frequency (No. of students)
10-20	14
20-30	11
30-40	11
40-50	10
50-60	4
Total	50

Question 3: Size of the class-intervals is
(a) 50
(b) 20

(c) 10
(d) 30
Solution:
Size of the class interval is 10. (c)

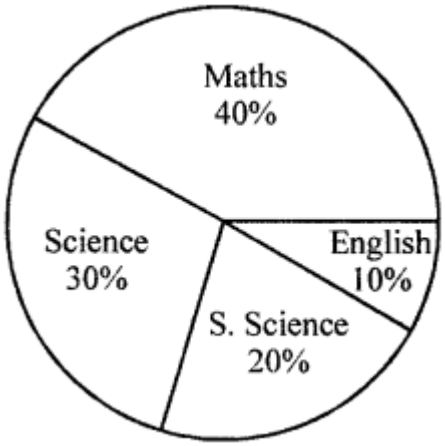
Question 4: The class having the maximum frequency is
(a) 10-20
(b) 20-30
(c) 30-40
(d) 40-50
Solution:
The class having the maximum frequency is 10-20. (a)

Question 5: The upper limit of the class having minimum frequency is
(a) 30
(b) 40
(c) 50
(d) 60
Solution:
The upper limit of the class having minimum frequency is 60. (d)

Question 6: Which two are classes having the same frequency?
(a) 10-20 and 20-30
(b) 20-30 and 30-40
(c) 30-40 and 50-60
(d) 40-50 and 50-60
Solution:
The two-class 20-30 and 30-40 have the same frequency. (b)

Question 7: The frequency of class whose class mark is 25 is
(a) 14
(b) 11
(c) 10
(d) 4
Solution:
25 is the class mark of the class whose frequency is 11. (b)

The pie graph shown in the adjoining figure representing the different subjects liked by the students of class VIII. Study the pie graph carefully and choose the correct answer from the given four options for questions 8 to 11.



Question 8: Which subject is liked by the maximum number of students
(a) Maths
(b) Science
(c) S. Science
(d) English
Solution:
Mathematics is liked by the maximum number of students. (a)

Question 9: Which subject is liked by the minimum number of students
(a) Maths
(b) Science
(c) S. Science
(d) English
Solution:
English is liked by the minimum number of students. (d)

Question 10: If there are 200 students in class VIII then the number of students who like S. Science
(a) 10
(b) 20
(c) 40
(d) 80
Solution:
In class VIII, there are 200 students,
then the number of students who like S. Science = $200 \times \frac{20}{100} = 40$ (c)

Question 11: Number of students who like Science
(a) 20
(b) 40
(c) 60
(d) 80
Solution:
Number of students who like science = $200 \times \frac{30}{100} = 60$ (c)

Choose the correct answer from the given four options (12 to 17):

Question 12: Probability of getting the sum as 4 when a pair of dice is rolled

(a) $\frac{3}{4}$ **(b)** $\frac{1}{12}$

(c) $\frac{1}{9}$ **(d)** $\frac{1}{6}$

Solution:

A pair of dice is rolled, then total number of outcomes = 6 × 6 = 36

Getting sum as 4 (1, 3), (2, 2), (3, 1) = 3

Probability P(E) = $\frac{3}{36} = \frac{1}{12}$ (b)

Question 13: Probability of getting exactly 2 heads when three coins are tossed together

(a) $\frac{1}{8}$ **(b)** $\frac{1}{4}$

(c) $\frac{3}{8}$ **(d)** $\frac{5}{8}$

Solution:

Three coins are tossed,

then total number of outcomes = $2^3 = 2 \times 2 \times 2 = 8$

Getting two heads (2, 2…), (2…, 2), (…2, 2) = 3

Probability = $\frac{3}{8}$ (c)

Question 14: Probability of selecting a consonant from the letters of the word 'FATHER'

