**MEAN (M)**

Definition: Mean (M) is also called the average and is the most commonly used measure of central tendency. Mean is used to represent the entire distribution of scores and the mean is usually found near the centre of the data.

**Uses:**

1. Mean is the most reliable measure of central tendency
2. Mean is more precise and can be easily calculated.
3. Mean is also called the centre of gravity and is used to compute further statistics for various kinds of purposes, eg: standard deviation, correlation, etc.
4. Mean is used as a starting point for explanation in case of normal probability curve.

**CALCULATING MEAN:**

1. **Calculation of Mean for Ungrouped Data.**

**Mean M =**$ \frac{ ∑X}{N}$

**Q1.**A worker works in a vineyard for a week from Monday to Saturday. His earnings per day are as follows:

Monday- Rs 150

Tuesday-Rs 100

Wednesday- Rs 90

Thursday – Rs 120

 Friday- Rs 50

 Saturday-Rs 300.

Calculate the average earned by the worker for the week.

SOLUTION:

Mean =sum of earnings per day in a week

 Total no. of days worked

 M =$ \frac{150+100+90+120+50+300}{6}$

 M =$ \frac{810}{6}$

 **M = 135**

**The worker has earned Rs 135 on an average per day for the week.**

**Q2.** Calculate the mean for the given ungrouped data below.

**A.** 14, 17, 18, 21, 12, 11, 10, 9, 19, 20.

SOLUTION : M =$ \frac{∑X}{N}$

 M= $\frac{ 14+17+18+21+12+11+10+9+19+20}{10}$

 M=$ \frac{151}{10}$

 **M= 15.1**

**B.** 6, 4, 7, 3, 5, 8, 9, 2.

 SOLUTION : M =$ \frac{∑X}{N}$

 M= $ \frac{6+4+7+3+5+8+2}{8}$

 M=$ \frac{44}{8}$

 **M= 5.5**

**C.** 44, 64, 74, 54, 67.

SOLUTION : M=$\frac{∑X}{N}$

 M = $ \frac{44+64+74+54+67}{5}$

 M =$ \frac{303}{5}$

 **M = 60.6**

**D.** 802, 704, 678, 472, 200, 342.

SOLUTION : M=$\frac{∑X}{N}$

 M = $\frac{802+704+ 678+472+200+342}{6}$

 M =$ \frac{ 3198}{6}$

 **M = 533**

**E.** 70, 40, 90, 80, 50, 20, 30.

SOLUTION : M =$ \frac{∑X}{N}$

M =$ \frac{70+40+90+80+50+20+30}{7}$

M =$ \frac{ 380}{7}$

**M = 54.30**

1. **CALCULATION OF MEAN FOR GROUPED DATA**

 **Formula:**  **M =** $\frac{∑fX}{N}$

Where -

M= Mean,

∑= Sum Total Of,

$f$= Frequency of Class Interval,

X= Individual Scores (Mid Points),

N= Total Frequency.

**A) Using the long method**

**PROBLEM No. 1 -** Calculate Mean using Long Method.

|  |  |  |  |
| --- | --- | --- | --- |
| **Class Interval** | **Frequency**$$(f)$$ | **Mid Points of Class Interval**$ ( X )$ | $$fX$$ |
| 115-119 | 2 | 117 | 234 |
| 110-114 | 2 | 112 | 224 |
| 105-109 | 4 | 107 | 428 |
| 100-104 | 6 | 102 | 612 |
| 95-99 | 8 | 97 | 776 |
| 90-94 | 12 | 92 | 1104 |
| 85-89 | 6 | 87 | 522 |
| 80-84 | 6 | 82 | 492 |
| 75-79 | 4 | 77 | 308 |
| 70-74 | 2 | 72 | 144 |
|  | **N =** 52 |  | $∑fX$ = 4844 |

SOLUTION: Formula : M = $\frac{∑fX}{N}$

 M = $ \frac{4844}{52}$

 M = 93.15

The Mean for the above grouped data is 93.15

**Problem No. 2 -** Calculate Mean using Long Method.

|  |  |  |  |
| --- | --- | --- | --- |
| **Class Interval** | **Frequency**$$(f)$$ | **Mid Points of Class Interval**$ ( X )$ | $$fX$$ |
| 65-69 | 1 | 67 | 67 |
| 60-64 | 3 | 62 | 186 |
| 55-59 | 4 | 57 | 28 |
| 50-54 | 7 | 52 | 364 |
| 45-49 | 9 | 47 | 423 |
| 40-44 | 11 | 42 | 462 |
| 35-39 | 8 | 37 | 296 |
| 30-34 | 4 | 32 | 128 |
| 25-29 | 2 | 27 | 54 |
| 20-24 | 1 | 22 | 22 |
|  | **N =** 50 |  | $$∑fX=2230$$ |

 SOLUTION:

