EXERCISE 13.1

Choose the correct answer from the given four options:

1. In the formula

$$\bar{x} = a + \frac{f_i d_i}{f_i},$$

For finding the mean of grouped data *di's* are deviations from *a* of

(A) Lower limits of the classes

(B) Upper limits of the classes

(C) Mid points of the classes

(D) Frequencies of the class marks

Solution:

(C) Mid points of the classes

Explanation:

We know,

$d_i = x_i - a$

Where,

x_i are data and 'a' is the assumed mean

So, d_i are the deviations from of mid - points of the classes.

Hence, the option (C) is correct

2. While computing mean of grouped data, we assume that the frequencies are

(A) Evenly distributed over all the classes

(B) Centred at the class marks of the classes

(C) Centred at the upper limits of the classes

(D) Centred at the lower limits of the classes

Solution:

(B) Centered at the class marks of the classes

Explanation:

In computing the mean of grouped data, the frequencies are centered at the class marks of the classes.

Hence, the option (B) is correct

3. If *xi*'s are the mid points of the class intervals of grouped data, *fi*'s are the corresponding frequencies and *x* is the mean, then $(f_i x_i - \bar{x})$ is equal to

(A) 0 **(B) –1** **(C) 1** **(D) 2**

Solution:

(A) 0

Explanation:

Mean (x) = Sum of all the observations/ Number of observations

$x = (f_1x_1 + f_2x_2 + \ldots.. + f_nx_n) / f_1 + f_2 + \ldots. + f_n$

$x = \Sigma fixi / \Sigma fi$, $\Sigma fi = n$

$x = \Sigma fixi / n$

$n\,x = \Sigma fixi$.....(1)

$\Sigma (fixi - x) = (f_1x_1 - x) + (f_2x_2 - x) + \ldots.. + (fnxn - x)$
$\Sigma (fixi - x) = (f_1x_1 + f_2x_2 + \ldots.. + fnxn) - (x + x + \ldots.n \text{ times})$
$\Sigma (fixi - x) = \Sigma fixi - nx$
$\Sigma(fixi - x) = nx - nx$ (From eq1)
$\Sigma(fixi - x) = 0$
Hence, option (A) is correct

4. In the formula $x = a + h(f_iu_i/f_i)$, for finding the mean of grouped frequency distribution, u_i =
(A) $(x_i+a)/h$
(B) $h\ (xi - a)$
(C) $(x_i - a)/h$
(D) $(a - x_i)/h$

Solution:
(C) $(x_i - a)/h$
Explanation:
According to the question,
$x = a + h(f_iu_i/f_i)$,
Above formula is a step deviation formula.
In the above formula,
x_i is data values,
a is assumed mean,
h is class size,
When class size is same we simplify the calculations of the mean by computing the coded mean of u_1, u_2, u_3 .....,
Where $u_i = (x_i - a)/h$
Hence, option (C) is correct

5. The abscissa of the point of intersection of the less than type and of the more than type cumulative frequency curves of a grouped data gives its
(A) mean **(B) median**
(C) mode **(D) all the three above**

Solution:
(B) Median
Explanation:
Since, the intersection point of less than ogive and more than ogive gives the median on the abscissa, the abscissa of the point of intersection of the less than type and of the more than type cumulative frequency curves of a grouped data gives its
Hence, option (B) is correct

6. For the following distribution :

Class	0-05	5-10	10-15	15-20	20-25
Frequency	10	15	12	20	9

the sum of lower limits of the median class and modal class is
(A) 15 (B) 25 (C) 30 (D) 35

Solution:
(B) 25

Explanation:

Class	Frequency	Cumulative Frequency
0-5	10	10
5-10	15	25
10-15	12	37
15-20	20	57
20-25	9	66

From the table, N/2 = 66/2 = 33, which lies in the interval 10 - 15.
Hence, lower limit of the median class is 10.
The highest frequency is 20, which lies in between the interval 15 - 20.
Hence, lower limit of modal class is 15.
Therefore, required sum is 10 + 15 = 25.
Hence, option (B) is correct

7. Consider the following frequency distribution:

Class	**0-05**	**6-11**	**12-17**	**18-23**	**24-29**
Frequency	**13**	**10**	**15**	**8**	**11**

The upper limit of the median class is
(A) 17 (B) 17.5 (C) 18 (D) 18.5

Solution:

(B) 17.5

Explanation:

According to the question,
Classes are not continuous, hence, we make the data continuous by subtracting 0.5 from lower limit and adding 0.5 to upper limit of each class.

