

Statistics

MATHEMATICAL REASONING

1. If the mean of 6, y, 7, 14 and x is 8. Then, the value of $x + y$ is _____.
 (a) 13 (b) 12
 (c) 10 (d) 15

2. If the mode of the data 4, 3, 2, 5, x, 4, 5, 1, 7, 3, 2, 1 is 4, then value of x is _____.
 (a) 4 (b) 3
 (c) 2 (d) 1

3. The mean of 13 observations is 14. If the mean of the first 7 observations is 16 and that of the last 7 observations is 12, then the 7th observation is _____.
 (a) 12 (b) 14
 (c) 16 (d) 18

4. The mean of ten items is p and if each item is decreased by 3, then its mean will be
 (a) $10p - 3$ (b) $3p$
 (c) $p - 3$ (d) $10 + p$

5. Find the median of the data given below.
 14, 6, 9, 15, 14, 9, 21, 21, 25, 21, 27, 29, 21, 8, 6, 15, 25, 14, 21, 9, 21, 25, 27, 29, 6, 14, 21, 21, 27, 25, 27, 9, 15, 14, 9
 (a) 25 (b) 21
 (c) 14 (d) 9

6. Find the mode of the given data.
 7, 4, 3, 5, 6, 3, 3, 2, 4, 3, 4, 3, 3, 4, 4, 3, 2, 2, 4, 3, 5, 4, 3, 4, 3, 4, 3, 1, 2, 3
 (a) 3 (b) 4
 (c) 5 (d) 2

7. The mean of 11 numbers is 10. What should be added as 12th number to make the mean 14?
 (a) 10 (b) 72
 (c) 58 (d) 90

8. If the mean of 10 observations is 20 and that of another 15 observations is 16, then the mean of 25 observations is _____.
 (a) 18 (b) 18.2
 (c) 17.6 (d) 17

9. The following observations have been arranged in the ascending order. If the median of the data 29, 32, 48, 50, x, x + 2, 72, 78, 84, 95 is 63, then the value of x is
 (a) 63 (b) 62
 (c) 61 (d) 60

10. If x is the mean of x_1, x_2, \dots, x_n , then for $a \neq 0$, the mean of $ax_1, ax_2, \dots, ax_n, \frac{x_1}{a}, \frac{x_2}{a}, \dots, \frac{x_n}{a}$ is _____.
 (a) $\left(a + \frac{1}{a}\right)\bar{X}$ (b) $\left(a + \frac{1}{a}\right)\frac{\bar{X}}{2}$
 (c) $\left(a + \frac{1}{a}\right)\frac{\bar{X}}{n}$ (d) $\frac{\left(a + \frac{1}{a}\right)\bar{X}}{2n}$

11. If mean of the following data is 11. Find the value of P.

x_i	13	5	7	19	11	13
f_i	6	8	P	11	8	4

 (a) 11 (b) 15
 (c) 17 (d) 13

12. Mean of 11 observations is 17.5. If one observation value 15 is deleted, then the mean of remaining observations is _____.
 (a) 15.75 (b) 16.75
 (c) 17.75 (d) 18.75

13. Find the mean of two digit natural numbers which have both digits same.
 (a) 55 (b) 45
 (c) 65 (d) 50

14. The average of n numbers $x_1, x_2, x_3, \dots, x_n$ is A. If x_1 is replaced by $(x + a)x_1$, x_2 is replaced by $(x + a)x_2, \dots$, then the new average is _____.
 (a) $(x + a)A$ (b) $\frac{(x - 1)A + nx_n}{n}$
 (c) $\frac{nA + (n + 1)x_n}{n}$ (d) $\frac{(n + 1)A + x_n}{n}$

15. The difference between the maximum and the minimum observation in the data is called _____.
 (a) Frequency
 (b) Class interval
 (c) Range
 (d) Cumulative frequency

EVERYDAY MATHEMATICS

16. A contractor employed 18 labourers at ₹ 12 each per day, 10 labourers at ₹ 13.50 each per day, 5 labourers at ₹ 25 each per day and 2 labourers at ₹ 42 each per day. The average wages paid is _____.

(a) ₹ 16 (b) ₹ 20
(c) ₹ 24 (d) ₹ 28

17. In a class test, in Mathematics, 10 students scored 75 marks, 12 students scored 60 marks, 8 students scored 40 marks and 3 students scored 30 marks. The mean of their score is (approximately) _____.

(a) 57 marks (b) 56 marks
(c) 15 marks (d) 54 marks

18. In a class, the mean weight of 60 students is 40 kg. The mean weight of boys is 50 kg while that of the girls is 30 kg. The number of boys and girls respectively are _____.

