Grade VII

Lesson : 3   DATA HANDLING

Objective Type Questions

I . Multiple choice questions

1. The ages of 10 teachers in a school are 32,41,28,54,35,26,33,38,40 (NCERT)

    The range of ages of teachers is :

    a) 30 years   b) 32 years   c) 40 years   d) 31 years

2. Mode of given data 2,2,2,3,3,4,5,5,5,6,6,8 is :

    a) 2   b) 3   c) 5   d) 2,5 both

3. The probability of an event is always a fraction between:

    a) 0 and 1   b) 1 and 2   c) 2 and 3   d) None of these

4. Which of the following is the mean of first five natural numbers?

    a) 2   b)3   c) 4   d) 5

5. Which of the following is the mode of the data 1,1,2,4,3,2,1,2,2,4?

    a) 1   b) 2   c) 3   d) 4

6. An unbiased die is tossed once. Which of the following is the probability of getting an even

    number ?

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

7. A container contains 3 red and 4 black balls. If one ball is selected at random from the

    container, what is the probability that it is black?

    a) $\frac{3}{7}$ b) $\frac{4}{7}$ c) 1   d) zero

8. A number is selected at random from the first five natural numbers. Find the probability

    that the number is a prime?

    a) $\frac{3}{7}$ b) $\frac{1}{2}$ c) $\frac{3}{5}$ d) $\frac{2}{5}$

9. The range of the data 14,6,12,17,21,10,4,3 is (NCERT)

    a) 21   b) 17   c) 18   d) 11

10. The mode of the data 23,26,22,29,29,26,29,22,23 is

    a) 23 and 29   b) 23 only   c) 29 only   d)26 only

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11. The median of the data 40,50,99,68,98,60,94 is

   a) 40   b) 60   c) 68   d) 99

12. Which of the following has the same mean, median and mode?

   a) 6,2,5,4,3,4,1   b) 4,2,2,1,3,2,3   c) 2,3,7,3,8,3,2   d) 4,3,4,3,4,6,4

13. Let x, y, z be three observations. The mean of these observations is

   a) $\frac{x XyXz}{3}$ b) $\frac{x+y+z}{3}$ c) $\frac{x-y-z}{3}$ d) $\frac{x Xy+z}{3}$

14. The number of trees in different parks of a city are 33,38,48,33,34,34,33 and 24. The mode of this data is.

   a) 24   b) 34   c) 33   d) 48

15. Which measures of central tendency get affected if the extreme observations on both the ends of a data arranged in descending order are removed?

   a) Mean And Mode   b) Mean and Median

   c) Mode and Median c) Mean, Median and Mode

16. The range of the data : 21,6,17,18,12,8,4,13 is

   a) 17   b) 12   c) 8   d) 15

17. The median of the data: 3,4,5,6,7,3,4 is

   a) 5   b) 3   c) 4   d) 6

18. Out of 5 brands of chocolates in a shop a boy has to purchase the brand which is most liked by children. What measure of central tendency would be most appropriate if the data is provided to him?

   a) Mean   b) Mode   c) Median   d) Any of these

19. What is the probability of picking up an ace from set of 52 cards?

   a) $\frac{1}{13}$ b) $\frac{2}{6}$ c) $\frac{3}{6}$ d) $\frac{4}{6}$

20. The different between the highest and the lowest observations in a data is its.

   a) frequency   b) width   c) range   d) mode

21. In a school, only 2 out of 5 students can participate in quiz. What is the chance that a student picked at random makes it to the competition?

   a) 20 %   b) 40%   c) 50%   d) 30%

22. Some integers are marked on a board. What is the range of these integers?

0	15
-11	-17
+20	
6	-4

   a) 31   b) 37

   c) 20   d) 3

23. On tossing a coin, the outcome is :

 a) only head　　　　　　　　　　　　b) only tail

 c) neither head nor tail　　　　　　d) either head or tail

24. The mean of three numbers is 40. All the three numbers are different natural numbers. If lowest is 19, what could be highest possible number of remaining two numbers?

 a) 81　　　　　b) 40　　　　c) 100　　　　d) 71

25. Khilona earned scores of 97, 73 and 88 respectively in her first three examinations. If she scored 80 in the fourth examination, then her average score will be.

 a) increased by 1　　b) increased by 1.5　　c) decreased by 1　　d) decreased by 1.5

26. Which measure of central tendency best represents the data of the most popular politician after a debate?

 a) Mean　　　　　b) Median　　　　c) Mode　　　　d) Any of the above

1. d	2. d	3. a	4. b	5. b	6. b	7. b	8. c	9. c	10. c
11. c	12. d	13. b	14. c	15. a	16. a	17. c	18. b	19. a	20. c
21. b	22. b	23. d	24. a	25. d	26.c				

II. Multiple choice questions

1. The number of trees in different parks of a city are 33,38,48,33,34,33 and 24

 a) 24　　　　　b) 34　　　　c) 33　　　　d) 482

2. Which measures of central tendency get affected if the extreme observations on both the ends of a data arranged in descending order are removed?

 a) Mean and Mode　　　　　　b) Mean and Median
 c) Mode and Median　　　　　d) Mean, Median and Mode

3. The median of the data : 3,4,5,6,7,3,4, is

 a) 5　　　　　b) 3　　　　c) 4　　　　d) 6

4. The mean of first eight whole number is.
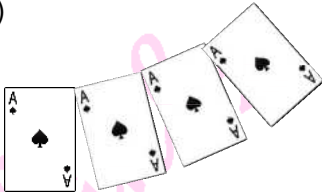
 a) 4.5　　　　b) 3.5　　　　c) 3　　　　d) 4

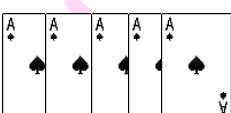5. The mode of the data 3.6, 3.4, 3.6, 3.1, 3.2, 3.4, 3.6, 3.5 is

 a) 3　　　　　b) 3.6　　　　c) 3.4　　　　d) 3.5
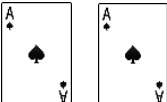
6. The mean of first five multiples of 8 is
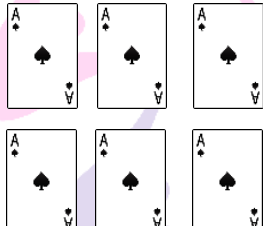
    a) 24   b) 28   c) 16   d) 30

7. There are 2 aces in each of the given set of cards placed face down. From which set are you certain to pick the two aces in the first go?

    a)

    b)

    c)

    d)

8. In a school, only 2 out of 5 students can participate in a quiz, What is the chance that a student picked at random makes it to the competition?

    a) 20%   b) 40%   c) 50%   d) 30%

9. Which of the following events is certain to happen?

    a) Tomorrow will be a cloudy day.   b) You are younger than tomorrow?

    c) Getting a head when a coin is tossed   d) India winning the next test series

10. Which of the following has the same mean, median and mode?

    a) 6,2,5,4,3,4,1   b) 4,2,2,1,3,2,3   c) 2,3,7,3,8,3,2   d) 4,3,4,3,4,6,4

1. c	2. a	3. c	4. b	5. b	6. a	7.c	8. b	9. b	10.d

III. Multiple choice questions

1. If mean of 6 observations is 4, then their sum is.

    a) 20   b) 22   c) 24   d) 26

2. The runs scored in a cricket match by 11 players are as follows:

   6, 15, 120, 50, 100, 80, 10, 15, 8, 10, 10. Find the median of scores.

