10TH CBSE MATHS FREE TERM 1 TEST 20 (Statistics)
10th Standard CBSE
Maths

Exam Time : 01:30:00 Hrs

Total Marks : 50

5

1) An agency has decided to install customised playground equipments at various colony parks. For that they decided to study the age-group of children playing in a park of the particular colony. The classification of children according to their ages, playing in a park is shown in the following table

Age group of children (in years)	6-8	8-10	10-12	12-14	14-16
Number of children	43	58	70	42	27

Based on the above information, answer the following questions.

(i) The maximum number of children are of the age-group
(a) 12-14 (b) 10-12 (c) 14-16 (d) 8-10
(ii) The lower limit of the modal class is
(a) 10   (b) 12   (c) 14   (d) 8
(iii) Frequency of the class succeeding the modal class is
(a) 58   (b) 70   (c) 42   (d) 27
(iv) The mode of the ages of children playing in the park is
**(a) 9   (b) 8   (c) 11.5   (d) 10.6
years   years   years   years**
(v) If mean and mode of the ages of children playing in the park are same, then median will be equal to
**(a) Mean   (b) Mode
(c) Both (a) and   (d) Neither (a) nor
(b)   (b)**

2) As the demand for the products grew, a manufacturing company decided to hire more employees. For which they want to know the mean time required to complete the work for a worker. The following table shows the frequency distribution of the time required for each worker to complete a work.

Time (in hours)	15-19	20-24	25-29	30-34	35-39
Number of workers	10	15	12	8	5

Based on the above information, answer the following questions.

(i) The class mark of the class 25-29 is
(a) 17   (b) 22   (c) 27   (d) 32

(ii) If x_i's denotes the class marks and f_i's denotes the corresponding frequencies for the given data, then the value of $\sum x_i f_i$ equals to
(a) 1200   (b) 1205   (c) 1260   (d) 1265

(iii) The mean time required to complete the work for a worker is
(a) 22 hrs   (b) 23 hrs   (c) 24 hrs   (d) none of these

(iv) If a worker works for 8 hrs in a day, then approximate time required to complete the work for a worker is
(a) 3 days   (b) 4 days   (c) 5 days   (d) 6 days

(v) The measure of central tendency is
(a) Mean   (b) Median   (c) Mode   (d) All of these

3) On a particular day, National Highway Authority of India (NHAI) checked the toll tax collection of a particular toll plaza in Rajasthan.

The following table shows the toll tax paid by drivers and the number of vehicles on that particular day.

Toll tax (in Rs)	30-40	40-50	50-60	60-70	70-80
Number of vehicles	80	110	120	70	40

Based on the above information, answer the following questions.

(i) If A is taken as assumed mean, then the possible value of A is

(a) 32   (b) 42   (c) 85   (d) 55

(ii) If x_i's denotes the class marks and f_i's denotes the deviation of assumed mean (A) from x_i's, then the minimum value of $|d_i|$ is

(a) -200 (b) -100 (c) 0 (d) 100

(iii) The mean of toll tax received. by NHAI by assumed mean method is

(a) Rs 52   (b) Rs 52.14   (c) Rs 52.50   (d) Rs 53.50

(iv) The mean of toll tax received by NHAI by direct method is

(a) equal to the mean of toll tax received by NHAI by assumed mean method

(b) greater than the mean of toll tax received by NHAI by assumed mean method

(c) less than the mean of toll tax received by NHAI by assumed mean method

(d) none of these

(v) The average toll tax received by NHAI in a day, from that particular toll plaza, is

(a) Rs 21000   (b) Rs 21900   (c) Rs 30000   (d) none of these

4) Transport department of a city wants to buy some Electric buses for the city. For which they wants to analyse the distance travelled by existing public transport buses in a day.

The following data shows the distance travelled by 60 existing public transport buses in a day.

Daily distance travelled (in km)	200-209	210-219	220-229	230-239	240-249
Number of buses	4	14	26	10	6

Based on the above information, answer the following questions.

(i) The upper limit of a class and lower limit of its succeeding class is differ by

(a) 9 (b) 1 (c) 10 (d) none of these

(ii) The median class is

(a) 229.5-239.5 (b) 230-239 (c) 220-229 (d) 219.5-229.5

(iii) The cumulative frequency of the class preceding the median class is

(a) 14 (b) 18 (c) 26 (d) 10

(iv) The median of the distance travelled is

(a) 222 km (b) 225 km (c) 223 km (d) none of these

(v) If the mode of the distance travelled is 223.78 km, then mean of the distance travelled by the bus is

(a) 225 km (b) 220 km (c) 230.29 km (d) 224.29 km

5) An electric scooter manufacturing company wants to declare the mileage of their electric scooters. For this, they recorded the mileage (km/ charge) of 50 scooters of the same model. Details of which are given in the following table.

