

# module

## TEACHING & LEARNING

---

---

### ADDITIONAL MATHEMATICS FORM 4

# STATISTICS

## CHAPTER 7

<p>NAME:.....</p> <p>FORM :.....</p>
--------------------------------------

Date received : .....

Date completed .....

Marks of the Topical Test : .....

---

---

Prepared by :

Addational Mathematics Department  
Sek Men Sains Muzaffar Syah Melaka

For Internal Circulations Only



Students will be able to:

- 1 Understand and use the concept of measures of central tendency to solve problems.
  - 1.1 Calculate the mean of ungrouped data.
  - 1.2 Determine the mode of ungrouped data.
  - 1.3 Determine the median of ungrouped data.

### 1. Determining the mean, mode, median of ungrouped data

The mean or arithmetic mean of a set of ungroup data ( $x$ ) consisting of  $N$  values is given by

$$\text{mean} = \frac{\text{sum of all data}}{\text{number of values}}. \text{ In symbol } \bar{x} = \frac{\sum x}{N}$$

Example 1 [ Ans a) 40.56 b) 4.059 ]

- a) Find the mean of the following set of data  
23, 43, 56, 27, 34, 37, 45, 43, 57

- b) Find the mean of the data in the following table

$x$	2	3	4	5	6	7
$f$	5	13	15	12	4	2

Exercise 1 [ Ans 10.2857 b) 3.2174 ]

- c) Find the mean of the following set of data  
3,7,9,11,11,15,16.

- d) Find the mean of the data in the following table

$x$	1	2	3	4	5	6
$f$	3	10	15	12	4	2

Homework Text Book : Exercise 7.1.1 page 137

The mode is the value with the highest number of occurrence in a set of data.

Example2 Determine the mode for each of the following set of data

- a) 2,4,5,6,4,7,3

- e) Find the mode of the data in the following table

$x$	1	2	3	4	5
$f$	3	10	15	12	4

- c) 3.2,3.3, 3.9, 3.3.,3.4,3.5, .3.6, 3.7

Homework Text Book : Exercise 7.1.2 page 137

The median is a single value at the centre of a set of data which has been arranged in ascending or descending order such that the data is divided into two parts, each part consisting of the same number of data. In general if a set of data has  $N$  values which are arranged in order then ,

- a) the median is the  $\left(\frac{N+1}{2}\right)^{\text{th}}$  value if  $N$  is odd number.
- b) the median is the mean of  $\left(\frac{N}{2}\right)^{\text{th}}$  value and  $\left(\frac{N}{2} + 1\right)^{\text{th}}$  value if  $N$  an even number

Example 3 Determine the median for each of the following set of data

a) 2,4,5,6,4,7,3	f) Find the mode of the data in the following table <table border="1"> <tr> <td><math>x</math></td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td><math>f</math></td> <td>3</td> <td>10</td> <td>15</td> <td>12</td> <td>4</td> </tr> </table>	$x$	1	2	3	4	5	$f$	3	10	15	12	4	c) 3.2,3.3, 3.9, 3.3.,3.4,3.5, .3.6, 3.7
$x$	1	2	3	4	5									
$f$	3	10	15	12	4									

Homework Text Book : Exercise 7.1.3 page 138

Find the mean , mode and the median for the following Data:

Data	mean	Mode	Median
a) 10,12,12,13,16,21	Ans:14	Ans:12	Ans:12.5
b)-9,12,15,-16,14,15,-10	Ans:3	Ans:15	Ans:12
c)4-2,3-2,5-4,3-2,6-2,5-7,4-4	Ans:4.614	Ans:3-2	Ans:4-4



Students will be able to:

- 1.4 Determine the modal class of grouped data from frequency distribution tables.
- 1.5 Find the mode from histograms.