(a) 30, 30 (b) 35, 25
(c) 25, 35 (d) 20, 40

19. Arnav scored 63 marks in English, 57 in Hindi, 82 in Mathematics, 55 in Social Science and x in Science. If the average he scored is 60, find the average of best four of the them.

(a) 63.25 (b) 65.15
(c) 64.25 (d) 60.75

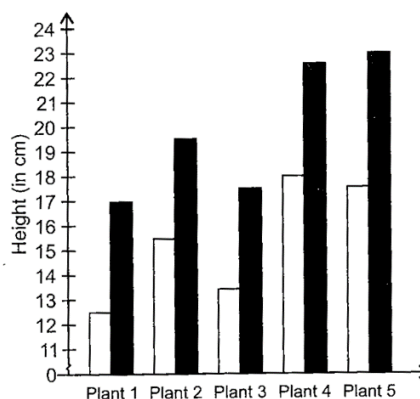
20. In a school, there are 40 students in which boys and girls are in the ratio 3:1. The mean age of the boys is 20 years and the mean age of the girls is 18 years. If there is increase in girls by 5 and decrease in boys by 10, then find the new average age (approx.) when the students joining or leaving doesn't change the average age of boys and girls respectively.

(a) 15 years (b) 19 years
(c) 16 years (d) Can't say

ACHIEVERS SECTION (HOTS)

21. The owner of a plant nursery wanted to test the effectiveness of a new type of fertilizer. He measured the heights of 5 plants, and then gave each an equal amount of fertilizer. Two weeks later, he measured the heights of the plants again. The graph below shows the height of the plants before and after the addition of fertilizer.

KEY	
<input type="checkbox"/>	Height before addition of fertilizer
<input type="checkbox"/>	Height after addition of fertilizer



What was the mean growth of the plants?

(a) 4.5 cm (b) 5 cm
(c) 5.5 cm (d) 6 cm

22. The sum of the squares of two consecutive even numbers is two more than two times the square of their mean. This statement is
- (a) Never true
(b) Always true
(c) True when the numbers are more than 100.
(d) True when the numbers are less than or equal to 100.

23. Match the following.

Column-I	Column-II
(p) Data which is collected for the first time by the statistical investigator or with the help of his workers is called	(1) Secondary
(q) These are the data already collected by a person or a society and these may be in published form is	(2) Variable
(r) When the data is compiled in the same form and order in which it is collected, it is known as	(3) Primary
(s) A quantity which can vary from one individual to another is called	(4) Raw Data

	P	Q	R	S
(A)	3	1	2	4
(B)	3	1	4	2
(C)	1	3	2	4
(D)	1	3	4	2

24. State T for true and 'F' for false.
- (i) If the number of observations is even, then the median is mean of $\left(\frac{n}{2}\right)^{th}$ and $\left(\frac{n}{2} + 1\right)^{th}$ terms.
- (ii) After four vertical lines for a tally marks, if the tally marks occurs for the fifth time, then the fifth line is put vertically with previous four lines.
- (iii) If the range of the data with minimum value 16, is 87, then the maximum value is 71.
- (iv) Mode of the data, 14, 71, 51, 91, 15, 2, 15, 51, 19, 41, 51, 15, 51 is 51.
- (v) Mean of first ten natural numbers is 5.5

	(i)	(ii)	(iii)	(iv)	(v)
(a)	T	F	T	T	T
(b)	F	F	T	T	T
(c)	T	F	F	T	T
(d)	T	F	T	F	T

25. Fill in the blanks.
- (i) The **P** of class interval is called its class mark.
- (ii) The **Q** can be calculated graphically.
- (iii) The **R** of all bars in histogram should be equal.
- (iv) Width of the class interval called **S** of class interval.

	P	Q	R	S
(a)	Lower value	median	width	range
(b)	Mid-value	mean	length	range
(c)	Mid-value	median	width	size
(d)	Upper-value	mode	length	size

HINTS & EXPLANATIONS

1. (a): We have, $\frac{6 + y + 7 + 14 + x}{5} = 8$
 $\Rightarrow 27 + x + y = 40 \Rightarrow x + y = 13$
2. (a) : in the given data, we have 1 appears 2 time; 2 appears 2 times; 3 appears 2 times; 4 appears 2 times; and so on.
 Since, the mode is 4.
 It means 4 appears most.
 $\therefore x = 4$
3. (b) : Mean of first 7 observations = 16
 \therefore Sum of first 7 observations = $16 \times 7 = 112$
 Mean of last 7 observations = 12
 \therefore Sum of last 7 observations = $12 \times 7 = 84$
 Now, mean of 13 observations = 14
 \therefore Sum of 13 observations = $14 \times 13 = 182$
 \therefore 7th observation = $(112 + 84 - 182) = 14$.