    a) 46   b) 8   c) 15   d) 120

3. The money saved by a student during first six days of a week are Rs.46, Rs.24, Rs.29, Rs.27, Rs.4 and Rs.42. Find the average saving per day

    a) 42   b) 39   c) 35   d) 36

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4. A bag is having 4 red balls and 6 yellow balls. If a ball is pulled out without seeing them, then find the probability of getting a red ball.

a) $\frac{2}{5}$ b) $\frac{3}{5}$ c) $\frac{9}{12}$ d) $\frac{2}{3}$

| 1. c | 2. c | 3. c | 4. a |

Hints / Solutions

I. Fill in the Blanks

1. The mean of first five prime numbers is _____.

2. The probability of getting a number greater than 2 on throwing a die once is _____ .

3. The difference between the highest and the lowest observation of a data is called _____ .

4. The mean of a data is defined as _____ .

5. In a set of observations, the observation that occurs the most often is called _____ .

6. In a given data, arranged in ascending or descending order, the middle most observation is called _____ .

7. Mean, Median, Mode are the measures of _____ .

8. The probability of an event which is impossible to happen is _____ .

9. The probability of an event which is certain to happen is _____ .

10. When a die is thrown, the probability of getting a number less than 7 is _____ .

11. In throwing a die the number of possible outcomes is _____ .

12. _____ can be used to compare two collections of data.

13. The representation of data with bars of uniform width is called _____ .

14. If the arithmetic means of 8,4,x,6,2,7 is 5, then the value of x is _____ .

15. The median of any data lies between the _____ and _____ observations.

16. Median is one of the observation in the data if number of observations is _____ .

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II. Fill in the Blanks

1. The median of data 18, 14,24,29,27 is _____.

   For median, arrangement of given data in ascending order.

   14, 18, (28), 27, 29

2. The range of the data 17,26,33,37,61,69,91,97 _____.

   Range = Maximum value – minimum value = 97 – 17 = 80.

3. The mode of the following data 62,61,49,37,91,61,47,53,54,97,98,99 is _____.

   Mode = Maximum occurring observation = 67 (occurs 2 times).

4. If 12 observation's mean is 6. Then, the sum of 12 observations is _____.

   Mean = $\frac{Sum\ of\ observations}{Number\ of\ observations}$

   $\Rightarrow 6 = \frac{Sum\ of\ observations}{12}$

   Sum of observations = 12 x 6 = 72.

I True or False

1. The mode of the observation 23,26,15,12,28,38,19,23,26,23 is 28.

2. Median of the data : 4,5,9,2,6,8,7 is 2

3. If a die is thrown, the probability of getting a number greater than 6 is 1.

4. When a coin is tossed, there are 2 possible outcomes.

5. If the extreme observation on both the ends of a data arranged in ascending order are

   removed, the median gets affected.

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6. The measures of central tendency of may not lie between the maximum and minimum values of data.

7. It is impossible to get a sum of the numbers on both dice when a pair of dice is thrown together.

8. The probability of the spinning arrow stopping in the shaded region is $\frac{1}{2}$.
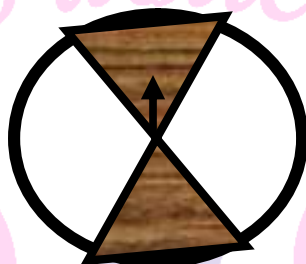
9. A coin is tossed 15 times and the outcomes are recorded as follows.

H T T H T H H H T T H T H T T. The chance of occurrence of a head is 50 percent.

9. Mean, Median and Mode may be the same for some data.

10. The probability of getting an ace out of a deck of cards is greater than 1.

11. Mean of the data is always from the given data.

12. Median of the data may or may not be from the given data.

13. Mode of the data is always from the given data.

14. Mean of the observations can be lesser than each of the observations.

15. Mean can never be a fraction.

16. Range of the data is always from the data.

17. The data 12,13,14,15,16 has every observation as mode.

18. The range of the data 2, -5, 4, 3,7,6 would change if 2 was subtracted from each value in the data.

19. The range of the data 3,7,1,-2,2,6,-3,-5 would change if 8 was added to each value in the data.

1. False	2. False	3. False	4. True	5. False	6. False	7. True
8. True	9. False	10. True	11. False	12. False	13. True	14. True
15. False	16. False	17. False	18. True	19. False	20. False	

1. The mean of the data 20,40,60,80,70,is 55.

   False, given mean = 55

   Sum of 20,40, 60, 80 and 70 = 270

   Mean = $\frac{Sum\ of\ all\ observations}{Number\ of\ observation}$ = $\frac{270}{5}$ = 54.

2. The value of x is 4 in the data 16,8,2,6, x,0,4,6 where mean is 5.

   $\therefore$ Mean = $\frac{Sum\ of\ all\ observations}{Number\ of\ observation}$

   $\Longrightarrow$ 5 = $\frac{16+8+2+6+x+0+4+6}{8}$ $\Longrightarrow$ 5= $\frac{42+x}{8}$

   $\Longrightarrow$ 5 x 8 = 42 + x

   $\Longrightarrow$ 40 = 42 + x

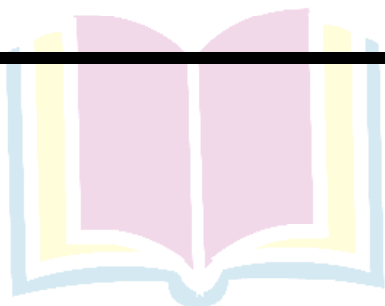 $\Longrightarrow$ 40 = 42 = x

   $\Longrightarrow$ - 2 = x

   $\therefore x$ = - 2.

3. The mean of 2, 18, 46 is 22 is equal to mean of 10,12,26.

   False mean of 2, 18, 46 is 22.

   $\therefore$ Mean = $\frac{10+12+26}{3}$ = $\frac{48}{3}$ = 16

   So, means are not equal.

I. Match the following

Match the Column A to Column B

Column A	Column B
a) Arithmetic mean	i) Highest frequency
b) Range	ii) Middle observation
c) Median	iii) $\dfrac{Sum\ of\ all\ observations}{Number\ of\ observations}$
d) Mode	iv) Highest observation Lowest observation

a-iii	b-iv	c-ii	D -i

I. Very Short Answer Questions

1. What is the mean of first four counting number?

$\dfrac{1+2+3+4}{4}$ $= \dfrac{10}{4}$ $= 2.5$

2. What is the mean of four highest single digit counting numbers?

$\dfrac{6+7+8+9}{4}$ $= \dfrac{30}{4}$ $= 7.5$

3. If the mode of the data 1,1, 2,2, 3,3, 4,4, 5,5, x is 2 then what is the value of x

x =2

4. What is the mean of 98, 99, 100, 0, 1 and 2

$\dfrac{98+99+100+0+1+2}{6}$ $= \dfrac{300}{46}$ $= 50$

5. What is the probability of an impossible event?

0

II. Very Short Answer Questions

1. Let x, y, z be there observations, what will be mean of these observations?

Mean $= \dfrac{x+y\,z}{3}$

2. What do you call the difference between the highest and the lowest observation?

Range

3. What will be the outcome of tossing a coin?

It will be either head of tail.

4. Define frequently of an observation.

The number of times a particular observation occurs is called frequently.

5. Define Mode .

Mode of a set of observations is the value of the observation that occurs most frequently.

