

Probability Solved Sums

The mean is the usual Average , so add and then divide.

The median is the middle value, so first rewrite the given number in ascending order.

The mode is the number that is repeated more often than any other.

Range is largest – Smallest number.

1. The Marks obtained by 10 students in an examination were as follows: 70, 65, 68, 70, 75, 73, 80, 70, 83, 86. Then the mean deviation about mode is

(A) 7.71

(B) 5.4

(C) 54

(D) 5.6

Answer: (B) 5.4

The marks obtained by 10 students in an examination were as follows 70, 65, 68, 70, 75, 73, 80, 70, 83, 86. Find mean deviation about mode is ?

Mode = 70

M.D about mode = $\frac{\sum |x-z|}{N}$ (for type 1)

X	$ x - z $	
70	$70 - 70 = 0$	$ x - z = 0 + 5 + 2 + 0 + 5 + 3 + 10$ $0 + 13 + 16 = 54$
65	$65 - 70 = 5$	
68	$68 - 70 = 2$	
70	$70 - 70 = 0$	SO M.D about mode = $\frac{\sum x-z }{N}$ (N = total numbers) = 54/10 = 5.4
75	$75 - 70 = 5$	
73	$73 - 70 = 3$	
80	$80 - 70 = 10$	
70	$70 - 70 = 0$	

$$83 \quad 83 - 70 = 13$$

$$86 \quad 86 - 70 = 16$$

2. The Mode of 6, 4, 5, 6, 3, 2, 2, 5, 4, 3, 6, 5, 4, 7, 4, 9, 9 is

(A) 6

(B) 4

(C) 5

(D) 9

Answer: (B) 4

The mode of 6,4,5,6,3,2,2,5,4,3,6,5,4,7,4,9,9 is ?

After rewriting we get

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

So 4 is mode.

3. The Arithmetic mean of all the factors of 21 is

(A) $11/3$

(B) $31/3$

(C) 5

(D) 8

Answer: (D) 8

The arithmetic mean of all factor of 21 is

Factor of 21 are = 1,3,7,21

$$\text{So mean} = \frac{1+3+7+21}{4} = \frac{32}{4} = 8$$

4) Total number of all possible squares in a chess Board is ?

Chess board has 8 squares box, so maximum number we get is 8 and least is ,

$$\text{So } 8^2+7^2+6^2+5^2+4^2+3^2+2^2+1^2$$

$$= > 204$$

5) Find the average of 1st 9 prime number is

First 9 prime numbers are 2,3,5,7,11,13,17,19,23.

$$\text{Average} = \frac{2+3+5+7+11+13+17+19+23}{9}$$

$$= 100/9$$

$$= 11 \frac{1}{9}$$

6) Mean of 35 observation is 78.4 , but it is found 96 is misread as 69 . The correct mean is ?

$$\frac{x}{25} = 78.4 , \text{ so } x = 25 \times 78.4$$

$$= 1960$$

$$X = 1960$$

$$\text{Now } \frac{x - \text{wrong} + \text{new}}{25}$$

$$=> \frac{1960 - 69 + 96}{25} = 79.48$$

7) if $\frac{1}{8}$ of a pencil is black $\frac{1}{2}$ of remaining is white and the remaining $3 \frac{1}{2}$ cm is blue find length of the pencil .

Black	white	Blue
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$$\text{Blue is } 3 \frac{1}{2} = 3.5$$

$$\text{black is } \frac{1}{8}x, \text{ that is remaining is } \frac{7x}{8}$$

white is half so as blue is 3.5

$$\frac{x}{8} + 3.5 + 3.5 = x$$

\downarrow \downarrow \downarrow \swarrow
B **W** **B** total length

$$\frac{x}{8} + 7 = x,$$

$$7 = \frac{7x}{8} = 8$$

$$X = 8$$

8) If the mean of 4 observation is 20 and when a constant 'C' is added to each observation ,the mean becomes 22. The value of C ?

$$\frac{x}{4} = 20$$

$$\frac{x}{4} = 22$$

$$X = 80$$

$$x = 88$$

Extra = 8 for 4 numbers

For each number $8/4 = 2$

9) If each entry in a data is divided by 10 Find the change in their arithmetic mean ?

$$\text{Arithmetic mean} = \frac{10+10}{2} = 10 \quad (\text{here 2 is to be replaced by 10 to get new mean})$$

$$\text{Each it is divided by 10} = \frac{10}{10} + \frac{10}{10} = 2$$

So it is divided by 10.