4. (c) : Let the given number be $x_1 + x_2, \dots, x_{10}$.
 Then, the mean of given numbers
 $= \frac{x_1 + x_2 + x_3 + \dots + x_{10}}{10}$
 $\therefore p = \frac{x_1 + x_2 + \dots + x_{10}}{10}$
 $\Rightarrow x_1 + x_2 + \dots + x_{10} = 10p$
 Now, if each number is decreased by 3, then the new number are, $(x_1 - 3), (x_2 - 3), \dots, (x_{10} - 3)$
 \therefore New mean
 $= \frac{(x_1 - 3) + (x_2 - 3) + \dots + (x_{10} - 3)}{10}$
 $= \frac{(x_1 + x_2 + \dots + x_{10}) - 30}{10} = \frac{10p - 30}{10}$
 So, new mean = $p - 3$
5. (b) : Arranging the given data in ascending order, we get
 6, 6, 6, 8, 9, 9, 9, 9, 9, 14, 14, 14, 14, 14, 15, 15, 15, 21, 21, 21, 21, 21, 21, 21, 21, 21, 25, 25, 25, 25, 27, 27, 27, 27, 29, 29
 Total number of terms is 35, which is odd.
 \therefore Median = $\left(\frac{35 + 1}{2}\right)^{th}$ term = 18th term i.e., 21
6. (a) : In the given data 3 appears most number of times i.e., 12 so, mode is 3.
7. (c) : Mean of 11 observations = 10
 \therefore Sum of 11 observations = $10 \times 11 = 110$
 Let x be added as 12th number.
 Then mean of 12 observations = 14
 \therefore Sum of 11 observations + x = 12×14
 $\Rightarrow 110 + x = 168 \Rightarrow x = 58$
8. (c) : Mean of 10 observations = 20
 Mean of another 15 observations = 16
 \therefore Total sum = $20 \times 10 + 16 \times 15$
 $= 200 + 240 = 440$
 \therefore Mean of 25 observations = $\frac{440}{25} = 17.6$
9. (b) : Here, number of terms = $n = 1$, which is even
 \therefore Median = average of $\left(\frac{10}{2}\right)^{th}$ term and $\left(\frac{10}{2} + 1\right)^{th}$ term
 \Rightarrow Median = average of 5th and 6th terms
 $\Rightarrow 63 = \frac{1}{2}(x + x + 2) \Rightarrow x + 1 = 63$
 $\Rightarrow x = 62$

10. (b) : $x = \frac{x_1 + \dots + x_n}{n}$

Now, $\frac{ax_1 + \dots + ax_n + \frac{x_1}{a} + \frac{x_2}{a} + \dots + \frac{x_n}{a}}{2n}$

$$= \frac{a(x_1 + x_2 + \dots + x_n) + \frac{1}{a}(x_1 + x_2 + \dots + x_n)}{2n}$$

$$= \frac{a(n\bar{x}) + \frac{1}{a}(n\bar{x})}{2n} = \frac{(n\bar{x})}{2n} \left(a + \frac{1}{a} \right) = \frac{\bar{x}}{2} \left(a + \frac{1}{a} \right)$$

11. (b) :

x_i	f_i	$f_i x_i$
13	6	78
5	8	40
7	P	7P
19	11	209
11	8	88
13	4	52
	$\sum f_i = 37 + P$	$\sum f_i x_i = 467 + 7P$

$$\text{Mean} = \frac{\sum f_i x_i}{\sum f_i}$$

$$\Rightarrow 11 = \frac{467 + 7P}{37 + P}$$

$$\Rightarrow 407 + 11P = 467 + 7P$$

$$\Rightarrow 4P = 60 \Rightarrow P = 15$$

12. (c) : Mean of 11 observations = 17.5

$$\therefore \text{Sum of 11 observation} = 192.5$$

Now, 15 is deleted from the data.

$$\therefore \text{Sum of 10 observations} = 192.5 - 15 = 177.5$$

\therefore Mean of remaining of observations

$$= \frac{177.5}{10} = 17.75$$

13. (a) : Two digit natural numbers which have both digits same are 11, 22, ..., 99

\therefore Mean

$$= \frac{11 + 22 + 33 + 44 + 55 + 66 + 77 + 88 + 99}{9}$$

$$= \frac{495}{9} = 55$$

14. (a) : It is given that,

$$\frac{x_1 + x_2 + \dots + x_n}{n} = A$$

\Rightarrow Now, each number is multiplied by $(x + a)$.