6. Find range of the data : 21, 6, 17, 18, 12, 8, 4, 13.

Range = L-S $= 21 - 4$ $= 17$.

III. Very Short Answer Questions

1. A die is thrown, Find the probability of getting a number greater than or equal to 3.

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

Favourable outcomes = 3, 4, 5, 6

$\therefore$ Required probability $= \dfrac{4}{6}$ $= \dfrac{2}{3}$.

2. Find the mean of first five even numbers.

First five even numbers = 2, 4, 6, 8, 10

Sum of first even numbers = 2+4+6+8+10 = 30

Mean $= \dfrac{Sum\ of\ the\ numbers}{Number\ of\ observations} = \dfrac{30}{5} = 6$

Hence, mean of first five even numbers is 6.

3. Find a number between $\dfrac{1}{3}$ and $\dfrac{1}{4}$.

$\dfrac{\frac{1}{3}+\frac{1}{3}}{2} + \dfrac{\frac{4+3}{12}}{2} = \dfrac{\frac{7}{12}}{2} = \dfrac{7}{12} \times \dfrac{1}{2} = \dfrac{7}{24}$

Hence, the number between them.

Number between $\dfrac{1}{3}$ and $\dfrac{1}{4}$ is $\dfrac{7}{24}$.

4. Find the range of the data 12, 4, 6, 7, 9, 14, 26, 36.

Given data 12,4,6,7,9,14,26,36

Ascending order of the given data

4,6,7,9,12,14,26,36

Range = Maximum value − Minimum value

= 36 - 4 = 32.

5. Find the range of the given values : 140, 136, 138, 142, 141, 146, 139

Ascending order : 136,138,139,140,141,142,146

$R = L - S$

$= 146 - 136 = 10$.

6. A cricketer's scores in 4 innings are 64, 32, 68 and 92

Sum of scores = 64 + 22 + 68 + 92 = 256

Mean of scores $= \frac{Total\ Scores}{Number\ of\ innings} = \frac{256}{4} = 64$.

7. Find the median of the following data 43, 46, 69, 62, 91, 72, 74

Ascending Order of the given data : 42,46,62,69,72,91,74

∴ Median = Middle value = 69.

8. Find the mode of the following weights (in kg).

39,36,35,36,41,49,36

Given weights (in kg) are 39,36, 35,36,41,49 and 36

Mode is the most occurring observations.

Here, 36 kg occurs 3 times

∴ Mode = 36 kg.

9. The height of 6 girls in a group are 142 cm, 150cm, 146cm, 154cm, x cm and 148 cm their average height is 147. Then, find the value of x.

Given heights (in cm) of 6 girls in a group are 142, 150 , 146, 154, x and 148 = 740 + x

Mean/Average $= \frac{Sum\ of\ observations}{Number\ of\ observations}$

$\Rightarrow 147 = \frac{740+x}{6} \Rightarrow 147 \times 6 = 740 + x$

$\Rightarrow 882 = 740 + x \Rightarrow x = 882 - 740 = 142$.

10. **A single card is chosen at random from a standard deck of 52 playing cards. What is the probability of choosing a king?**

A standard deck contains 4 kings.

So, probability of getting a king $= \frac{4}{52} = \frac{1}{13}$

11. **The scores in Mathematics test (out of 35) of 15 students is as follows :**

18,21,23,24,19,18,17,16,15,25,22,20,9,4,6. Find the median of this data.

For median, we have to arrange the given data in ascending order.

4,6,9,15,16,17,18,18,19,20,21,22,23,24,25

∴ Median = Middle observation = 18.

12. **The runs scored in a cricket match by 11 players is as follows:**

0,9,65,72,49,51,23,24,8,4,26. Find the mean.

As per the given information, runs scored by 11 players in a cricket are

0,9,65,72,49,51,23,24,8,4 and 26.

Mean $= \frac{Sum\ of\ observations}{Number\ of\ observations}$

Sum of all observation

= 0+ 9+65+72+49+51+23+24+8+4+26

=331

∴ Mean $= \frac{331}{11}$

= 30.99

I Short Answer Questions

1. **The runs scored in a cricket match by 11 players is as follows ?**

6, 15, 120, 50, 100, 80, 10, 15, 8,10,15 Find

Find mean of this data

Mean $= \frac{Total\ of\ data}{Number\ of\ data}$

Putting the given values we get,

6 + 15 + 120 +50+100 +80

$= \frac{6+15+120+50+100+80+10+15+8+10+15}{11}$

$= \frac{429}{11} = 39.$

2. Find the modes of the following :

a) 2,6,5,3,0,3,2,4,5,2,4   b) 2,14,16,12,14,14,16,14,10,14,18,14

a) Since data is as follows :

2,6,5,3,0,3,2,4,5,2,4

2 occur maximum times

So the mode of given data is 2

b) Given data is :

2,14,16,12,14,14,16,14,10,14,18,14

In the given data frequency of 14 is 6, which is maximum

3. For the following data 39,48,56,75,76,81,85,85,90,95 find the range and mean.

Since given data is 39,48,56,75,76,81,85,85,90,95

In the given data

Maximum   = 95

Minimum   = 39

$\therefore$ Range = Maximum − Minimum

$\qquad$ = 95 -39 = 56.

Mean is given by, we get   39 + 48 + 56 + 75 + 76

$= \dfrac{39 + 4 + 56 + 75 + 76 + 81 + 85 + 90 + 95}{10}$

$= \dfrac{730}{10}$ = 73

4. Rahul scored the following number of runs in six innings 34,47,37,49,54,61

Calculate the mean runs scored by him per inning

Rahul score runs scored by him per inning are as follows :

34, 47,37,49,54,61

Mean $= \dfrac{Sum\ of\ the\ data}{Number\ of\ data}$

$= \dfrac{34+37+47+49+54+61}{6}$

$= \dfrac{282}{6}$ = 47

Thus. The mean runs scored in an innings is 47

5. A coin is flipped to decide which team start the game, what is the Probability that your team will start .

If a coin is flipped there may be two comes head and Tail.

So, the total outcomes = 2

Favourable outcomes = 1

Hence, Probability

$$= \frac{\text{Favourable outcome}}{\text{Total Number of outcomes}} \quad = \frac{1}{2}$$

6. Find the arithmetic mean of first 6 natural numbers

First six natural numbers are 1,2,3,4,5,6 Let $\overline{X}$ denote their arithmetic mean. Then

$$\overline{X} = \frac{1+2+3+4+5+6}{6} \quad = \frac{21}{6} = \frac{7}{2} = 3.5$$

7. Given below are the ages of 25 students of class VIII in a school. Prepare a discrete frequency distribution.

15,16,16,14,17,17,16,15,15,16,16,17,15,16,16,14,16,15,14,15,16,16,15,14,15

Age	Tally marks	Frequency
14	IIII	4
15	INI III	8
16	INI INI	10
17	III	3
Total		25

8. Form a discrete frequency distribution from the following scores:

15,18,16,20,25,24,25,20,16,15,18,18,16,24,15,20,28,30,27,16,24,25,20,18,28,27,25,24,24,
18,18,25,20,16,15,20,27,28,29,16

Frequency distribution of scores :

Age	Tally marks	Frequency
15	IIII	4
16	INI I	6
18	INI I	6
20	INI I	6
24	INI	5
25	INI	5
27	III	3
28	III	3
29	I	1
30	I	1
Total		25

9. Find the median of the data

21,15,6,25,18,13,20,9,8,12 (NCERT Exemplar)

Arranging in ascending order :

6,8,9,12,13,15,18,20,21,25

Since number of observations is even, the median is given by finding the average or mean of the two middle most observations.