10) Time taken by 5 members of team 5 X 1000 m are 2.55,2.15,2.30,2.60 and 2.40 . Find team average in km/hr .

Total distance = 5500m

Total time = 12 min \Rightarrow 720 sec

$$\text{Speed} = \frac{\text{distance}}{\text{Time}} = \frac{5000}{720}$$

$$\Rightarrow \frac{2500}{72} \quad (\text{for converting m/sec})$$

$$= \frac{500}{72} \times \frac{18}{5} = > 25 \text{ Km/hr.}$$

11) Find the co-efficient of $n = 10$, $\bar{x} = 12$ and $\sum x^2 = 1530$

$$\sigma = \sqrt{\left(\frac{\sum x^2}{n}\right) - \left(\bar{x}\right)^2}$$

$$= \sqrt{\frac{1530}{10} - (12 \times 12)}$$

$$= \sqrt{153 - 144}$$

$$= \sqrt{9}$$

$$= 3$$

$$\text{Co-efficient of variation (c.v)} = \left(\frac{\sigma}{\bar{x}}\right) \times 100$$

$$= \frac{3}{12} \times 100$$

$$= 25$$

12) Obtain mean of the following data :

X : 5 10 15 20 25

F : 3 10 25 7 5

X	F	F ₂
5	3	15
10	10	100
15	25	375
20	7	140
25	5	125
	50	755

$$\text{Mean} = \frac{755}{50} = 15.1$$

13) Average mark of 10 children is 80 then their total mark is

$$\Rightarrow x/10 = 80$$

$$x = 800$$

14) For distribution mean = 65, median = 70 , then mode and co- efficient of variation is ?

$$\Rightarrow \text{Co efficient of variation} = \frac{SD}{\text{mean}} \times 100$$

Mode = 3 median – 2 mean.

$$= 3 \times 70 - 2 \times 65$$

$$= 210 - 130$$

$$= 80$$

Set 2

1. The number of values less than the median of 97 values is

Median = middle number

1,2,3,4, 97

$$\frac{\text{last no} - \text{First no}}{2} = \frac{97 - 1}{2} = 48$$

Ans : = > 48.

2. A set of values in ascending order are 20, 22, x, 28, 30, 32. If median of these values is 26 then the value of x is

20, 22, x, 28, 30, 32

Median is 26

There will be two middle numbers

(ie) x & 28

To find X :

$$\text{Median} = \frac{X_1 + X_2}{2}$$

$$\text{Median} = \frac{X_1 + X_2}{2}$$

$$\frac{X + 28}{2} = 26$$

$$\Rightarrow X + 28 = 52$$

$$X = 52 - 28$$

$$\text{Ans : } X = 24$$

3. Thirteen eggs collected in a farm have the following weights in grams: 32, 40, 28, 33, 39, 46, 41, 33, 40, 41, 31, 32, 33. The mode of the above data is

Mode = Most repeated value

The value 33 is the repeated value and

It is repeated for 3 times

$$\text{Ans : } 33$$

4. If the mean of x, x+2, x+4, x+6, x+8 is 20 then x is

Mean of X, X + 2, X + 4, X + 6, X + 8 is 20 .

Total number of terms = 5

If mean is 20 for 5 items

$$\text{Then } 5 \times 20 = 100$$

The values other than X (ie) 2 + 4 + 6 + 8

Will give 20

So subtract it from 100

$$(100 - 20) = 80$$

There are 5 terms so $= 80/5 = 16$

Ans = > 16

5. The Mean of 15 numbers is 213. If each number is divided by 3, the new mean will be

For new numbers = 213

If divided by 3 $= 213 / 3$

Ans = > 71

6. The Arithmetic mean of 10 numbers is -7. If 5 is added to every number then the new arithmetic mean is

Arithmetic mean of 10 number is -7 , 5 is added to every number

$$-7 + 5 = -2$$

Ans = > -2

7. The Product of mean and mode for the data 1, 2, 2, 3, 3, 3, 4, 4, 4, 4 equals

$$\text{Mean} = \frac{1+2+2+3+3+3+4+4+4+4}{10}$$

$$\text{Mean} = 30/10 = 3$$

$$\text{Mean} = 3$$

Mode = Most repeated terms,

$$\text{Mode} = 4$$

$$\text{Product of mean and mode} = 3 \times 4$$

Ans : 12

8. The mean mark of 100 students was found to be 60. Later on, it was found that a score of 91 was misread as 41. Then the correct mean corresponding to the correct score is

