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B -147, Sector -6 Noida, UP - 201301,
www.askiitians.com
Email: info@askiitians.com
Tel: 1800-2000-838

Class: 9
Subject: Mathematics
Topic: Statistics
No. of Questions: 20

Q1. The following are the marks obtained by 50 students in Environmental Science.

Marks	Tally Marks	Number of students
2	|||||||	7
3	||	2
4	||||||||	8
5	|||||||||	9
6	|||||	5
7	||||||||	8
8	||	2
9	|||||||||	9

What is the median of their scores?

Sol. Step 1.

Marks	Tally Marks	Number of students
2	|||||||	7
3	||	2
4	||||||||	8
5	|||||||||	9
6	|||||	5
7	||||||||	8
8	||	2
9	|||||||||	9

If you look at the given table from top to bottom carefully, you will notice that the marks obtained by 50 students in Environmental Science are arranged in ascending order.

Step 2.

Total numbers of students are 50 which is even.

So, median is equal to the average of $\left(\frac{n}{2}\right)^{th}$ and $\left(\frac{n}{2}+1\right)^{th}$ student's marks in Environmental Science, (where n is the number of students)

$\left(\frac{n}{2}\right)^{th} = \left(\frac{50}{2}\right)^{th} = 25^{th}$

$\left(\frac{n}{2}+1\right)^{th} = \left(\frac{50}{2}+1\right)^{th} = 26^{th}$

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If you count the number of students in tally marks column of the table, you will notice that the marks obtained by 25th and 26th students in Environmental Science are 5 and 5 respectively

median = $\frac{5+5}{2}$

= $\frac{10}{2}$

= 5

Step3.

Now the median of their scores is 5.

Q2. If there are n numbers of which one is $\left(1-\frac{1}{n^2}\right)$ and all the others are 1's, then by how much is the arithmetic mean of these numbers less than 1.

Sol. $\frac{1}{n^3}$

Q3. Find the mean of all the internal angles in a pentagon.

Sol. Step1.

The sum of all five internal angles in a pentagon must be 540°

Now the mean of all the internal angles in a pentagon = $\frac{540}{5} = 108$

Step2.

Therefore the mean of all the internal angles in a pentagon is 108°

Q5. Find the median of the following set

10, 14, 19, 20, 17, 22, 15, 17, 20, 21, 13, 12

Sol. Step1.

If you look at the question carefully, you will notice that the given data is

10, 14, 19, 20, 17, 22, 15, 17, 20, 21, 13, 12

Step2.

To find the median first of all arrange the data in the ascending order,

You get 10, 12, 13, 14, 15, 17, 17, 19, 20, 20, 21, 22

Step3.

Total numbers of items are 12 which is even.

So, the median is equal to the average of $\left(\frac{n}{2}\right)^{th}$ and $\left(\frac{n}{2}+1\right)^{th}$ $terms$, (where n is the number of terms) $\left(\frac{n}{2}\right)^{th} = \left(\frac{12}{2}\right)^{th} = 6^{th}$

$\left(\frac{n}{2}+1\right)^{th} = \left(\frac{12}{2}+1\right)^{th} = 7^{th}$

6th and 7th terms are 17 and 17 respectively

Median = $\frac{17+17}{2}$

$= \frac{34}{2}$

= 17

Step4.

Therefore the median of the data set is 17.

Q6. Gita got an average score of 79 in 4 tests. She got 80 as the average of the highest 3 scores, and his lowest two scores are the same numbers. What is the average of her highest two scores?

(a) 81.5

(b) 82

(c) 82.5

(d) 81

Sol. B. (82)

Q7. Raj is part of the school cricket team, and this year he has scored an average of 36 runs. He has played 8 innings so far, and his scores in 7 of them are 26, 44, 42, 37, 46, 34, 43

What was his score in the last one?

(a) 21

(b) 14

(c) 12

(d) 16

Sol. D

Step1.

If you look at the question carefully, you will notice that Raj has second an average of 36 runs in 8 innings.

Let Raj score in the last inning = x

His scores in 7 innings out of 8 innings = 26, 44, 42, 37, 46, 34, 43

Step2.