So, median = $\frac{13+15}{2}$ = $\frac{28}{2}$ = 14

10. If the mean of 26, 28, 25, x, 24 is 27 , find the value of (NCERT Exemplar)

Mean = $\frac{Sum\ of\ all\ observations}{NUmber\ of\ observations}$

Or   27 = $\frac{26+28+25+x+24}{5}$

Or   27 = $\frac{103+x}{5}$

Or   135 = 103 + x

Or x = 135 − 103

So, x = 32

11. The median of observations 11, 12, 14, 18, $x+2$, 20, 22, 25, 61, arranged in ascending order is 21. Find the value of x (NCERT Exemplar).

Median from data = $x+2$

Or   21 = $x+2$

Or x = 21-2

Or x = 19.

1. In a readymade garment shop the number of shirts sold per days during the month of December are given below.

32,40,33,30,35,40,32,33,40,36,30,32,30,36,34,33,40,32,33,40,32,35,35,30,32,33,34,33,35

Make a frequency distribution table for above data.

Frequency distribution table :

Number of shirts sold	Tally marks	Frequency
30	IIII	4
32	IIII I	6
33	IIII I	6
34	II	2
35	IIII	4
36	II	2
40	IIII	5
Total		29

2. On the basis of following frequency table find the mean marks :

Marks	20	30	40	50	60	70
No. of students	12	45	48	5	32	40

Marks (x)	No. of students (f)	F x x
20	12	240
30	45	1350
40	48	1920
50	5	250
60	32	1920
70	40	2800
Total	N = 182	$\sum fx$ = 8480

Mean $= \dfrac{\sum fx}{N}$

Putting values from table,

Mean $= \dfrac{8480}{182}$ = 46.59.

3. In a packet there are five flash cards 1, 2, 3, 4 and 5.

What is the probability of drawing a flash card bearing 2?

In the given question,

Number of maximum outcomes = 5 (As there are five flash cards)

Favourable outcome, a flash card bearing 2

Hence,

Probability = $\frac{\text{No.of favourable outcomes}}{\text{Total number of outcomes}} = \frac{1}{5}$.

4. A container has 3 red balls, 6 white balls. If a ball is pulled without seeing them.

a) What is the probability of getting a red ball?

b) What is the probability of getting a white ball?

Total number of balls = 3 + 6 = 9

a) probability of getting a red ball = $\frac{\text{Total No.of red balls}}{\text{Total No. of balls}} = \frac{3}{9} = \frac{1}{3}$

b) probability of getting a red ball = $\frac{\text{Total No.of white balls}}{\text{Total No. of balls}} = \frac{6}{9} = \frac{2}{3}$

5. The ages in years of 10 teachers in a school are 32, 41, 28, 54, 35, 26, 33, 38, 40.

a) What is the age of the oldest teacher and that of the youngest teacher?

b) What is the range of the ages of the teachers?

c) What is the mean age of these teachers?

a) In order to find the ages of the teachers, let us arrange their ages in ascending order

as follows :

23, 26, 28, 32, 33, 35, 38, 40, 41, 54

We observe that the age of the oldest teacher is 54 years and the age of the youngest teacher

is 23 years.

b) We have,

Age of the oldest teacher = 54 years

Age of the youngest teacher = 23 years

∴ Range of the ages of teachers = (54-23) = 31 years.

c) We have,

Mean age = $\frac{\text{Sum of the ages of teachers}}{\text{Total No of teachers}}$

Mean age of teachers = $\frac{23+26+28+32+33+35+38+40+41+54}{10}$

Mean age of teachers = $\frac{350}{10}$ years = 35 years.

6. Organise the following grades in a class assessment in a tabular form :

4, 6, 7, 5, 3, 5, 4, 5, 8, 6, 2, 5, 1, 9, 6, 7, 8, 4, 6, 7

Find the arithmetic mean of grades. Also find the high grade, the lowest grade and the range of the data.

In the tabular form, the above data can be represented as follows:

Grade	Tally Bars	Frequency (f_i)
1	I	1
2	I	1
3	I	1
4	I I I	3
5	I I I I	4
6	I I I I	4
7	I I I	3
8	I I	2
9	I	1

In order to compute the arithmetic mean of grades i.e. average grade, we prepare the following table :

Computation of Arithmetic Mean

Grade (x_i)	Frequency (f_i)	$x_i \times f_i$
1	1	1x1=1
2	1	1x2=2
3	1	1x3=3
4	3	3x4=12
5	4	4x5=20
6	4	4x6=24
7	3	3x7=21
8	2	2x8=16
9	1	1x9=9
Total	$\sum fi = 20$	$\sum fi\, x_i = 108$

$\therefore$ Mean grade $= \dfrac{\sum fi\, x_i}{\sum fi} = \dfrac{108}{20} = 5.4$

Hence the mean grade is 5.4

It is evident from the frequency table that the highest and lowest grades are 9 and 1 respectively.

$\therefore$ Range of the data = 9 -1 = 8

18

7. If the mean of five observations x, $x+2$, $x+4$, $x+6$, $x+8$, is 11. Find the mean of first three observations.

We have,

$11 = \frac{x+(x+2)+(x+4)+(x+6)+(x+8)}{5}$

$\Rightarrow 11 = \frac{5x+20}{5}$

$\Rightarrow 55 = 5x + 20$

$\Rightarrow 5x = 35$

$\Rightarrow x = 7$

$\therefore$ Mean of first three observations

$= \frac{x+(x+2)+(x+4)}{3} = \frac{3x+6}{3}$

$= x + 2 = 7 + 2 = 9$

$[\because x = 7]$

8. The mean of 40 observations was 160. It was detected on re-checking that the value of 165 was wrongly copied as 125 for computation of mean. Find the correct mean.

We have,

N = Number of observations = 40, Mean = 160

$\therefore$ Mean $= \frac{Sum\ of\ the\ observations}{Number\ of\ observations}$

$\Rightarrow 160 = \frac{Sum\ of\ the\ observations}{40}$

$\Rightarrow 160 \times 40 =$ Sum of observations

Thus, incorrect sum of observations = 160 x 40

Now,

Correct sum of the observations = Incorrect sum of the observations – Incorrect observation + correct observation

$\Rightarrow$ Correct sum of the observations = 160 x 40 – 125 + 165

$\Rightarrow$ Correct sum of the observations = 6400 + 40 = 6440

$\therefore$ Correct Mean $= \frac{Correct\ sum\ of\ the\ observations}{Number\ of\ observations} = \frac{6440}{40} = 161.$

9. The mean of 10 observations was calculated as 40. It was detected on rechecking that the value of 45 was wrongly copied as 15. Find the correct mean.

Mean $= \dfrac{Sum\ of\ all\ observations}{Number\ of\ observations}$

Or

$40 = \dfrac{Sum\ of\ all\ observations}{10}$

So, sum of all observation $= 400$

But this is incorrect sum, since one observation was copied wrongly.

So correct sum = Incorrect sum − Incorrect observation + correct observation

$= 400 - 15 + 45 = 430$

Correct Mean $= \dfrac{Correct\ Sum}{Number\ of\ observations} = \dfrac{430}{10} = 43$.