Mileage (km/charge)	100-120	120-140	140-160	160-180
Number of scooters	7	12	18	13

Based on the above information, answer the following questions.

(i) The average mileage is
(a) 140 krn/charge   (b) 150 krn/ charge   (c) 130 krn/charge   (d) 144.8 krn/charge

(ii) The modal value of the given data is
(a) 150   (b) 150.91   (c) 145.6   (d) 140.9

(ill) The median value of the given data is
(a) 140   (b) 146.67   (c) 130   (d) 136.6

(iv) Assumed mean method is useful in determining the
(a) Mean   (b) Median   (c) Mode   (d) All of these

(v) The manufacturer can claim that the mileage for his scooter is
(a) 144 krn/charge   (b) 155 krn/charge   (c) 165 krn/charge   (d) 175krn/charge

6) Household income in India was drastically impacted due to the COVID-19 loekdown. Most of the companies decided to bring down the salaries of the employees by 50%.

The following table shows the salaries (in percent) received by 25 employees during loekdown.

Salaries received (in percent)	50-60	60-70	70-80	80-90
Number of employees	9	6	8	2
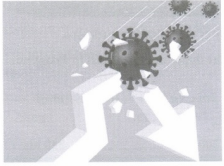
Based on the above information, answer the following questions.

(i) Total number of persons whose salary is reduced by more than 30%, is

(a) 10   (b) 20   (c) 25   (d) 15

(ii) Total number of persons whose salary is reduced by atmost 40%, is

(a) 15   (b) 10   (c) 16   (d) 8

(iii) The modal class is

(a) 50-60   (b) 60-70   (c) 70-80   (d) 80-90

(iv) The median class of the given data is

(a) 50-60   (b) 60-70   (c) 70-80   (d) 80-90

(v) The empirical relationship between mean, median and mode is

(a) 3 Median = Mode + 2 Mean   (b) 3 Median = Mode - 2 Mean   (c) Median = 3 Mode - 2 Mean   (d) Median = 3 Mode + 2 Mean

7) A group of students went to another city to collect the data of monthly consumptions (in units) to complete their Statistics project. They prepare the following frequency distribution table from the collected data gives the monthly consumers of a locality.

| Monthly consumption (in units)	No.of consumers
65 - 85	4
85 - 105	5
105 - 125	13
125 - 145	20
145 - 165	14
165 - 185	8
185 - 205	4

(i) What is the lower limit of median class?
(a) 125 (b) 145 (c) 165 (d) 185
(ii) What is the lower limit of modal class?
(a) 125 (b) 145 (c) 165 (d) 185
(iii) What is the mean of upper limits of median and modal class?
(a) 125 (b) 145 (c) 165 (d) 185
(iv) What is the width of the class?
(a) 10   (b) 15   (c) 20   (d) 25
(v) The median is :
(a) 137 (b) 135 (c) 125 (d) 135.7

8) 100m RACE

A stopwatch was used to find the time that it took a group of students to run 100 m.

Time in (sec)	0-20	20-40	40-60	60-80	80-100
No.of students	8	10	13	6	3
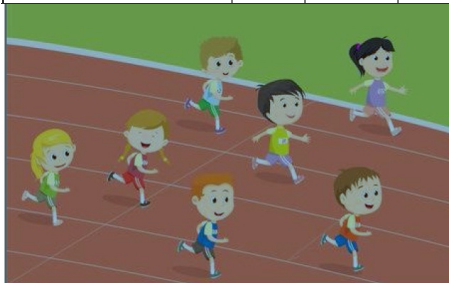
(i) Estimate the mean time taken by a student to finish the race.
(a) 54   (b) 63   (c) 43   (d) 50

(ii) What will be the upper limit of the modal class ?
(a) 20   (b) 40   (c) 60   (d) 80

(iii) The construction of cumulative frequency table is useful in determining the

(a) Mean   (b) Median (c) Mode (d) All of the above

(iv) The sum of lower limits of median class and modal class is
(a) 60   (b) 100   (c) 80   (d) 140

(v) How many students finished the race within 1 minute?
(a) 18   (b) 37   (c) 31   (d) 8