Mark of 100 students mean = 60

-----→ so total marks for 100 students = 6000

-----→ one score was misread as 41 for 91. The difference is 50

$$6000 + \frac{50}{100} = \frac{6050}{100}$$

$$= 605$$

Alternative

$$60 + \frac{50}{100}$$

$$= 60 + 0.5$$

$$= 60.5$$

Ans : 60.5

9. The mean of 5 observations is 25, if one of the observation is excluded the mean becomes 20. The excluded number is

Mean of 5 observation is 25

$$5 \times 25 = 125$$

One observation is excluded the mean is 20

For 4 observation mean is 20

$$4 \times 20 = 80$$

Subtract mean of 4 from mean of 5

$$125 - 80$$

$$= 45$$

Ans : 45

10. The Mean of the first n natural numbers

mean of first n natural number

$$\frac{n(n+1)}{2}$$

11. If the arithmetic Mean of 7, 5, 13, x and a be 10, then the value of x is

$$\frac{7 + 5 + 13 + x + 9}{5} = 10$$

$$34 + x = 50$$

$$x = 50 - 34$$

Ans : 16

12. The mean of first five prime numbers is

The mean of first five prime number ?

First 5 prime number = 1 , 3 , 5 , 7 , 11

$$= \frac{2 + 3 + 5 + 7 + 11}{5} = \frac{28}{5} = 5.6$$

Ans : 5.6

13. The Mean weight of 40 students using the data given below is

Weights (in Kgs): 48 50 53 54

No of students : 5 20 10 5

Mean weight of 40 students

5 students weight 48 kg = 5 X 48 = 240 Kg

20 students weight 50 kg = 20 X 50 = 1000 Kg

10 students weight 53 kg = 530 kg

5 students weight 54 kg = 5 X 54 = 270 kg

$$\text{Mean} = \frac{240+1000+530+270}{40}$$

$$= 2040 / 40$$

Ans : 51

14. The arithmetic mean of a group of 100 observations was calculated as 63. It was later found that one observation was wrongly taken as 75 instead of 65. The correct mean is

Arithmetic mean of 100 observation = 63

For one observation readind was

Taken wrong instead of 65 , 75

Was taken

The difference = 75 – 65 =100

$$10 / 100 = 10$$

Subtract it from 63

Ans : 62.90

15. If l is the standard deviation of the elements α, β, γ . Then the standard deviation of the elements $\alpha+3, \beta+3, \gamma+3$ is

= > IF a constant term is added to all the number in the data, the standard deviation doesn't change. S.D. changes only when different numbers are added. So S.D. $\alpha + 3, \beta + 3, \gamma + 3$ is ' l '

16. The Mean of 5 numbers is 25. If one number is excluded and the mean is still 25, the excluded number is

One number is excluded and mean is still 25

For 5 numbers mean = $5 \times 25 = 125$

For 4 numbers mean = $4 \times 25 = 100$

The difference is $125 - 100 = 25$

Ans : 25

17. The ages of children in a scout camp are 14, 14, 15, 16, 14, 16, 15, 16, 14, 14 years. The relationship between mean, median and mode is

(A) Mean = Median = Mode

(B) Mean < Median < Mode

(C) Mean > Median > Mode

(D) Median < Mode < Mean

Answer: (C) Mean > Median > Mode

- Mean =
$$\frac{14+14+15+16+14+16+15+16+14+14}{10}$$

$$= \frac{148}{10} = 14.8$$

Mean = 14.8

- Median :

First of all we should arrange in ascending order

$14 + 14 + 14 + 14 + 14 + 15 + 15 + 16 + 16$

$$\text{Median} = x_1 + x_2 / 2 = 14 + \frac{15}{2} = \frac{29}{2} = 14.5$$

Median = 14.5

- Mode = most no. of repeated term

- 14, 14, 14, 14, 14, 15, 15, 16, 16, 16,

Mode = 14 (5 times repeated)

Mean (14.8) > median (14.5) > mode (14)

18. What is the standard deviation of the first n natural numbers?

- (A) $\sqrt{\frac{n^2-1}{12}}$ (B) $\sqrt{\frac{n^2+1}{12}}$ (C) $\sqrt{\frac{n(n+1)}{12}}$ (D) $\sqrt{\frac{n(n+1)(2n+1)}{12}}$