10. The following double bar graph represents test matches results summary for Cricket Team of country x against different countries :
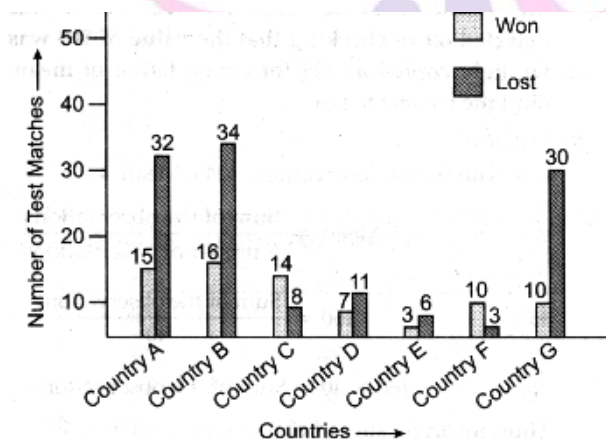
Use the bar graph to answer the following questions.

a) Which country has managed maximum wins against country x?

b) The difference between the number of matches won and lost is highest for which country against country x?

c) Number of wins of country E is the same as number of losses of which country against country x?

    a) Country B   b) Country G   c) Country F

11. The mean of three numbers is 10. The mean of other four numbers is 12. Find the mean of the numbers.

Mean of 3 numbers $= \frac{Sum\ of\ 3\ numbers}{3}$

$\implies 10 = \frac{Sum\ of\ 3\ numbers}{3}$

Hence, sum of 3 numbers = 30Also,

Mean of other 4 numbers$= \frac{Sum\ of\ other\ 4\ numbers}{4}$

$\implies 12 = \frac{Sum\ of\ 4\ numbers}{4}$

Hence, sum of other 4 numbers = 48

Then Mean of all the numbers =

$$\frac{Sum\ of\ all\ the\ numbers}{Total\ numbers}$$

$$\frac{Sum\ of\ first\ 3\ numbers +\ Sum\ of other 4\ numbers}{Total\ numbers}$$

$\frac{30+48}{7} = \frac{78}{7} = 11.14$. Hence mean of all the number is 11.14.

12. Observe the data and answer the questions that follow 16, 15, 16, 16, 8, 15, 17.

a) Which data value can be put in the data, so that the mode remains the same?

b) At least how many and which value(s) must be put into change the mode to 15?

c) What is the least number of data values that must be put into to change the mode to 17?

Name them.

Arranging the given data in ascending order

8,15,15,16,16,16,17

a) As per the given data, 16 is the mode of data, since it has highest frequency i.e.3.

Now, if 15 is added to the given data, mode will get changed to 15 and 16 whereas if any other number i.e. 8,16 or 17 is added, mode will remain same.

b) At least two 15's should be added to change the mode to 15. On adding two 15's, the frequency of 15 will be maximum i.e.4,

c) We will have to add at least three 17's to change the mode to 17. On adding three 17's the frequency of 17 will be maximum i.e.4.

1. The scores in mathematics test (out of 25) of 15 students are as follows :

19,25,23,20,9,20,15,10,5,16,25,20,24,12,20

Find the mean, mode and median of this data. Are the three same?

Arranging the numbers with same value together we get

5,9,10,12,15,16,19,20,20,20,20,20,23,24,25,25

∴ Mode of data is 20 as it occurs more frequently than other observations

The Mean = $\frac{Sum\ of\ all\ observations}{Total\ number\ of\ observations}$ = $\frac{263}{15}$ = 17.4

And Media is that middle observation. Therefore, 20 is the median

Hence, Median and mode are equal i.e. 20 but mean is different.

2. The enrolment in a school during six consecutive years was as follows :

1555, 1670, 1750, 2013 , 2540, 2820

Find the mean enrolment of the school for this period.

Sums of enrolment of the school for this period. =

(1555 + 1670 + 1750 + 2013 + 2540 + 2820) = 12,348

Number of years = 6

∴ Mean enrolment = $\frac{Sum\ of\ enrolment}{number\ of\ Years}$ = $\frac{12348}{6}$ = 2,058

3. For the data given below, calculate the mean of its median and mode.

6,2,5,4,3,4,4,2,3

Arranging the numbers with same value together, we get

2,2,3,3,4,4,4,5,6

∴ Mode = 4 as it occurs most of time

So, Median = 4

Now, Mean of median and mode = $\frac{Median+Mode}{2}$ = $\frac{4+4}{2}$ = $\frac{8}{2}$ = 4

4. The letters written on paper slips of the word MEDIAN are put in a bag. If one slip is drawn randomly, what is the probability that it bears the letter D?

Total number of letters = 6

∴ Total number of trials = 6

Probability of getting letter D = $\frac{Frequency\ of\ letter\ D}{Total\ trials}$

Probability of getting letter D = $\frac{1}{6}$.

5. Age (in year) of children of two groups are recorded as below:

Age (in Years)	
Group A	Group B
7	7
7	9
9	11
8	12
10	12
10	12

i) Find the mode and range for each group.

ii) Find the range and mode if the two groups are combined together.

i) Group A

Mode = 7 and 10, as they occur 2 times each.

Range = 10 -7 = 3

Group B

Mode = 12

Range = 12 -7 = 5

ii)   Mode = 7 and 12, as they occur 3 times each.

Range = 12 -7 = 5

6. A coin is tossed 1000 times with the following frequencies:

Head: 445   Tail : 555

When a coin is tossed at random, what is the probability of getting i) a head?   ii) a tail?

Total number of trials = 1000
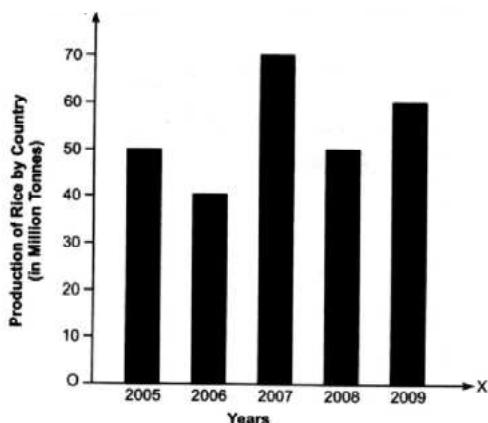
Number of times head comes up = 445

Number of times tail comes up = 555

Probability of getting a head $= \dfrac{Number\ of\ heads}{Total\ number\ of\ trials} = \dfrac{445}{1000} = 0.445$

Probability of getting a tail $= \dfrac{Number\ of\ tails}{Total\ number\ of\ trials} = \dfrac{555}{1000} = 0.555.$

7. Study the bar graph given below and answer the questions that follow.

i) In which year was production the least?

ii) After which year was the maximum rise in the production?

iii) Find the average production of rice during the 5 years

    i) 2006

    ii) 2006

    iii) Rice production in 2006 = 40 million tonnes

        Rice production in 2008 = 50 million tonnes

  $\therefore$ Difference of rice production = 50 − 40 million tonnes

        = 10 million tonnes

8. Given below is a bar graph showing the heights of five mountain peaks.
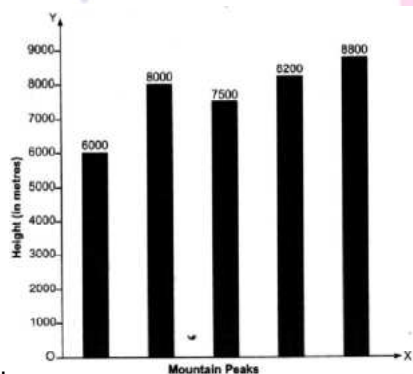
Read the bar graph carefully and answer the following questions.