Class	Frequency	Cumulative Frequency
0.5-5.5	13	13
6.5-11.5	10	23
11.5-17.5	15	38
17.5-23.5	8	46
23.5-29.5	11	57

According to the question,
N/2 = 57/2 = 28.5
28.5 lies in between the interval 11.5 - 17.5.
Therefore, the upper limit is 17.5.
Hence, option (B) is correct

8. For the following distribution:

Marks	**Number of students**
Below 10	**3**
Below 20	**12**
Below 30	**27**
Below 40	**57**
Below 50	**75**
Below 60	**80**

The modal class is
(A) 10-20 (B) 20-30 (C) 30-40 (D) 50-60

Solution:

(C) 30-40

Explanation:

Marks	Number of students	Cumulative Frequency
Below 10	3=3	3
10-20	(12 – 3) = 9	12
20-30	(27 – 12) = 15	27
30-40	(57 – 27) = 30	57
40-50	(75 – 57) = 18	75
50-60	(80 – 75) = 5	80

Here, we see that the highest frequency is 30, which lies in the interval 30 - 40.
Hence, option (C) is correct

9. Consider the data :

Class	**65-85**	**85-105**	**105-125**	**125-145**	**145-165**	**165-185**	**185-205**
Frequency	**4**	**5**	**13**	**20**	**14**	**7**	**4**

The difference of the upper limit of the median class and the lower limit of the modal class is
(A) 0 (B) 19 (C) 20 (D) 38

Solution:

(C) 20

Explanation:

Class	Frequency	Cumulative Frequency
65-85	4	4
85-105	5	9
105-125	13	22
125-145	20	42
145-165	14	56
165-185	7	63
185-205	4	67

Here, N/2 = 67/2 = 33.5 which lies in the interval 125 – 145.
Hence, upper limit of median class is 145.
Here, we see that the highest frequency is 20 which lies in 125 - 145.
Hence, the lower limit of modal class is 125.
∴ Required difference = Upper limit of median class – Lower limit of modal class
= 145 – 125 = 20

Hence, option (C) is correct

10. The times, in seconds, taken by 150 athletes to run a 110 m hurdle race are tabulated below

Class	**13.8-14**	**14-14.2**	**14.2-14.4**	**14.4-14.6**	**14.6-14.8**	**14.8-15**
Frequency	**2**	**4**	**5**	**71**	**48**	**20**

The number of athletes who completed the race in less than 14.6 seconds is :
(A) 11 (B) 71 (C) 82 (D) 130

Solution:

(C) 82

Explanation:

The number of athletes who completed the race in less than 14.6 second= 2 + 4 + 5 + 71 = 82

Hence, option (C) is correct

11. Consider the following distribution :

Marks obtained	Number of students
More than or equal to 0	63
More than or equal to 10	58
More than or equal to 20	55
More than or equal to 30	51
More than or equal to 40	48
More than or equal to 50	42

The frequency of the class 30-40 is

(A) 3 (B) 4 (C) 48 (D) 51

Solution:

(A) 3

Explanation:

Marks Obtained	Number of students	Cumulative Frequency
0-10	(63 – 58) = 5	5
10-20	(58 – 55) = 3	3
20-30	(55 – 51) = 4	4
30-40	(51 – 48) = 3	3
40-50	(48 – 42) = 6	6
50<	42 = 42	42

Hence, frequency in the class interval 30 - 40 is 3.

Hence, option (A) is correct

12. If an event cannot occur, then its probability is

(A) 1 (B) ¾ (C) ½ (D) 0

Solution:

(D) 0

Explanation:

The event which cannot occur is said to be impossible event.

The probability of impossible event = zero.

Hence, option (D) is correct

13. Which of the following cannot be the probability of an event?

(A)1/3 (B) 0.1 (C) 3% (D)17/16

Solution:

(D)17/16

Explanation:

Probability of an event always lies between 0 and 1.

Probability of any event cannot be more than 1 or negative as (17/16) > 1

Hence, option (D) is correct