9) Mr. Kumar is a Maths teacher who is working in KV Gachibowli Hyderabad. In his class X, total 80 students are there. He decided to teach them as per their capabilities. So, he conducted one revision test on the basis of class IX result. The maximum marks were 50. There were 12 students who scored less than 10 marks. Shruthi who got 3 marks was handed over a red card as an intimation to work hard for one month and show improvement, as she scored the least in the class. Anish was presented a badge of honour for scoring the highest in the class. He scored 48 marks. Best performer badge given to Anish. Mr. Kumar prepared a frequency distribution table for the data of the marks obtained by the students in the revision test as follows:
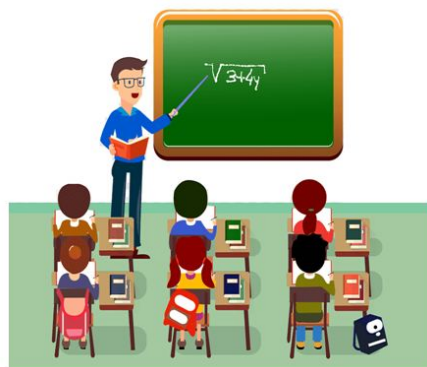
Marks	Number of students
0 – 10	12
10 – 20	16
20 – 30	21
30 – 40	13
40 – 50	18

(a) Find the lower limit of modal class of the frequency distribution obtained by Mr. Kumar
(i) 10   (ii) 20   (iii) 30   (iv) 40
(b) Find the median class of the distribution
(i) 10–20   (ii) 20–30   (iii) 30–40   (iv) 40–50
(c) Find the mean marks obtained by the students.
(i) 23.25   (ii) 24.25   (iii) 26.125   (iv) 31.375
(d) Find the range of the marks obtained by the student
(i) 31   (ii) 37.25   (iii) 41.25   (iv) 45
(e) Mr. Kumar formed Section A for those who scored above 40; Section B for those who scored between 30 and 40; Section C for those who scored between 20 and 30 and Section D for those who scored below 20. How many students were there in Section D
(i) 12   (ii) 16   (iii) 28   (iv) 49

10) Shweta went to a beach with her uncle. From a point A where Shweta was standing, a ship and light house come in a straight line as shown in the figure.

A ←— 20 m —→
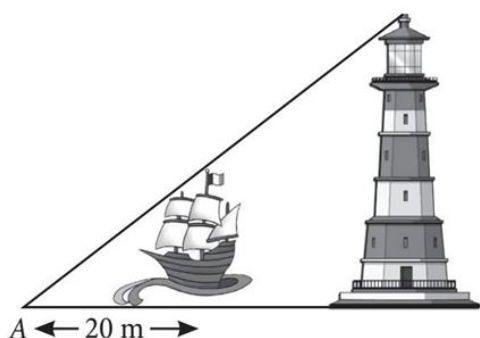
(i) Which similarity criteria can be seen in this case, if ship and lighthouse are considered as straight lines?
(a) AA   **(b) SAS**   **(c) SSS**   **(d) ASA**
(ii) The distance between Shweta and the ship is twice as much as the height of the ship. What is the height of the ship?
(a) 40m   **(b) 10 m**   **(c) 15 m**   **(d) 25m**
(iii) If the distance of Shweta from the lighthouse is twelve times the height of the ship, then the ratio of the heights of ship and lighthouse is
(a) 3 : 1   **(b) 1 : 4**   **(c) 1 : 6**   **(d) 2 : 3**

(iv) What is the ratio of the distance between Shweta and top of ship to the dista nce between the tops of ship and lighthouse?
(a) 1 : 5   **(b) 1 : 6**   **(c) 2 : 5**   **(d) Can't be determined**

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1)
 (i) (b): Since, the highest frequency is 70, therefore the maximum number of children are of the age-group 10-12.
(ii) (a): Since, the modal class is 10-12
∴ Lower limit of modal class = 10
(iii) (c) : Here,$f_0 = 58$,$f_1 = 70$ and $f_2 = 42$
Thus, the frequency of the class succeeding the modal class is 42.
(iv) (d): $\text{Mode} = l + \left[\dfrac{f_1 - f_0}{2f_1 - f_0 - f_2}\right] \times h$

$= 10 + \left[\dfrac{70-58}{140-58-42}\right] \times 2$

$= 10 + \dfrac{12}{40} \times 2 = 10 + \dfrac{24}{40} = 10.6 \text{ years}$

(v) (c): Given that, Mean = Mode
∴ By Empirical relation, we have
Mode = 3 Median - 2 Mean
⟹ Mode = 3 Median - 2 Mode
⟹ 3 Mode = 3 Median
⟹ Median = Mode = Mean

2)

 (i) (c): Class mark of class 25 - 29

$= \frac{25+29}{2} = \frac{54}{2} = 27$

(ii) (d): Let us consider the following table:

Class	Class mark (x_i)	Frequency (fi)	$= x_i\, f_i$
15-19	17	10	170
20-24	22	15	330
25-29	27	12	324
30-34	32	8	256
34-39	37	5	185
Total		$\Sigma f_i = 50$	$\sum x_i f_i = 1265$

$\therefore \quad \text{Mean}(\bar{x}) = \frac{\sum x_i f_i}{\sum f_i} = \frac{1265}{50} = 25.3$ Thus, the mean time to complete

the work for a worker

= 25.3 hrs = 3 days

(iii) (d)

(iv) (a)

(v) (d): We know the measure of central tendency are mean, median and mode.