i) Which is the highest peak and what is its height?

ii) What is the ratio of the heights of the highest peak and the nest highest peak?

iii) Arrange the heights of the given peaks in descending order.

    i) Highest peak is Mount Everest and its height is 8800 m

    ii) Required Ratio $= \frac{8800}{8200} = \frac{44}{41} = 44:41$

    iii) Heights of peaks in descending order are :

        8800 m, 8200m, 8000m, 7500m 6000m

9. The marks (out of 100) obtained by a group of students in a science test are 85, 76, 90, 85, 39, 48, 56, 95, 81 and 75. Find the :

i) Highest and the lowest marks obtained by the students.

ii) Range of the marks obtained

iii) Mean marks obtained by the group

    i) Highest mark = 95

    Lowest mark = 39

    ii) Range = Highest mark − Lowest mark

    = 95-39 = 56

    iii) Mean of marks = $\frac{85+76+90+85+39+48+56+95+81+75}{10}$ = 730/10 = 73

10. The mean weight of 8 numbers is 15 kg. If each number is multiplied by 2, what will be the new mean?

Let $x_1, x_2, x_3 \ldots x_8$ numbers with their mean equal to 15 kg. Then

$$15 = \frac{x_1 + x_2 + x_3 + x_4 + x_5 + x_6 + x_7 + x_8}{8}$$

$\Longrightarrow x_1 + x_2 \ldots + x_8 = 15 \times 8$

$\Longrightarrow x_1 + x_2 \ldots + x_8 = 120$

New numbers are $\Longrightarrow 2x_1 + 2x_2 + 2x_3 \ldots + 2x_8$ .... Let M be their mean. Then.

$M = \frac{2x_1 + 2x_2 + 2x_3 \ldots + 2x_8}{8}$

$M = \frac{2(x_1 + x_2 + x_3 \ldots + x_8)}{8}$

$M = \frac{2(120)}{8}$

M = 30.

<div align="center">

I Long Answer Questions

</div>

1. The mean marks (out of 100) of a group of student is 60. If there marks are 85, 62, 36, 48, 72, X, 75 and 39. Find the value of X.

Mean is given as

Mean = $\frac{85+62+36+48+72+x+75+39}{8}$ = 60

$\Longrightarrow = \frac{417 \, X \, x}{8}$ = 60

$= \Rightarrow 417 + x = 480$

$= \therefore x = 480 - 417 = 63$

2. Following are the marks obtained by 25 students in class test (out of 25 marks) in Maths : 18, 13, 18, 16, 8, 5, 13, 5, 18, 18, 2, 16, 13, 8, 17, 18, 5, 2, 13, 8, 19, 16, 8, 20

How many students obtained marks more than the mean marks?

Arranging the observations (marks) in ascending order :

2,2,5,5,5,8,8,8,8,13,13,13,16,16,16,17,17,18,18,18,18,18,19,20

Sum of observations

2 x 2 = 4

5 x 3 = 15

8 x 4 = 32

13 x 4 = 52

16 x 3 = 48

17 x 2 = 34

18 x 5 = 90

19 x 1 = 19

20 x 1 = 20
_____
Total 314
_____

Number of students = 25

Mean marks = $\frac{\text{Sum of the observations}}{\text{Total number of students}} = \frac{314}{25}$ = 12.5

So the number of students who scored marks more than mean marks is 4+3+2+5+1+1 = 16.

3. For the following data make a frequency distribution table and answer the following questions:

40, 38, 40, 37, 35, 38, 31, 35, 40, 38, 38, 33, 40, 35, 31, 30, 37, 33, 30, 32, 38

a) What is the range of given data?

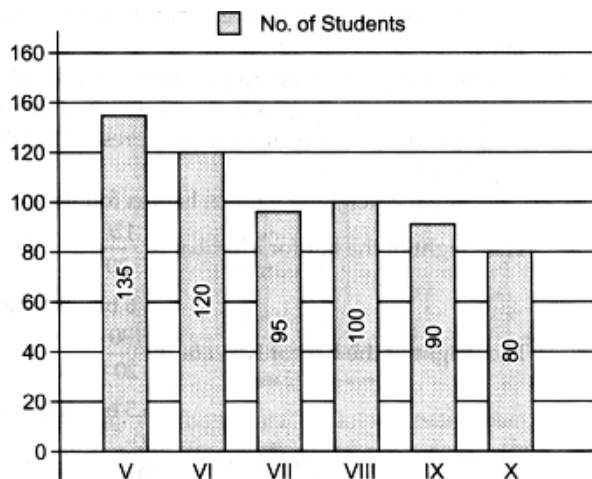**b) What is the mode of given data?**

Frequency Distribution Table:

Numbers	Tally marks	Frequency
30	I I	2
31	I I	2
32	I	1
33	I I I	3
35	I I I	3
37	I I	2
38	̶I̶I̶I̶I̶	5
40	I I I I	4
Total		22

a) Range = 40 − 30 = 10   b) Mode = 38

because 38 is repeated maximum 5 times.

4. Study the following graph and answer the following questions?

a) Which class has the maximum number of children?

    i) V   ii) VI   iii) VII   iv) VIII

b) Which class has the minimum number of children?

    i) IX   ii) X   iii) VII   iv) VIII

c) Which of the following is the ratio of students of class VI to the students of class VIII?

    i) 4:5   ii) 5:6   iii) 6: 5   iv) 8: 5

    a) i   b) ii   c) iii $= \frac{120}{100} = 6{:}5$

5. The following data gives the number of students of Delhi state who sent abroad for study during some years.

Year	Number of students
1995	1400
1996	1600
1997	1250
1998	1000
1999	2000
2000	2200

Represent the above data with the help of a bar graph

In order to construct a bar graph representing the above data. We follow the following steps.

a) Take a graph paper and draw two mutually perpendicular lines OX and OY as shown in Fig. Call OX as the horizontal axis and OY as the vertical axis.

b) Along OX, mark years and along OY, mark number of students.

c) Along OX, choose the uniform (equal) width of the bars and the uniform gap between them, according to the space available for the graph.

d) Choose a suitable scale to determine the heights of the bars, according to the availability of space. Here, we choose 1 big division to represent 200 students.

e) Calculate the height of various bars as follows :

The height of the bar for the year 1995 is equal to.