(a) $\frac{1}{3}$ **(b)** $\frac{3}{4}$

(c) $\frac{5}{6}$ **(d)** $\frac{2}{3}$

Solution:

From the letter ‘FATHER’
Total outcomes = 6
∴ Consonant = $\frac{4}{6} = \frac{2}{3}$ (d)

Question 15: Probability of getting more than 2 heads when a pair of coins is tossed.
(a) 1
(b) $\frac{1}{2}$
(c) $\frac{1}{3}$
(d) 0
Solution:
A pair of coins tossed, then
Total number of outcomes = 2 × 2 = 4
Getting more than two heads – None
∴ Probability = 0 (d)

Question 16: Probability of getting a red ball from a bag containing 20 red balls
(a) 0
(b) 1
(c) $\frac{1}{20}$
(d) $\frac{1}{2}$
Solution:
Total red balls = 20
Probability a red ball = $\frac{20}{20}$ = 1 (b)

Question 17: Probability of getting a non-red ball from a bag containing 4 red, 5 blue and 3 black balls is

(a) $\frac{1}{3}$ **(b)** $\frac{2}{3}$

(c) $\frac{1}{4}$ **(d)** $\frac{5}{12}$

Solution:

In a bag, there are 4 red balls, 5 blue and 3 black balls.

∴ Total outcomes = 4 + 5 + 3 = 12

Probability of a non-red ball (5 blue + 3 black) = 8

$= \frac{8}{12} = \frac{2}{3}$ (b)

Value Based Questions

Question 1: Draw a pie chart of the data given below:
The time spent by a Class VIII student during a day.

sleep	School	Tuition	Self-study	Play	Others
7 hrs	6 Hrs	2 Hrs	2 Hrs	4 Hrs	3 Hrs

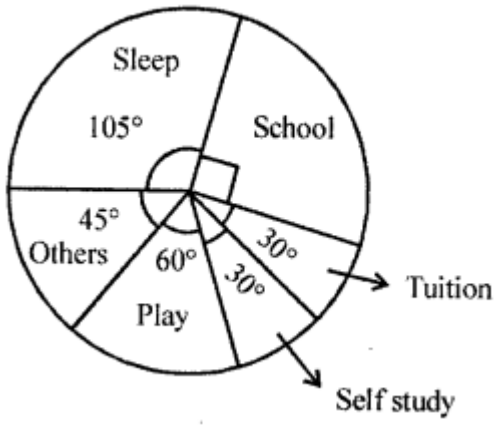
Should a student of class VIII study for just 2 hours daily? Which time is considered the best time for self-study?

Solution:

Time spent during a day

Stream	No. of hours	Central angle
Sleep	7	$\frac{7}{24} \times 360° = 105°$
School	6	$\frac{6}{24} \times 360° = 90°$
Tuition	2	$\frac{2}{24} \times 360° = 30°$
Self-study	2	$\frac{2}{24} \times 360° = 30°$
Play	4	$\frac{4}{24} \times 360° = 60°$
Others	3	$\frac{3}{24} \times 360° = 45°$
Total	24	$360°$

Pie chart of the above data is given here:



More time should be given for self-study and it should be early in the morning when the mind is fresh.

Question 2: From a bag containing 2 saffron, 3 white and 4 green balls a ball is drawn at random. Find the probability that ball drawn is

(i) Saffron
(ii) White
(iii) Green

Which are three colours in our National Flag? What values did they indicate? What values are being promoted?

Solution:

A bag contains 2 saffron, 3 white and 4 green ball

∴ Total outcomes = 2 + 3 + 4 = 9

One ball is drawn at random.

(i) Probability of a saffron ball P(E) = $\frac{2}{9}$

(ii) Probability of a white ball P(E) = $\frac{3}{9} = \frac{1}{3}$

(iii) Probability of a green ball P(E) = $\frac{4}{9}$

These three colours are of our national flag.

Saffron colour is for braving and sacrifice, white is for peace and green is for the prosperity of the nation.