3)

 Let us consider the following table:

Class	Class marks (x_i)	$d_i = x_i - A$	Frequency (f_i)	$f_i\, d_i$
30-40	35	-20	80	-1600
40-50	34	-10	110	-1100
50-60	55 = A	0	120	0
60-70	65	10	70	700
70-80	75	20	40	800
Total			$\Sigma f_i = 420$	$\sum f_i d_i = 1200$

 (i) (d): Clearly, the possible values of assumed mean (A) are 35, 45, 55, 65, 75.

(ii) (c): The values of $|d_i|$ are 0, 10, 20

Thus, the minimum value of $|d_i|$ is 0.

(iii) (b): Required Mean $= A + \frac{\sum f_i d_i}{\sum f_i} = 55 - \frac{1200}{420}$

= Rs 52.14.

(iv) (a): Mean by direct and assumed mean method are always equal.

(v) (d): Average toll tax received by a vehicle = Rs 52.14 Total number of vehicles = 420

$\therefore$ Average toll tax received in a day = Rs (52.14 x 420) = Rs 21898.80

4)

 (i) (b): The upper limit of a class and the lower class of its succeeding class differ by 1.

(ii) (d) : Here, class intervals are in inclusive form. So, we first convert them in exclusive form. The frequency distribution table in exclusive form is as follows:

Class interval	Frequency (f_i)	Cumulative frequency (c.f)
199.5-209.5	4	4
209.5-219.5	14	18
219.5-229.5	26	44
229.5-239.5	10	54
239.5-249.5	6	60

Here, Σf_i i.e., $N = 60$

$\Rightarrow \frac{N}{2} = 30$ Now, the class interval whose cumulative frequency is just greater than 30 is 219.5 - 229.5.

$\therefore$ Median class is 219.5 - 229.5.

(iii) (b): Clearly, the cumulative frequency of the class preceding the median class is 18

(iv) (d) : Median $= l + \left[\frac{\frac{N}{2} - c.f.}{f} \right] \times h$

$= 219.5 + \left(\frac{30-18}{26} \right) \times 10$

$= 219.5 + \frac{12 \times 10}{26} = 219.5 + 4.62 = 224.12$

$\therefore$ Median of the distance travelled is 224.12 km

(v) (d): We know, Mode = 3 Median - 2 Mean

$\therefore$ Mean $= \frac{1}{2}(3 \text{ Median } - \text{ Mode })$

$= \frac{1}{2}(672.36 - 223.78) = 224.29$ km

5)

Given frequency distribution table can be drawn as:

Class interval	Class mark	Frequency (f_i)	$x_i f_i$	c.f
100-120	110	7	770	7
120-140	130	12	1560	19
140-160	150	18	2700	37
160-180	170	13	2210	50
Total		50	7240	

(i) (d): Clearly, average mileage

$= \frac{7240}{50} = 144.8 \text{ km/ charge}$

(ii) (b) : Since, highest frequency is IS, therefore, modal class is 140-160.

Here, l = 140, f_1 = 18, f_0 = 12, f_2 = 13, h = 20

$\therefore$ Mode $= 140 + \frac{18-12}{36-12-13} \times 20 = 140 + \frac{6}{11} \times 20$

$= 140 + \frac{120}{11} = 140 + 10.91 = 150.91$

(iii) (b) : Here $\frac{N}{2} = \frac{50}{2} = 25$ and the corresponding class whose cumulative frequency is just greater than 25 is 140-160.

Here, l = 140, c.f = 19, h = 20 and f = 18

$\therefore$ Median $= l + \left(\frac{\frac{N}{2} - c.f.}{f} \right) \times h$

$= 140 + \frac{25-19}{18} \times 20 = 140 + \frac{60}{9} = 146.67$

(iv) (a) : Assumed mean method is useful in determining the mean.

(v) (a): Since, Mean = 144.S, Mode = 150.91 and Median = 146.67 and minimum of which is 144 approx, therefore manufacturer can claim the mileage for his scooter 144 km/charge.