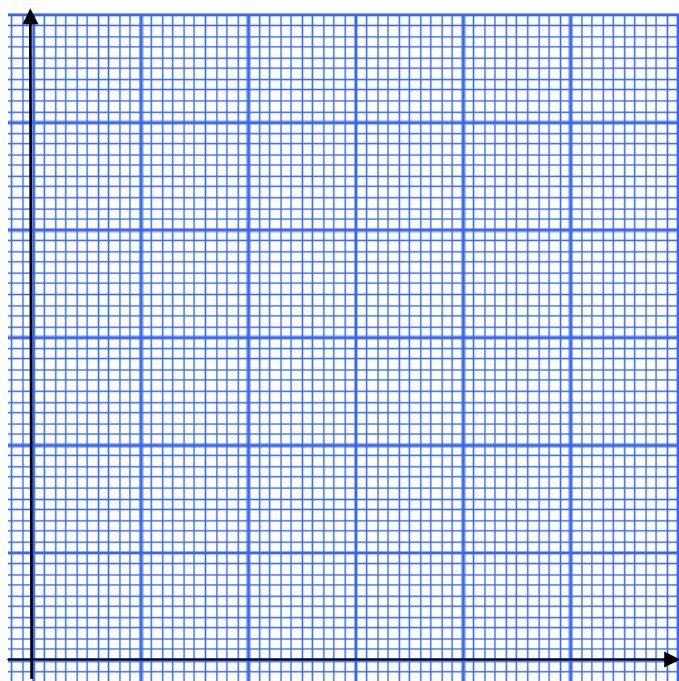
1. The modal class of group data is the class having the highest frequency
2. The mode of a grouped data can be obtained from a histogram

Example 4 For each of grouped data below, determine the modal class and the mode

a

Marks	10-19	20-29	30-39	40 - 49	50 -59
Frequency	5	7	9	8	3

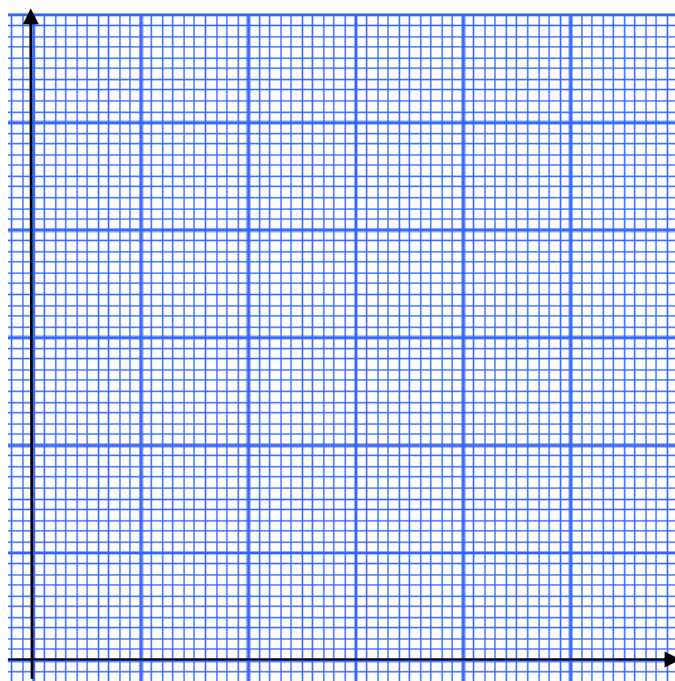
Modal class = .....



From the histogram, mode =

Mass(kg)	30-39	40-49	50-59	60 - 69	70 -79
Frequency	5	8	10	6	3

Modal class = .....



From the histogram, mode =

Homework Text Book Exercise 7.1.5 Page 141



Students will be able to:

- 1.6 Calculate the mean of grouped data.

The mean of grouped data given by  $\bar{x} = \frac{\sum fx}{\sum f}$  where  $x$  is mid-point and  $f$  is the frequency of the class

Example 5 : Find the mean of each grouped data below

a)

Marks	1-20	21-40	41-60	61-80	81-100
Frequency	3	5	16	4	2

Solutions

Marks	Mid point $x$	$f$	$fx$
1-20	10.5	3	31.5
21-40		5	
41-60		16	
61-80		4	
81-100		2	
		$\sum f =$	$\sum fx =$

$$\text{Mean, } \bar{x} = \frac{\sum fx}{\sum f} = \frac{1460}{30} = 48.667 = 48.67$$

b)

Marks	10-19	20-29	30-39	40 - 49	50 -59
Frequency	5	7	9	8	3

Marks	Mid point $x$	$f$	$fx$
		$\sum f =$	$\sum fx =$

Mean =

Homework Text Book Exercise 7.1.6 Page 143



Students will be able to:

- 1.7 Calculate the median of grouped data from cumulative frequency distribution tables.
- 1.9 Estimate the median of grouped data from an ogive.

The median can be obtained by

- a) estimating from an ogive
- a) using a cumulative frequency table and the formula
- b)

$$M = L + \left[ \frac{\frac{1}{2}N - F}{f_m} \right] C, \text{ where}$$

$L$  : lower boundary of the median class

$N$  : Frequency

$C$  : size of the class interval

$F$  : cumulative frequency before the median class median.