Question 3: Four defective oranges are accidentally mixed with 16 good ones. One orange is drawn at random. Find the probability that the orange drawn is good one.

What will happen if 4 bad persons are mixed with 16 good ones?

Solution:

Four defective oranges are mixed with 16 good oranges.

∴ Total number of outcomes = 4 + 16 = 20

One orange is drawn at random.

∴ Probability of an orange being a good one = $\frac{16}{20} = \frac{4}{5}$

Similarly, when 4 bad boys are mixed with 16 good boys, they will spoil the good boys.

Bad boys arc curse on society. So, try to avoid them.

Higher Order Thinking Skills (Hots)

Question 1: A bag contains 12 balls out of which x are black.
(i) If a ball drawn at random, what is the probability that it will be a black ball?

(ii) If 6 more black balls are put in the bag, the probability of drawing a black ball will be double than that of (i). Find the value of x.

Solution:
In a bag there are 12 balls, x is black.
(i) A ball is drawn at random.
Probability of a ball being black P(E) = $\frac{x}{12}$
(ii) By putting 6 more black balls, total number of black balls = x + 6
and total balls = 12 + 6 = 18
Now, probability of a black ball = $\frac{x+6}{18}$
According to the condition,
$\frac{x+6}{18} = 2 \times \frac{x}{12}$

$6x + 36 = 18 \Rightarrow 36 = 18x - 6x = 12x$

$\therefore x = \frac{36}{12} = 3$

Question 2: Ankita and Nagma are friends. They were both born in 1998. What is the probability that they have

(i) same birthday?
(ii) Different birthday?
Solution:
Ankita and Nagma both born in 1998.
(i) Probability of being same birth date = $\frac{1}{365}$.

(ii) Probability of being different birth dates = $\frac{365-1}{365} = \frac{364}{365}$.

Check Your Progress

Question 1: Each student from the group of 40 students was asked to roll a dice independently. The results are given below:
2, 3, 3, 4, 1, 5, 2, 6, 1, 4, 2, 3, 4, 4, 6, 1, 5, 5, 2, 4, 5, 5, 3, 1, 6, 5, 4, 2, 3, 6, 1, 1, 4, 4, 5, 3, 2, 2, 6,6
Make a frequency distribution table for the same.
Solution:
Frequency table of the given data is given below:

Number of students appeared	Tally marks	Frequency
1	𝍸 |	6
2	𝍸 ||	7
3	𝍸 |	6
4	𝍸 |||	8
5	𝍸 ||	7
6	𝍸 |	6
Total		40

Question 2: The marks obtained by 30 students of a class in a test of maximum marks 20 are as follows:
15, 11, 12, 10, 9, 8, 19, 13, 16, 3, 2, 17, 18, 19, 14, 6, 20, 15, 16, 12, 10, 4, 9, 8, 12, 17, 18, 20, 19, 12.
Prepare a frequency distribution table for the above data using class intervals 0-4, 4-8 and so on.
Solution:
Frequency distribution table is given below:

Marks obtained (class intervals)	Tally marks	Number of students (frequency)
0 – 4	||	2
4 – 8	||	2
8 – 12	𝍸 ||	7
12 – 16	𝍸 |||	8
16 – 20	𝍸 ||||	9
20 – 24	||	2
Total		30

Question 3: Construct a frequency distribution table for the following weights (in grams) of 35 oranges, using class intervals 40—45, 45-50 and so on.
30, 40, 45, 32, 43, 50, 55, 63, 72, 73, 62, 61, 54, 53, 50, 43, 76, 38, 54, 55, 66, 70, 74, 75, 45, 47, 59, 58, 60, 63, 74, 33, 35, 70, 68.
(i) How many classes are there in the frequency distribution table?
(ii) Which weight group has the lowest frequency?
(iii) Which weight group has the highest frequency?
Solution:
Frequency distribution table is given below:

Weight (in grams)	Tally marks	Number of oranges
30 – 35	|||	3
35 – 40	||	2
40 – 45	|||	3
45 – 50	|||	3
50 – 55	𝍸	5
55 – 60	||||	4
60 – 65	𝍸	5
65 – 70	||	2
70 – 75	𝍸		6
75 – 80	||	2
Total		35

(i) Number of classes =10.
(ii) Group (class) 35-40, 65-70 and 75-80 have lowest frequency,
(iii) Class 70-75 has the highest frequency.