Average score = $\frac{\text{Total score in 8 innings}}{\text{Total innings}}$

$\Rightarrow 36 = \frac{26+44+42+37+46+34+43+x}{8}$

$\Rightarrow 36 = \frac{272+x}{8}$

$\Rightarrow 36 \times 8 = 272+x$

$\Rightarrow 288 = 272+x$

$\Rightarrow 272+x = 288$

$\Rightarrow x = 288-272$

$\Rightarrow x = 16$

Step3.

Therefore Raj scores in the last inning is 16.

Q8. The following table shows profits of 5 companies in a business group last year.

Company	Profit
Company 1	Rs. 500,000
Company 2	Rs. 250,000
Company 3	Rs. 350,000
Company 4	Rs. 300,000
Company 5	Rs. 450,000

What is the average profit of the business group?

(a) Rs. 371500

(b) Rs. 370000

(c) Rs. 370200

(d) Rs. 369600

Sol. B

Q9. A teacher measures the heights of 11 students in her class as follows (in centimeters)

133, 153, 154, 114, 113, 147, 115, 141, 127, 159, 119

The median height of the students is ____ cm.

Sol. Step1.

If you look at the question carefully, you will notice that a teacher measures the heights of 11 students in her class as follows (in centimeters)

133, 153, 154, 114, 113, 147, 115, 141, 127, 159, 119

Step2.

Median is the middle number in a sorted list.

To find the median first of all arrange the heights in the ascending order, we get

113, 114, 115, 119, 127, 133, 141, 147, 153, 154, 159

Median = $\left(\frac{n+1}{2}\right)^{th}$ $[if\ n\ is\ odd]$ (where n is the number of terms)

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$= \left(\frac{11+1}{2}\right)^{th}$

$= \left(\frac{12}{2}\right)^{th}$

= 6th

Since 6^{th} terms in the scores 113, 114, 115, 119, 127, 133, 141, 147, 153, 154, 159 is 133

Therefore median = 133

Step3.

Therefore the median of height of 11 students is 133.

Q10. Find the mean of the factor of 12.

Sol. Factors of 12 are 1, 2, 3, 4, 6, and 12

Mean $= \frac{1+2+3+4+6+12}{6} = \frac{28}{6} = \frac{14}{3}$

Q11. The mean of the age of three students Reema, Dipanshu and Bhavya is 15 years. If their ages are in the ratio 4:5:6 respectively, then find their respective ages.

Sol. Let their ages be 4x, 5x and 6x.

Their mean age $= \frac{4x+5x+6x}{3}$

$$15 = \frac{15x}{3} \Rightarrow 5x = 15 \Rightarrow x = 3$$

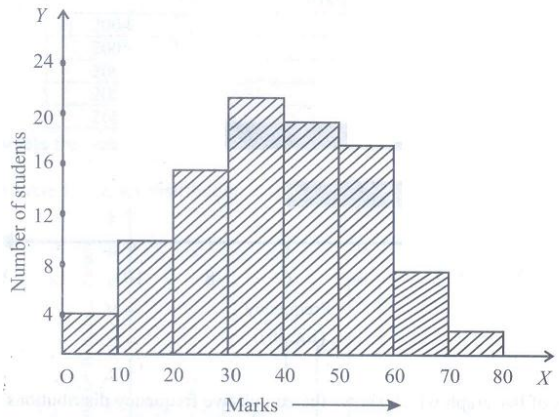
So, their ages are 12, 15, 18 year.

Q12. The following table gives the marks scored by 100 students in an entrances examination.

Mark:	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of students(Frequency)	4	10	16	22	20	18	8	2

Represent this data in the form of a histogram.

Sol.



We represent the class limits along X-axis on a suitable scale and the frequencies along Y-axis on a suitable scale.

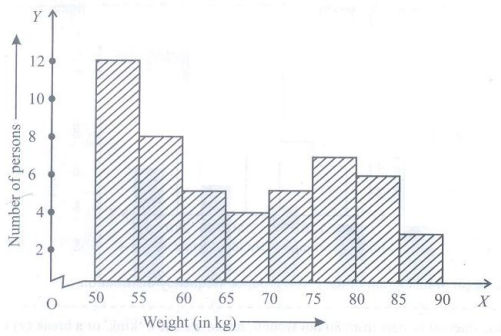
Taking class-intervals as bases and the corresponding frequencies as heights, we construct rectangle to obtain the histogram of the given frequency distribution as shown in figure.