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6)

(i) (d): Required number of persons = 9 + 6 = 15

(ii) (c): Required number of persons = 6 + 8 + 2 = 16

(iii) (a) : 50-60 is the modal class as the maximum frequency is 9.

(iv) (b) : The cumulative frequency distribution table for the given data can be drawn as :

Salaries received (in percent)	Number of employees (f_i)	Cumulative frequency c.f
50-60	9	9
60-70	6	9 + 6 = 15
70-80	8	15 + 8 = 23
80-90	2	23 + 2 = 25
Total	$\sum f_i = 25$	

Here, $\frac{N}{2} = \frac{25}{2} = 12.5$

The cumulative frequency just greater than 12.5 lies in the interval 60-70.

Hence, the median class is 60-70.

(v) (a): We know, Mode = 3 Median - 2 Mean

$\therefore$ 3 Median = Mode + 2 Mean.

7) **(i) (a):**

Monthly consumption (in units)	No.of consumers (f_i)	cumulative frequency
65 - 85	4	4
85 - 105	5	9
105 - 125	13	22
125 - 145	20	42
145 - 165	14	56
165 - 185	8	64
185 - 205	4	68
Total	$\Sigma f_i = n = 68$	

Here, $\Sigma f_i = n = 68$ then $\frac{n}{2} = \frac{68}{2} = 34$ which lies in interval 125 - 145

= 125

(ii) (a): 125

(iii) (b): 145

(iv) (c): 20

(v) (a): Median class = 125 - 145

So, l = 125; n = 68; f = 20; cf = 22 and h = 20

Using formula, Median $= l + \left[\dfrac{\frac{n}{2} - cf}{f} \right] \times h$

$= 125 + \left\{ \dfrac{\frac{68}{2} - 22}{20} \right\} \times 20$

$= 125 + \dfrac{34 - 22}{20} \times 20 = 125 + 12$

= 137

8) **(i) (c):**

Time in (sec)	x	f	cf	fx
0-20	10	8	8	80
20-40	30	10	18	300
40-60	50	13	31	650
60-80	70	6	37	420
80-100	90	3	40	270
Total		**40**		**1720**

$\text{Mean} = \dfrac{1720}{40}$

= 43

(ii) (c): 60

(iii) (b): Median

(iv) (c): Median class 40 - 60, Modal class = 40 - 60

Sum of lower limits of median class and modal class = 40 + 40 = 80

(v) (c): Number of students are = 8 + 10 + 13

= 31

9)

(a) (ii) 20

(b) (ii)

$N = 80 \Rightarrow \frac{N}{2} = 40$

The class having cumlative frequency just above 40 is 20-30
(having c.f = 49). So,20-30 is the median class.

(c) (iii)

$$\text{Mean Marks} = \frac{\sum f_i x_i}{\sum f_i} = \frac{2090}{80} = 26.125 .$$

(d) (iv)

Range of marks obtained by the students
Highest marks scored - Lowest marks score

(e) (iii)

Number of students in section D.
= Number of students who scored less than 20 marks
= Cumulative frequency of the class 10-20=28

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10)

(i) (a)

In $\triangle ABC$ and $\triangle ADE$,

$\angle A = \angle A$ (common)

$\angle B = \angle D$ (coorresponding angles)

$\therefore \quad \Delta ABC \sim \Delta ADE$ (By AA similarity criteria)

(ii) (b)

We have, $AB = 2BC \Rightarrow BC = \frac{20}{2} = 10$ m

So,height of ship = 10m

(iii) (c)

We have, AD=12 BC

$\Rightarrow AD = 12 \times 10 = 120$ m

$\therefore \triangle ABC \sim \triangle ADE$

$\therefore \frac{AB}{AD} = \frac{BC}{DE}$

$\Rightarrow \frac{BC}{DE} = \frac{20}{120} = \frac{1}{6}$

So,ratio of height of ship and light house is 1:6

(iv) (a)

Since,$\triangle ABC \sim \triangle ADE$

$\Rightarrow \frac{AB}{AD} = \frac{AC}{AE}$

$\Rightarrow \frac{AE}{AC} - 1 = 6 - 1 \Rightarrow \frac{AE-AC}{AC} = 5 \Rightarrow \frac{EC}{AC} = 5$

$\Rightarrow \frac{AC}{EC} = \frac{1}{5} \quad \therefore$ Required ratio = 1 :5

(v) (b)

Height of lighthouse = DE

Now, $\frac{BC}{DE} = \frac{1}{6}$

$\Rightarrow DE = 6BC$

= 6 X 10 = 60m