Answer: (A) $\sqrt{\frac{n^2-1}{12}}$

19. The standard deviation of 50, 47, 53, 48, 51, 52, 49 is

- (A) 4
(B) 2
(C) 14/3
(D) $\sqrt{\frac{14}{3}}$

$$\text{Mean} = \frac{50+47+53+48+51+52+49}{7} = \frac{350}{7}$$

Mean = 50

Difference of mean and each value given and then square the difference and then take the mean $0^2 + 3^2 + 3^2 + 2^2 + 1^2 + 2^2 + 1^2 / 6$

$$= \frac{9 + 9 + 4 + 1 + 4 + 1}{6} = \frac{28}{6} = \frac{14}{3}$$

Ans : 14/3

20. Find the range of the following data: 25, 67, 78, 43, 21, 17, 49, 54, 76, 92, 20, 45, 86, 37, 35.

- (A) 78
(B) 75
(C) 92
(D) 86

Answer: (B) 75

Range = largest value – smallest value

$$= 92 - 17$$

Ans : 75

21. The heights (in meters) of 10 trees in a grove are 15, 2, 8, 11, 3, 9, 9, 6, 10, 6, 12. The range for this data is

- (A) 10

(B) 15

(C) 6

(D) 13

Answer: (D) 13

Range = largest value – smallest value

$$= 15 - 2$$

Range = 13

22. The range of the first 30 Natural numbers is

(A) 28

(B) 29

(C) 30

(D) 31

Answer: (B) 29

Range of first 30 natural numbers the first 30 natural numbers are 1 , 2 , 3 , 4 , 5 , . . . 29, 30

Range = largest value - smallest value

$$= 30 - 1 = 29$$

Range = 29

23. Find the range of first 10 prime numbers

(A) 28

(B) 26

(C) 29

(D) 27

Answer: (D) 27

Prime number = 2 , 3 , 5 , 7 , 11 , 13 , 17 , 19 , 23 , 29

Range = largest value – smallest value

$$= 29 - 2 = 27$$

Ans : 27

24. Probability of sure and impossible events

(A) $(\frac{1}{2}, \frac{1}{2})$

(B) (0,1)

(C) (1,0)

(D) (1,1)

Answer: (C) (1,0)

Probability for impossible even is

Always 0

A sure event probability is 1

= (1 , 0)

25. For a set of n values, $\sum x - x$ is equal to

(A) nx

(B) $(n-2)x$

(C) $(n-1)x$

(D) 0

Answer: $(n-1)x$

= ($nx - x$)

= $x (n - 1)$

26. For any n observations of data, what is the value of $(\sum x) - nx$?

(A) $n(\sum x)$

(B) $(n-2)x$

(C) $(n-1)x$

(D) 0

Answer: (D) 0

By identify $\sum x - \bar{x} = 0$ so for

Observation of data is also 0

27. Find the average of first ten positive multiples of three?

(A) 17.5

(B) 17

(C) 16.5

(D) 16

Answer: (C) 16.5

Average of first 10 multiple of 3 ?

$$= \frac{3 + 6 + 9 + 12 + 15 + 18 + 21 + 24 + 27 + 30}{10}$$

$$= \frac{165}{10} = 16.5$$

Ans : 16.5

28. The average marks of 6 boys in a group is 47. The marks of 5 of them are 52, 47, 52, 44 and 41. The marks of the sixth boy is

(A) 41

(B) 44

(C) 47

(D) 46

Answer: (D) 46

Marks of 5 boys = 52 , 47 , 52 , 44 , 41

Find 6th boy mark ?

Average marks of 6 boys = $6 \times 47 = 282$ ----- > 1

Marks of 5 boys = $52 + 47 + 52 + 44 + 41 = 236$ ----- > 2

Subtract equation 1 & 2

$$282 - 236 = 46$$

6th boy mark = 46

29. The average of 4 values is 20 and when a quantity is added to each value the average is

22. Find the quantity.

(A) 1

(B) 2

(C) 3

(D) 4

Answer: (B) 2

Average of 4 values = 20

When a quantity added, average becomes 22

Average of 4 values = $4 \times 20 = 80$

Again a quantity is added to each of the 4 values

So $= 4 \times 22 = 88$

So to each value a quantity of 2 is added

30. Average of a and b is 45 and the average of b and c is 35 then $a - c = ?$

(A) 20

(B) 30

(C) 25

(D) 15

Answer: (A) 20

Average of B & c = 35

To find $A - C$

Average of A & B = 45 $= 45 \times 2 = 90$

Average of B & C = 35 $= 35 \times 2 = 70$

$$A + B + 0 = 90$$

$$\underline{0 + B + C = 70}$$

$$A - C = 20$$

Ans : $A - C = 20$

31. Temperatures are recorded every 1 hour for eleven hours from 6.00 am onwards in a town. The averages of the first six readings is 30 degree Celsius, the last six readings is 20 degree Celsius and the overall average is 26 degree Celsius. The 6th reading is