Q13. The following in the distribution of weights (in kg) of 50 persons:

Weight (in kg):	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
Number of Persons:	12	8	5	4	5	7	6	3

Draw a histogram for the above data.

Sol. We represent the class limits along X-axis on a suitable scale and the frequencies along Y-axis on a suitable scale. Since the scales on X-axis starts at 50, a kink (break) is indicated near the origin to signify that the graph is drawn to scale beginning at 50, and not at the origin.



Q14. The mean of 6, 10, x and 12 is 8. Find the value of x.

Sol. $\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n} = \frac{6+10+x+12}{4} = \frac{28+x}{4}$

$\Rightarrow 8 = \frac{28+x}{4}$ $(\because \overline{X} = 8)$

$\Rightarrow$ 28+X = 32 $\Rightarrow$ X = 4 $\therefore$ value of x is 4.

Q15. In a class of 100 students there are 70 boys whose average marks in a subject are 75. If the average marks of the complete class are 72, then the average marks of the girls is –

(a) 73
(b) 65
(c) 68
(d) 74

Sol. (b)

Let the average marks of the girls students be x, then

$72 = \frac{70\times75+30\times x}{100}$ (Number of girls = 100-70 = 30)

i.e. $\frac{7200-5250}{30} = x$

$\therefore x = 65$

Q16. A set of number consists of three 4's, five 5's, six 6's, eight 8's, and seven 10's. The mode of this set of numbers is-

(a) 6
(b) 7
(c) 8
(d) 10

Sol. (c) Mode of the data is 8 as it repeated maximum number of times.

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Q17. The marks obtained by a set of students in an examination are given below:

Marks	5	10	15	20	25	30
No. of students	6	4	6	12	X	4

If the mean of the above data is 18, calculate the numerical Value of x.

Sol. From the above data, we may prepare the table given below:

Marks(xi)	No. of students (frequency)(f_i)	f_ix_i
5	6	30
10	4	40
15	6	90
20	12	240
25	X	25x
30	4	120
	$\sum f_i = (32 + x)$	$\sum f_i x_i = (520 + 25x)$

$\therefore$ Mean = $\frac{\sum f_i x_i}{\sum f_i} = \frac{(520+25x)}{(32+x)}$ But, mean = 18

$\therefore \frac{520+25x}{32+x} = 18 \Rightarrow 520 + 25x = 18(32 + x) \Rightarrow 7x = 56 \Rightarrow x = 8.$ Hence, $x = 8$

Q18. Find the value of K from the following data if mean of the given data is 16.

X	5	10	15	20	25
y	2	8	k	10	5

Sol.

x	f	fx
5	2	10
10	8	80
15	K	15k
20	10	200
25	5	125
Total	25 + k	415 + 15k

Mean = $\frac{\sum fx}{\sum f}$

16 = $\frac{415+15k}{25+k}$

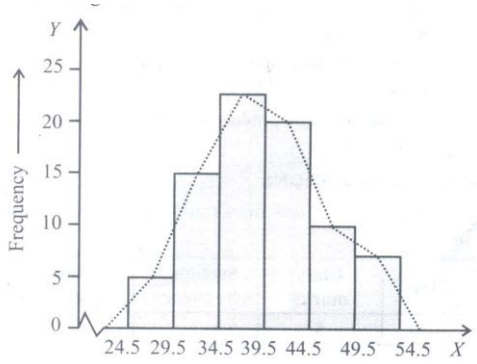
(25 + K)16 = 415 + 15 k

400+16k = 415 + 15 k
16k-15k = 415-400
K = 15

Q19. Draw a histogram for the following data:

Class interval	25-29	30-34	35-39	40-44	45-49	50-54
Frequency	5	15	23	20	10	7

Sol.



20. The mean of discrete observations y_1 , y_2 , ... y_n is given by –

(a) $\frac{\sum_{i=1}^{n} yi}{n}$

(b) $\frac{\sum_{i=1}^{n} yi}{\sum_{i=1}^{n} i}$

(c) $\frac{\sum_{i=1}^{n} yifi}{n}$

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(d) $\frac{\sum_{i=1}^{n} yifi}{\sum_{i=1}^{n} fi}$

So. (a)