**Median**

**Median of Grouped Data**

 **Median is a measure of central tendency which gives the value of the middle-most observation in the data. In case of ungrouped data, we first arrange the data values of the observations in ascending order. Then, if n is odd, the median is the (n+1)/2 th observation. But in case of Grouped data, it is difficult to find (n+1)/2 the observation. We use formula to find Median.**

 **We first find cumulative frequency & then locate the class whose cumulative frequency is greater than (and nearest to) n/2 , where n is total observations. This is called the median class**



**where**

 **l = lower limit of median class,**

* **n = number of observations,**
* **cf = cumulative frequency of class preceding the median class,**
* **f = frequency of median class,**
* **h = class size (assuming class size to be equal).**

**Numerical**: The following frequency distribution gives the monthly consumption of electricity of 68 consumers of a locality. Find the median.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Monthly consumption** | **65-85** | **85-105** | **105-125** | **125-145** | **145-165** | **165-185** | **185-205** |
| **No.of.Consumers** | **4** | **5** | **13** | **20** | **14** | **8** | **4** |

**Solution:**

**Step 1: Find Cumulative Frequency**

**Step 2: Find Median Class**

**Step 3: Apply formula to find Median**

 

**Applying the formula, Median** =125+(68/2-22/20)\*20

 =  **125 + (34 -22)**

 **20 \* 20**   = **137**

|  |  |
| --- | --- |
| **Size of farms****(Acres)** | **No.of.farms** |
| **5-15** | **7** |
| **15-25** | **12** |
| **25-35** | **17** |
| **35-45** | **25** |
| **45-55** | **31** |
| **55-65** | **5** |
| **65-75** | **3** |
| **75-85** | **2** |
| **85-95** | **4** |

|  |  |  |
| --- | --- | --- |
| **Size of farms****(Acres)** | **No.of.farms****F** | **Cf** |
| **5-15-10=h** | **7** | **7** |
| **15-25** | **12** | **19** |
| **25-35** | **17** | **36** |
| **35-45** | **25** | **61 cf** |
|  **L=45-55** | **31=f** | **92** |
| **55-65** | **5** | **97** |
| **65-75** | **3** | **100** |
| **75-85** | **2** | **102** |
| **85-95** | **4** | **106=n** |

****

**=45+106/2-61/31\*10**

**=45+53-61/31\*10**

**=45+-8/31\*10**

**=45+(-0.25)\*10**

**=45-2.5**

**Median=42.5**

|  |  |  |
| --- | --- | --- |
| **Sl no** | **X** | **arrangement** |
| **1** | **5** | **5** |
| **2** | **8** | **6** |
| **3** | **6** | **7** |
| **4** | **9** | **8** |
| **5** | **19** | **9** |
| **6** | **13** | **10** |
| **7** | **17** | **12** |
| **8** | **15** | **13** |
| **9** | **12** | **15** |
| **10** | **7** | **17** |
| **11** | **10** | **19** |

**Median=N+1/2**

 **=11+1/2=12/2= 6**

 **MEDIAN=10**

|  |  |  |
| --- | --- | --- |
| **Sl no** | **X** | **Arrangement** |
| **1** | **52** | **52** |
| **2** | **65** | **55** |
| **3** | **63** | **55** |
| **4** | **72** | **58** |
| **5** | **60** | **60** |
| **6** | **55** | **63** |
| **7** | **55** | **64** |
| **8** | **58** | **65** |
| **9** | **64** | **70** |
| **10** | **73** | **72** |
| **11** | **70** | **73** |
| **12** | **75** | **75** |

**MEDIAN=63+64= 63.5**

**MODE**

**STUDENT’S WEIGHT**

**58,55,45.45.41.42.54,36.41.39.41.40.52.36.55.38.49.45.46.50.55**

 **MODE=41**

|  |  |
| --- | --- |
| **Size of the shoes in inches** | **Sales** |
| **4** | **20** |
| **5** | **30** |
| **6** | **35** |
| **7** | **40** |
| **8** | **50** |
| **9** | **28** |
| **10** | **20** |
| **11** | **10** |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Height inches** | **58** | **60** | **62** | **63** | **64** | **65** | **66** | **68** | **70** | **72** |
| **No.of stu** | **2** | **4** | **6** | **12** | **20** | **22** | **24** | **6** | **3** | **1** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Height inches** | **I** | **II** | **III** | **IV** | **V** | **VI** |
| **58** | **2** | **6** |  |  |  |  |
| **60** | **4** |  | **10** | **12** |  |  |
| **62** | **6** | **18** |  |  | **22** |  |
| **63** | **12** |  | **32** | **54** |  | **38** |
| **64** | **20** | **42** |  |  |  |  |
| **65** | **22** |  | **46** |  | **66** |  |
| **66** | **24** | **30** |  | **33** |  | **52** |
| **68** | **6** |  | **9** |  |  |  |
| **70** | **3** | **4** |  |  | **10** |  |
| **72** | **1** |  |  |  |  |  |

**I=Biggest value 24=66 II= 42 (20+22) 64,65**

**III= 46 (22+24) 65,66 IV=54 (12+20+22) 63,64,65**

**V=66 (20+22+24) 64,65,66 VI=52 (22+24+6) 65,66,68**

|  |  |
| --- | --- |
| **Column no** | **Height inches** |
| **58** | **60** | **63** | **64** | **65** | **66** | **68** | **70** | **72** |
| **I** |  |  |  |  |  | **1** |  |  |  |
| **II** |  |  |  | **1** | **1** |  |  |  |  |
| **III** |  |  |  |  | **1** | **1** |  |  |  |
| **IV** |  |  | **1** | **1** | **1** |  |  |  |  |
| **V** |  |  |  | **1** | **1** | **1** |  |  |  |
| **VI** |  |  |  |  | **1** | **1** | **1** |  |  |
| **Total** |  |  | **1** | **3** | **5** | **4** | **1** |  |  |
|  |  |  |  |  |  |  |  |  |  |

 **MODE=65**

**Continual series**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Mark** | **20-30** | **30-40** | **40-50** | **50-60** | **60-70** | **70-80** | **80-90** |
| **No.of std** | **3** | **8** | **14** | **20** | **8** | **5** | **2** |

**Z=L+f1-f0/2f1-f0-f2\*I**

|  |  |
| --- | --- |
| **MARK** | **No.of std** |
| **20-30** | **3** |
| **30-40** | **8** |
| **40-50** | **14** |
| **50-60** | **20 MC** |
| **60-70** | **8** |
| **70-80** | **5** |
| **80-90** | **2** |

**L= LOWER VALUE OF MODEL CLASS=50**

**F1=FREQUENCY VALUE OF MODEL CLASS=20**

**F0=BEFORE THE VALUE OF MODEL CLASS FREQUENCY=14**

**F2=AFTER THE VALUE OF MODEL CLASS FREQUENCY=8**

**I=DIFRENTS BETWEEN THE MODEL CLASS=10**

**Z=50+20-14/2\*20-14-8\*10**

 **=50+6/2\*20-22\*10**

**=50+6/40-22\*10**

**=50+6/18\*10**

**=50+0.3\*10**

**=53.3**