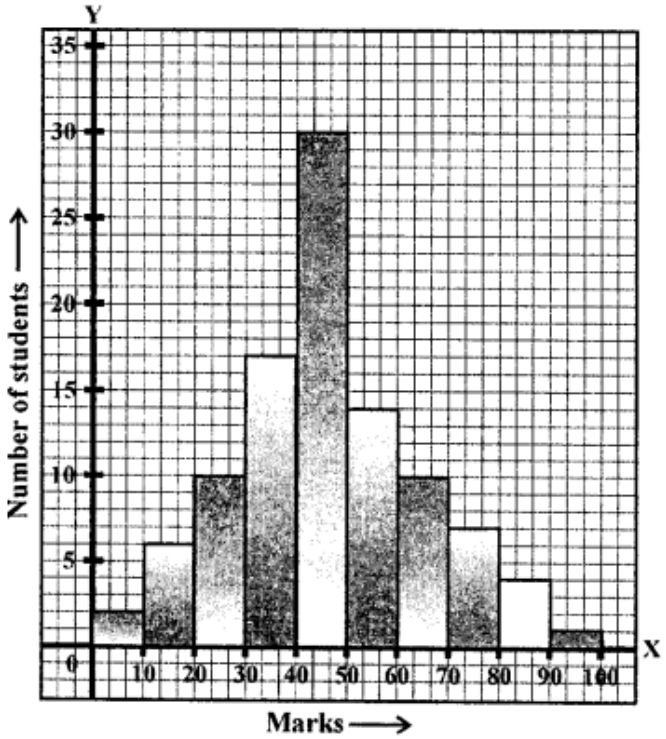
Question 4: Draw a histrogram of the following data:
Marks obtained by students in a Mathematics Paper of maximum marks 100.

Marks obtained (Class interval)	**0 – 10**	**10 – 20**	**20 – 30**	**30 – 40**	**40 – 50**	**50 – 60**	**60 – 70**	**70 – 80**	**80 – 90**	**90 – 100**
Number of students (Frequency)	**2**	**6**	**10**	**17**	**30**	**14**	**10**	**7**	**4**	**1**

Solution:

Marks obtained (Class interval)	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80	80 – 90	90 – 100
Number of students (Frequency)	2	6	10	17	30	14	10	7	4	1

The histogram regarding the given data is given here:



Question 5: The following data represents the number of students using different mode of transportation to come to school.

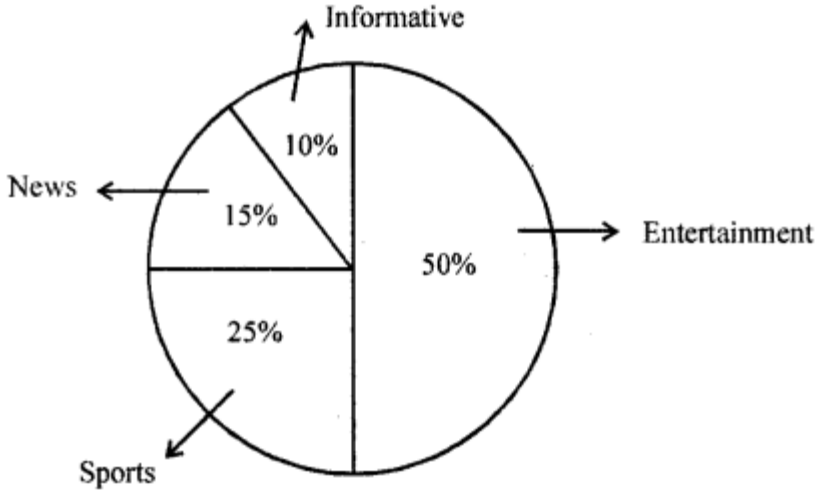
Mode of transport	**Bicycle**	**School bus**	**Car**	**Walking**
Number of students	**360**	**240**	**80**	**120**