\therefore New mean

$$= \frac{x_1(x + a) + x_2(x + a) + \dots + x_n(x + a)}{n}$$

$$= \frac{(x + a)(x_1 + x_2 + \dots + x_n)}{n}$$

$$= \frac{(x + a)(nA)}{n}$$

15. (c) :

16. (a) : Total wages in each day

$$= ₹ (18 \times 12 + 1 \times 13.50 + 5 \times 25 + 2 \times 42)$$

$$= ₹ 560$$

$$\text{Total number of labourers} = 18 + 10 + 5 + 2 = 35$$

$$\therefore \text{Average wages} = \frac{560}{35} = ₹ 16.$$

17. (a) : Total scored of all students

$$= 10 \times 75 + 12 \times 60 + 8 \times 40 + 3 \times 30$$

$$= 750 + 720 + 320 + 90 = 1880$$

$$\text{Total number of students} = 10 + 12 + 8 + 3 = 33$$

$$\therefore \text{Mean score} = \frac{1880}{33} = 57 \text{ (approx.)}$$

18. (a) : Mean weight of 60 students = 40 kg

Let the number of boys be x .

Then, the number of girls = $(60 - x)$

Now, mean weight of boys = 50

$$\therefore \text{Sum of weights of boys} = 50x \quad \dots(i)$$

Also, mean weight of girls = 30

$$\therefore \text{Sum of weights of girls} = 30(60 - x) \quad \dots(ii)$$

$$\text{Now, } \frac{50x + 30(60 - x)}{60} = 40$$

$$\Rightarrow 50x + 1800 - 30x = 2400$$

$$\Rightarrow 20x = 600 \Rightarrow x = 30$$

$$\therefore \text{Number of boys} = 30$$

$$\text{And number of girls} = 60 - 30 = 30.$$

19. (c) : Average =

$$\frac{\text{Sum of scores in all five subjects}}{5}$$

$$\Rightarrow 60 = \frac{63 + 57 + 82 + 55 + x}{5}$$

$$\Rightarrow 257 + x = 300 \Rightarrow x = 43$$

Marks score in five subjects are 63, 57, 82, 55, 43.

\therefore Best four marks are 63, 57, 82, 55

\therefore Required average

$$= \frac{63 + 57 + 82 + 55}{4} = 64.25$$

- 20.** (b) : Let number of boys and girls be $3x$ and x respectively.
 Total number of students = 40
 $\Rightarrow 3x + x = 40 \Rightarrow 4x = 40 \Rightarrow x = 10$
 \therefore Number of boys = $3 \times 10 = 30$
 And number of girls = 10
 Now, after decreasing 10 boys, number of boys is 20.
 \therefore Average age of 20 boys = 20 years.
 Sum of age of 20 boys = $20 \times 20 = 400$
 Also, after increasing 5 girls, number of girls is 15.
 Average age of 15 girls = 18 years
 \therefore Sum of age of 15 girls = $15 \times 18 = 270$
 Now, total number of students
 $= 40 - 10 + 5 = 35$
 Average age of students = $\frac{400 + 270}{35}$
 $= \frac{670}{35} = 19.14 = 19$ years (approx.)
- 21.** (a) : Mean growth of plants
 $= \frac{4.5 + 4 + 4 + 4.5 + 5.5}{5} = 4.5 \text{ cm}$
- 22.** (b) : Let the number be $2x$ and $2x + 2$.
 Mean = $\frac{2x + 2x + 2}{2} = \frac{4x + 2}{2} = 2x + 1$
 According to question,
 $(2x)^2 + (2x + 2)^2 = 2 + 2(2x + 1)^2$
 $\Rightarrow 4x^2 + 4x^2 + 4 + 8x = 2 + 2(4x^2 + 1 + 4x)$
 $\Rightarrow 8x^2 + 8x + 4 + 4 = 8x^2 + 8x + 4$, which is true.
- 23.** (b) :
- 24.** (c) : (i) is true.
 (ii) If the tally mark occurs for the fifth times then the four lines (||||) marked earlier are crossed by an oblique line as (||||)
- (iii) Range = Maximum value - Minimum value
 $\Rightarrow 87 = \text{Maximum value} - 16$
 $\Rightarrow \text{Maximum value} = 87 + 16 = 103$
- (iv) 51 occurs most of the times i.e., 4 times.
 So, 51 is the mode.
- (v) Mean = $\frac{1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10}{10}$
 $= \frac{55}{10} = 5.5$
- 25.** (c) :