(A) 25 degree

(B) 15 degree

(C) 14 degree

(D) 26 degree

Answer: (C) 14 degree.

Temperature recorded for 1 hour for 11 hour

For 1st six reading = $30 \times 6 = 180$

For last six reading = $20 \times 6 = 120$

Totally 1st + last reading = 300 ----- > 1

Overall average = 26

For 11 hours = $26 \times 11 = 286$ ----- > 2

Subtract equation 1 & 2

$$300 - 286 = 14$$

The sixth reading is 14 which is sixth because of 12 readings in which sixth reading is added to both the first and last reading.

32. There are 3 persons namely, A B and C in family. The average age of A and B is 20, the average age of B and C is 19, and the average age of C and A is 21. The ages of A, B and C are

(A) 22, 18, 20

(B) 24, 20, 16

(C) 18, 20, 24

(D) 16, 20, 24

Answer: (A) 22, 18, 20

Average age of A & C = 20

Average age of B & C = 19

Average age of C & A = 21

$$\frac{A+B}{2} = 20$$

$$A + B = 40$$

$$\frac{b+c}{2} = 19$$

$$b + c = 38$$

$$\frac{c+a}{2} = 21$$

$$c + a = 42$$

$$A + b + b + c + a = 40 + 38 + 42$$

$$2a + 2b + 2c = 120$$

$$2(a + b + c) = 120$$

$$A + b + c = 60$$

$$\text{If } a + b = 40$$

$$C = 20$$

$$\text{If } c = 20, B = 18, \text{ AND } a = 22$$

$$\text{Ans : } A = 22, B = 18, C = 20$$

33. The average of 11 numbers is 10.8. If the average of the first six numbers is 10.4 and that of the last six numbers is 11.5, then the middle (6th) number is

(A) 10.3

(B) 12.6

(C) 13.5

(D) 15.5

Answer: (B) 12.6

$$\Rightarrow \text{Total } x / 11 = 10.8 \Rightarrow 118.8$$

$$\text{First 6} \rightarrow x / 6 = 10.4$$

$$X = 62.4$$

$$\text{Last 6} \rightarrow x / 6 = 11.5$$

$$X = 69$$

$$\text{First 6 + last 6} = 69 + 62.4$$

$$= 131.4$$

$$(\text{first 6 + last 6}) - (\text{Average of 11}) = 131.4 - 118.8$$

$$= 12.6$$

34. The average salary of all workers in the factory Rs. 60. The average salary of 12 officers is Rs. 400. The average salary of rest is Rs. 56. Find the total no of workers in the factory.

$$\text{Total no} = x$$

$$\text{Officers} = 12$$

$$\text{Rest} = x - 12$$

$$\text{So, } 60x = 12 \times 400 + (x - 12) \times 56$$

$$60x = 4800 + 56x - 672$$

$$X = 1032$$

35. The average weight of 10 persons is increased by 1.5 Kg when one of them with weight 50 Kg is replaced by a new man. The weight of the new man (in Kgs) is

- (A) 60
- (B) 50
- (C) 55
- (D) 65

Answer: (D) 65.

Avg.weight of 10 persons increased by 1.5 kg

Weight replaced 50kg

For 10 person – 15kg should be increased

$$\text{So } 50 + 15 = 65$$

New person weight = 65 kg

36. The average of five numbers is 20. If we eliminate one number from it, the average will be reduced by 5. What is the number eliminated?

- (A) 5
- (B) 40
- (C) 20
- (D) 15

Answer: (B) 40

For 5 number = 20

$$5 \times 20 = 100$$

For 4 numbers average decreased

$$\text{By } 5 = 20 - 5 = > 15$$

$$4 \times 15 = 60$$

So number eliminated = $100 - 60$

Ans : 40