Draw a pie chart to represent this data. Pie chart is given below:
Solution:

Mode of transport	**Number of students**	**Central angle**
Bicycle	360	$\frac{360}{800} \times 360° = 162°$
School bus	240	$\frac{240}{800} \times 360° = 108°$
Car	80	$\frac{80}{800} \times 360° = 36°$
Walking	120	$\frac{120}{800} \times 360° = 54°$
Total	800	360°

Pie chart is given below:

Question 6: Answer the following questions based on the pie chart given below:
(i) Which type of programmes are viewed the most?
(ii) Which type of programmes are viewed the least?
(iii) Which two types of programmes have number of viewers equal to those watching sports channels?

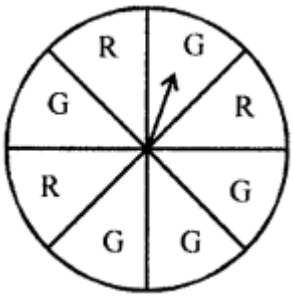


Viewers watching different types of channels on T.V.

Solution:
From the given pie chart,

(i) Entertainment is viewed the most.
(ii) Informative is viewed the least.
(iii) Viewers of sports is equal to the sum of the viewers of news and informative.

Question 7: Suppose you spin the wheel shown in adjoining figure.
(i) List the outcomes of getting a green sector and not getting a green sector on this wheel.
(ii) Find the probability of getting a green sector.
(iii) Find the probability of not getting a green sector.



Solution:
In the spin wheel, 3 sectors are red and 5 sectors are green.
(i) Getting green sector are G, G, G, G, G
and not getting a green sector is R, R, R.
Total number of outcomes = 5 + 3 = 8
(ii) Probability of getting a green sector P(E) = $\frac{5}{8}$.
(iii) Probaility of getting a non-green sector P(E) = $\frac{3}{8}$

Question 8: A bag has 4 red and 2 yellow balls. A ball is drawn from the bag without looking into the bag. What is the probability of getting?

(i) A red ball?
(ii) Not a red ball?

Solution:
In a bag, there are 4 red, 2 yellow balls.
∴ Total number of balls = 4 + 2 = 6
(i) One ball is drawn at random.
Probability of getting a red ball = $\frac{4}{6} = \frac{2}{3}$.
(ii) Probability of getting not a red ball = $\frac{2}{6} = \frac{1}{3}$.

Question 9: Three coins are tossed together, find the probability of getting
(i) at most 2 heads
(ii) 3 heads.
Solution:
Three coins are tossed together.
∴ Number of total outcomes = $(2)^3 = 2 \times 2 \times 2 = 8$
(i) Probability of getting at the most 2 heads P(E)
= HTT, HHT, HTH, HTT, THH, TTH, THT = 7 = $\frac{7}{8}$
(ii) Probability of getting 3 heads (HHH = 1) = $\frac{1}{8}$

Question 10: A letter is chosen from the word 'RECTANGLE'. What is the probability that it is
(i) a consonant
(ii) not a consonant?
Solution:
In the word 'RECTANGLE'
Total letters (outcomes) = 9
(i) Probability of a letter which is a consonant P(E) = (R, C, T, N, G, L)
= $\frac{6}{9} = \frac{2}{3}$
(ii) Probability of a letter being not a consonant (E, A, E), P(E) = $\frac{3}{9} = \frac{1}{3}$.