M = $ \frac{∑fX}{N}$

M = $ \frac{2230}{50}$

M = 44.6

The Mean for the above grouped data is 44.6

**Problem No. 3 -** Calculate Mean using Long Method.

|  |  |  |  |
| --- | --- | --- | --- |
| **Class Interval** | **Frequency**$$(f)$$ | **Mid Points of Class Interval**$ ( X )$ | $$fX$$ |
| 120-122 | 2 | 121 | 242 |
| 117-119 | 2 | 118 | 236 |
| 114-116 | 2 | 115 | 230 |
| 111-113 | 4 | 112 | 448 |
| 108-110 | 5 | 109 | 545 |
| 105-107 | 9 | 106 | 954 |
| 102-104 | 6 | 103 | 618 |
| 99-101 | 3 | 100 | 300 |
| 96-98 | 4 | 97 | 388 |
| 93-95 | 2 | 94 | 188 |
| 90-92 | 1 | 91 | 91 |
|  | **N =**40 |  | $∑fX=$4240 |

 SOLUTION:

M = $\frac{∑fX}{N}$

M = $\frac{4240}{40}$

M = 106

The Mean for the above grouped data is 106

**Problem No. 4 -** Calculate Mean using Long Method.

|  |  |  |  |
| --- | --- | --- | --- |
| **Class Interval** | **Frequency**$$(f)$$ | **Mid Points of Class Interval**$ (X)$ | $$fX$$ |
| 45-49 | 2 | 47 | 94 |
| 40-44 | 3 | 42 | 126 |
| 35-39 | 2 | 37 | 74 |
| 30-34 | 17 | 32 | 544 |
| 25-29 | 30 | 27 | 810 |
| 20-24 | 25 | 22 | 550 |
| 15-19 | 15 | 17 | 255 |
| 10-14 | 3 | 12 | 36 |
| 05-09 | 2 | 7 | 14 |
| 00-04 | 1 | 2 | 2 |
|  | **N =**100 |  | $∑fX=$2505 |

 SOLUTION:

M = $\frac{∑fX}{N}$

M = $ \frac{2505}{100}$

M = 25.05

The Mean for the above grouped data is 25.05

**Problem No. 5 -** Calculate Mean using Long Method.

|  |  |  |  |
| --- | --- | --- | --- |
| **Class Interval** | **Frequency**$$(f)$$ | **Mid Points of Class Interval**$ ( X )$ | $$fX$$ |
| 90-94 | 1 | 92 | 92 |
| 85-89 | 4 | 87 | 348 |
| 80-84 | 2 | 82 | 164 |
| 75-79 | 8 | 77 | 616 |
| 70-74 | 9 | 72 | 648 |
| 65-69 | 14 | 67 | 938 |
| 60-64 | 6 | 62 | 372 |
| 55-59 | 6 | 57 | 42 |
| 50-54 | 4 | 52 | 208 |
| 45-49 | 3 | 47 | 141 |
| 40-44 | 3 | 42 | 126 |
|  | **N =**60 |  | $∑fX=$3995 |

SOLUTION:

M = $\frac{ ∑fX}{N}$

M = $\frac{3995}{60}$

M = 66.58

The Mean for the above grouped data is 66.58

**B) USING THE ASSUMED MEAN METHOD:**

The formula for using the assumed mean method for calculating mean is as given below:

 **M =** $A+\frac{Σfx'}{N}$**× i**

Where **x’=** $\frac{X-A}{i}$

A is the assumed mean,

f is the frequency of the Class Interval,

i is the size of the Class Interval,

N is the total frequency.

**Q1.** Calculate the Mean using the assumed mean method.

**x’=**

=

= 5

**x’=**

=

= 4

**x’=**

=

= 3

**x’=**

=

= 2

**x’=**

=

= 1

**x’=**

=

= 0

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Class Interval** | **Frequency (f)** | **Mid-point (x)** | **X’** | **fx’** |
| 65-69 | 1 | 67 | 5 | 5 |
| 60-64 | 3 | 62 | 4 | 12 |
| 55-59 | 4 | 57 | 3 | 12 |
| 50-54 | 7 | 52 | 2 | 14 |
| 45-49 | 9 | 47 | 1 | 9 |
| 40-44 | 11 | 42\* | 0 | 0 |
| 35-39 | 8 | 37 | -1 | -8 |
| 30-34 | 4 | 32 | -2 | -8 |
| 25-29 | 2 | 27 | -3 | -6 |
| 20-24 | 1 | 22 | -4 | -4 |
|  | **N =** 50 |  |  | **∑fx’** = 26 |

\*Assumed mean

SOLUTION:

**M =** $A+\frac{Σfx'}{N}$**× i**

M= $42+ \frac{26}{50 }$ × 5

M= 42 + 0.52 × 5

M = 42 + 2.6

M = 44.6

The mean of the grouped data is 44.6

**Q2.** Calculate the Mean using the assumed mean method

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Class Interval** | **Frequency (f)** | **Mid-point (X)** | **x’** | **fx’** |
| 115-119 | 2 | 117 | 5 | 10 |
| 110-114 | 2 | 112 | 4 | 8 |
| 105-109 | 4 | 107 | 3 | 12 |
| 100-104 | 6 | 102 | 2 | 12 |
| 95-99 | 8 | 97 | 1 | 8 |
| 90-94 | 12 | 92\* | 0 | 0 |
| 85-89 | 6 | 87 | -1 | -6 |
| 80-84 | 6 | 82 | -2 | -12 |
| 75-79 | 4 | 77 | -3 | -12 |
| 70-74 | 2 | 72 | -4 | -8 |
|  | **N =** 52 |  |  | **∑fx’ =** 12 |

\*Assumed mean

SOLUTION:

**M =** $A+\frac{Σfx'}{N}$**× i**

M = A + $\frac{12 }{52}×5$

M = 92 + 0.23 ×5

M = 92 + 1.15

M = 93.15

The mean of the given grouped data is 93.15.

**Q3.** Calculate the Mean using the assumed mean method

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Class Interval** | **Frequency (f)** | **Mid-point (X)** | **x’** | **fx’** |
| 120 - 122 | 2 | 121 | 5 | 10 |
| 117 -199 | 2 | 118 | 4 | 8 |
| 114 – 116 | 2 | 115 | 3 | 6 |
| 111 – 113 | 4 | 112 | 2 | 8 |
| 108 – 110 | 5 | 109 | 1 | 5 |
| 105 - 107 | 9 | 106\* | 0 | 0 |
| 102 – 104 | 6 | 103 | -1 | -6 |
| 99 – 101 | 3 | 100 | -2 | -6 |
| 96 – 98 | 4 | 97 | -3 | -12 |
| 93 – 95 | 2 | 94 | -4 | -8 |
| 90 – 92 | 1 | 91 | -5 | -5 |
|  | **N =** 40 |  |  | **∑fx’ =** 0 |

\*Assumed mean

SOLUTION:

**M =** $A+\frac{Σfx'}{N}$**× i**

M = 106 + $\frac{0}{40}$ ×3

M = 106 + 0

M = 106

The mean of the given grouped data is 106.

**Q4.** Calculate the Mean using the assumed mean method

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Class Interval** | **Frequency (f)** | **Mid-point (X)** | **x’** | **fx’** |
| 45 - 49 | 2 | 47 | 4 | 8 |
| 40 - 44 | 3 | 42 | 3 | 9 |
| 35 - 39 | 2 | 37 | 2 | 4 |
| 30 - 34 | 17 | 32 | 1 | 17 |
| 25 - 29 | 30\* | 27 | 0 | 0 |
| 20 - 24 | 25 | 22 | -1 | -25 |
| 15 - 19 | 15 | 17 | -2 | -30 |
| 10 - 14 | 3 | 12 | -3 | -9 |
| 5 - 9 | 2 | 7 | -4 | -8 |
| 0 -4 | 1 | 2 | -5 | -5 |
|  | **N =** 100 |  |  | **∑fx’ =** -39 |

\*Assumed mean

SOLUTION:

**M =** $A+\frac{Σfx'}{N}$**× i**

M = 27+ $\frac{-39}{100}$ × 5

M = 27 + (-0.39) × 5

M = 27 + (-1.95)

M = 27 – 1.95

M = 25.05

The mean of the given grouped data is 25.05.

**Q5.** Calculate the Mean using the assumed mean method

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Class Interval** | **Frequency (f)** | **Mid-point (X)** | **x’** | **fx’** |
| 90 - 94 | 1 | 92 | 5 | 5 |
| 85 -89 | 4 | 87 | 4 | 16 |
| 80 - 84 | 2 | 82 | 3 | 6 |
| 75 - 79 | 8 | 77 | 2 | 16 |
| 70 - 74 | 9 | 72 | 1 | 9 |
| 65 - 69 | 14 | 67\* | 0 | 0 |
| 60 - 64 | 6 | 62 | -1 | -6 |
| 55 – 59 | 6 | 57 | -2 | -12 |
| 50 – 54 | 4 | 52 | -3 | -12 |
| 45 - 49 | 3 | 47 | -4 | -12 |
| 40 - 44 | 3 | 42 | -5 | -15 |
|  | **N =** 60 |  |  | **∑fx’ =** -5 |

\*Assumed mean

SOLUTION:

**M =** $A+\frac{Σfx'}{N}$**× i**

M = 67 + $\frac{-5}{60}$ × 5

M = 67 + (- 0.083) × 5

M = 67 – 0.416

M = 66.58

The mean of the given grouped data is 66.58.