$\frac{1400}{200}$ = 7 big divisions ;

The height of the bar for the year 1996

$\frac{1600}{200}$ = 8 big divisions ;

The height of the bar for the year 1997

$\frac{1250}{200}$ = big divisions ;

= 6 big divisions and 2.5 small divisions

The height of the bar for the year 1998

$\frac{1000}{200}$ = 5 big divisions ;
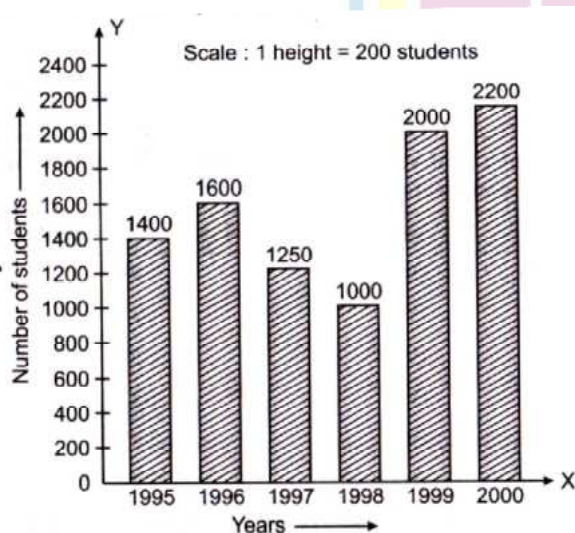
The height of the bar for the year 1999

$\frac{2000}{200}$ = 10 big divisions ;

The height of the bar for the year 2000

$\frac{2200}{200}$ = 11 big divisions ;

f) We draw the bars as shown in Fig. below and on the top of each bar we write the number of students represented by it.

6. In a school, there are five sections of class VII. The number of students in each section is given below.   Construct a bar graph representing this data:

Section	A	B	C	D	E
Number of students	40	48	52	45	30

We go through the following steps to construct the bar graph:

a) Take a graph paper and draw two lines Ox and OY perpendicular to each other. Call the horizontal line as Ox and the vertical line as OY.

b) Along the horizontal axis Ox, mark "sections of Class VII" and long the vertical axis OY mark "No. Of students".

c) Along the horizontal axis Ox, choose the uniform (equal) width of the bars and the uniform gap between them.

d) Choose a suitable scale to determine the heights of the bars, according to the space available for the graph. Here, we choose 1 small division to represent 1 student.

e) Calculate the heights of the various bars as follows:

Height of the bar for section A = 40 x 1

= 40 small divisions = 4 big divisions

Height of the bar for section B = 48 x 1

= 48 small divisions = 4 big divisions and 8 small divisions

Height of the bar for section C = 52 x 1

= 52 small divisions = 5 big divisions and 2 small divisions

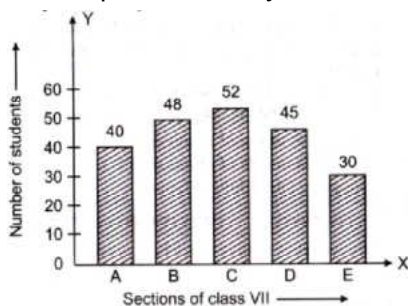Height of the bar for section D = 45 small divisions

= 4 big divisions and 5 small divisions

Height of the bar for section E = 30 small divisions

= 3 big divisions .

f) We draw the bars as shown in Fig. below and on the top of each bar, we write the number of students represented by it.

7. The population of four major cities in India in a particular year is given below :

City	Mumbai	Kolkata	Delhi	Chennai
Number of students	120	130	150	80

Construct a bar graph to represent the above data.

To construct the bar graph representing the given data, we follow the following steps.

a) We take a graph paper and draw two mutually perpendicular lines Ox and Oy.

b) Along the horizontal line Ox, we mark 'cities' and along the vertical line, we mark the 'population'.

c) Along the axis Ox, we choose equal suitable width of each bar. The gap between the bars is chosen same.

d) Choose a suitable scale to determine the heights of the bars, according to the availability of space. Here, we choose 1 big division to represent 20 lakh population.

e) Calculate the height of various bars as follows:

The height of the bar for Mumbai $= \frac{120}{20} = 6$ big divisions.

The height of the bar for Kolkata $= \frac{130}{20} = 6.5$ big divisions.

The height of the bar for Delhi $= \frac{150}{20} = 7.5$ big divisions.

The height of the bar for Chennai $= \frac{80}{20} = 4$ big divisions.

f) Now, we draw the bars as shown in Fig. below and at the top of each bar we write the population of the corresponding city.
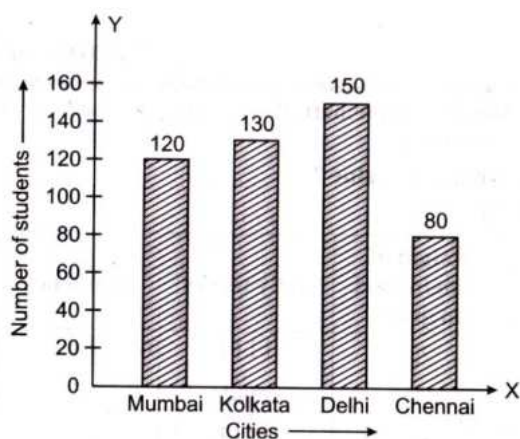
8. The results of pass percentage of Class X and XII in C.B.S.E examination for 5 years are given in the following table :

Year	X	XI
1994-95	90	95
1995-96	95	80
1996-97	90	85
1997-98	80	90
1998-99	98	95

Draw bar graphs to represent the data.

We go through the following steps to construct the bar graphs :

a) We draw twp lines perpendicular to each other on a graph paper and call them horizontal and vertical axes as shown in Fig. below.
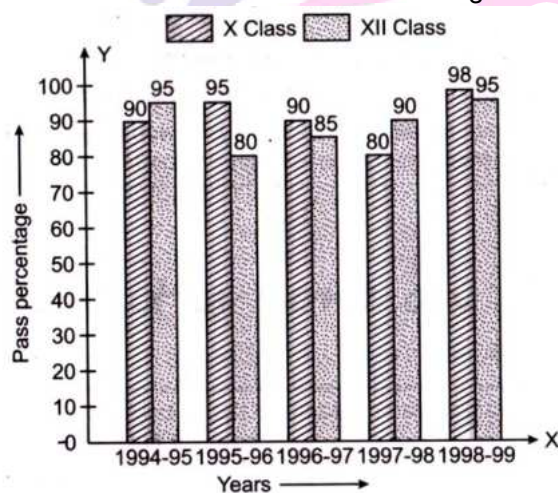

b) Along the horizontal axis, we mark the 'years' and along the vertical axis we mark the 'pass' percentage.

c) We choose a suitable scale to determine the heights of bars. Here, we choose the scale as 1 big division to represent 10.

d) First we draw the bars for Class X results and then bars for Class XII results for different years.

Bars for X and XII class results are shaded separately and the shading is shown in the top right corner of the graph paper.

9. Study the double bar graph given below and answer the questions that follow:
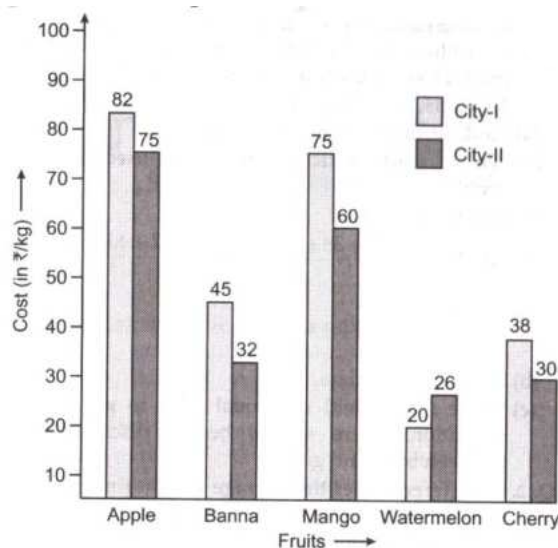
a) What information does the above double graph depict?

b) Name the fruits for which cost of 1 kg is great in City I as compared to City II

c) What is the difference of rates for apples in both the cities?

d) Find the ration of the cost of mangoes per kg in City I to the cost of mangoes per kg in City II (NCERT Exemplar)

a) The double bar graph compares the cost of different fruits per kg in cities I and II

b) Apple, Banana, Mango and Cherry.

c) Since $82 - 75 = 7$ therefore in both the cities the difference of rates of apples is Rs.7/kg.

d) $75 : 60 = 5 : 4$.

10. The cards bearing letter of the word "MATHEMTICS" are placed in a bag. A card is taken out from the bag without look in into the bag (at random)

a) How many outcomes are possible when a letter is taken out of the bag at random?

b) What is the probability of getting :

i) M?   ii) Any vowel?   iii) Any consonant?   iv) x?

a) There are 11 outcomes namely M,M,A,A,T,T,H,E,I,C,S

b) i) Probability of getting 'M' $= \frac{2}{11}$

ii) Probability of getting a Vowel $= \frac{4}{11}$

iii) Probability of getting Consonant $= \frac{7}{11}$

iv) Probability of getting X = 0 $= \frac{0}{11}$.

1. The heights of 10 girls were measured in cm and the results are as follows:

135,150,139,128,151,132,146,149,143,141

i) What is the height of the tallest girl?

ii) What is the height of the shortest girl?

iii) What is the range of the data?

iv) what is the mean height of the girls?

c) How many girls have height more than the mean height

i) Height of tallest girl = 151 cm

ii) Height of shortest girl = 128 cm

iii) Range = Height of tallest − Height of shortest girl

= 151 − 128 cm = 23 cm

iv) Mean = $\frac{135+150+139+128+151+132+146+149+143+141}{10} = \frac{1414}{10}$ = 141.4 cm

2. Calculate the mean and median for the following data.

Marks	10	11	12	13	14	16	19	20
Number of students	3	5	4	5	2	3	2	1

Using empirical formula, find its mode.

Arranging the data in tabular form, we have

Marks (x)	Tally Marks	Number of students (f)	Cumulative Frequency	f x x
10	I I I	3	3	30
11	⌐H̶H̶⌐	5	8	55
12	I I I I	4	12	48
13	⌐H̶H̶⌐	5	17	65
14	I I	2	19	28
16	I I I	3	22	48
19	I I	2	24	38
20	I	1	25	20
Total		25		332

Created by Pinkz

Mean $= \dfrac{Sum\ of\ f\ \text{x}\ x}{\text{Number of students}} = \dfrac{332}{25} = 13.28$

Number of students 9n) = 25

∴ Median = Value of $\left(\dfrac{25+1}{2}\right)^{th}$ = 13th observation i.e. 13 is the median

Empirical formula is Mode = 3 Median – 2 Mean

$\qquad$ = 3 x 13-2 x 13.28 = 12.44

Hence, the mode is 12.44.

3. The table below gives the flavours of ice cream liked by children (boys and girls) of a society.

Flavours	Vanilla	Chocolate	Strawberry	Mango	Butterscotch
Boys	4	9	3	8	13
Girls	8	12	7	9	10

Study the table and answer the following questions:

i) Draw a double bar graph using appropriate scale to represent the above information.

ii) Which flavour is like the most by the boys?

iii) How many girls are there in all?

iv) How many children like chocolate flavour of ice cream?

v) Find the ratio of children who like strawberry flavour to vanilla flavour of icecream.

$\qquad$ i) We go through following steps to construct the bar graphs.

$\qquad$ Step 1: We draw lines perpendicular to each other on a graph paper and call them horizontal and vertical axis.

$\qquad$ Step 2 : Along the horizontal axis, we mark the 'flavours' and along the vertical axis, we mark the 'flavours liked'.

$\qquad$ Step 3 : We choose suitable scale to determine the height of bars. Here we choose the scale as I big division to represent 2.

$\qquad$ Step 4: First, we draw the bars for flavours liked by boys and then bars for flavours liked by girls.

$\qquad$ Step 5: We draw the bars are shown in figure.

Bars for boys and girls are shaded separately and the shading is shown in top right corner of graph paper.
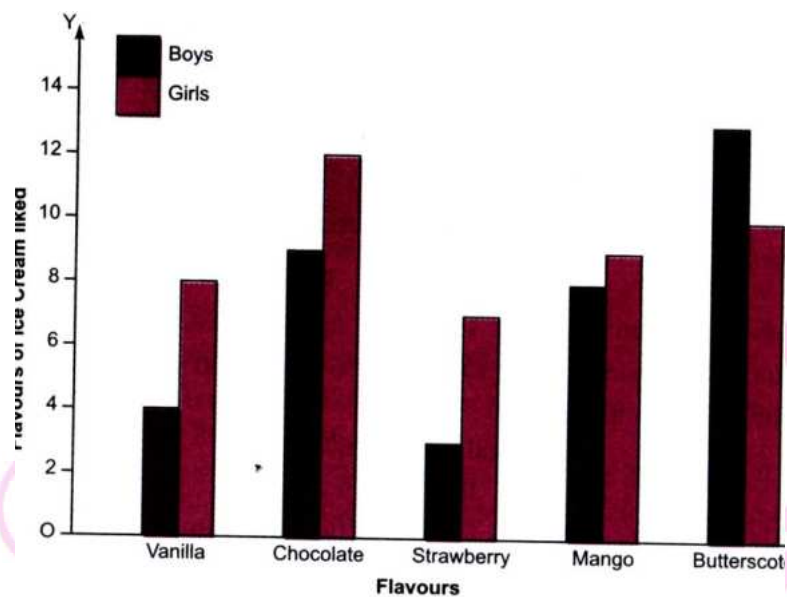
ii) Butterscotch

iii) Total girls = 8+12+7+9+10=46

iv) Children who lie chocolate flavour = 9 +12 = 21

v) Ratio is 10: 12 or 5 : 6.

4. Tell whether the following is certain to happen, impossible can happen but not certain

    i) You are older today than yesterday.

    ii) A tossed coin will land heads up.

    iii)A die when tossed shall land up with8 on top.

    iv) The next traffic light seen will be green

    v. Tomorrow will be a cloudy day.

       i) Certain to happen

       ii) Can happen but not certain

       iii) Impossible

       iv) Can happen but not certain

       v) Can happen but not certain.

Value Based Questions

1. In a block the number of girl students in seven primary schools are as follows:

37,38,35,40,45,52,40

a) Find the mean of the given data

b) Which mathematical concept is used in this problem?

c) What is its value?

a) Mean $= \frac{37+38+35+40+45+52+40}{7} = \frac{287}{7} = 41$

b) Mean of given data

c) Value : Girl child has equal right to get proper education. There should be no discrimination between boys and girls.

2. In different cities the average weight (in gram) of protein food provided per child under the age of 15 years is as follow:

80,90,75,110,90,80,85,90,110,80,75,80,110,80,75,80,110,90,85,80,75,90,85,110,90,90,75,110,85

a) On the basis of given data make a frequency distribution table.

b) Which mathematical concept is used in this problem?

c) What is its value?

Sol: a)

Weight of protein food (in gram)	Tally Marks	Frequency
75	I I I I	4
80	୲୲୲୲୲	5
85	I I I I	4
90	୲୲୲୲୲ I I I	7
110	୲୲୲୲୲	5
Total		n = 25

b)Tabulation of data

c) In India, children need sufficient protein food for nutrition

Or

A nation has to take one of its human resources.