$f_m$  : frequency of the median class

Example 5. Find the median for the data in the following group data

a) Ans ( median = 49.25)

Marks	1-20	21-40	41-60	61-80	81-100
Frequency	3	5	16	4	2
Cumulative, F					

b)

Marks	10-19	20-29	30-39	40 - 49	50 -59
Frequency	5	7	9	8	3



Students will be able to:

- 1.9 Determine the effects on mode, median and mean for a set of data when:
- each data is changed uniformly;
  - extreme values exist;
  - certain data is added or removed.
- 1.10 Determine the most suitable measure of central tendency for given data.

### 1.9 Determining the effect on mode, median, and mean for a set of data when each data is changed uniformly .

Example 6 Find Mode , mean and median for each of following : 2, 3, 3, 6, 9, 13.

Find the Mode , mean and median if

- a) each of the data was added by 3, subtracted by 3, multiplied by 4 and divided by 2**

Complete the table below

	Mean	Mode	Median
Original data			
Data + 3			
Data -3			
Data $\times$ 4			
Data $\div$ 2			

Conclusions :			
	mean	Mod	Median
Original data	S	U	V
$\pm$ Original data			
$\times / \div$ Original data			

- b) Extreme values exist**

#### Example 7

Find mean ,mod and median for data A and data B and complete the following table

A : 16,17,18,19,18

B : 15,16,19,42 16

#### Solution

	Mean	Mode	Median
Data A	17.6	18	18
Data B			

Compare your answer .

The extreme value of 42 in Data B causes the mean to increase and the value of mean does not accurately represents the measure of central tendency .

- C) Certain data is added or removed**

**Example 8** : Data A : 16,17,18,19,18  
 Find mean ,mod and median for data A

If certain data is added or removed ,Find mean ,mod and median for new data .

	mean	Mode	Median
Original data	17.6	18	18
Add 16 to the original data	Ans: 17.167	Ans: 18	Ans:17.5
Add 20 to the original data	Ans:18	Ans:18	Ans:18
Removed 16 from the original data	Ans:18	Ans:18	Ans:18
Removed 19 from the original data	Ans:17.25	Ans:18	Ans:17.5

**Conclusions :**

1. If the added data is less than the mean , then the new mean is decreased
2. If the added data is more than the mean, then the new mean is increased .
3. If the removed data is less than the mean, then the new mean is increased .
4. If the removed data is more than the mean, then the new mean is decreased

Example 9 [a Answer  $x = 22$  , b ) i)  $b = 15, q = 20$  ii) mode =17, median = 19 ]

<p>a)A set of number has a mean of 14. When two numbers x and y are added to the set of data the mean of new set of the data is 17 . Find the value of x</p>	<p>b) The set of data 21, b, 24, 17, b+2, 26 has a mean , q if the number b is removed from the set, the mean of the remaining set of data is q +1 . find</p> <ol style="list-style-type: none"> <li>i) the values of b and q</li> <li>ii) the mode and the median of the original data</li> </ol>
--	--

### 1.10 Determining the most suitable measure of central tendency for given data.

1. Under normal condition, the mean is chosen over the mode and the median to represent a set of data because every value in the set is taken into account in the calculation of the mean. Hence the mean gives a good overall picture of the data.
2. If there exists one or two values that are too large or too small, then the median is a better choice as the measure of central tendency compared to mean.
3. If a certain value occurs frequently in a set of data, then mode is a better measure of central tendency.

#### Example 10 :

a) Calculate the mean and median of the set of data 1, 2, 3, 3, 5, 7, 8, 10, 96. Explain why median is more suitable average measure to represent the above set of data

**Solution**

Mean =

Median =

Median is more suitable measure to represent the above set of data compared to mean because

- i) eight out of nine values of data are smaller than the mean and it does not give an accurate information of the average
- ii) the median is not affected by extreme value, 96.

b) i) Determining the mean, mode and median of the set of data 4.1, 3.9, 4.2, 3.9, 7.9.

- ii) State and explain which of the values in (i) represents a suitable measure to describe the efficiency level of the typists

Homework Text Book exercise 7.1.10 page 152 . Skill Practice 7.1 page 153



*Students will be able to:*

7.2 Understand and use the concept of measures of dispersion to solve problems.

2.1 Find the range of ungrouped data.

2.2 Find the interquartile range of ungrouped data.

### MEASURES OF DISPERSION

2.1 Finding the range and interquartile range of ungrouped data.

For ungrouped data

Range = maximum value – minimum value

Interquartile range = upper quartile – lower quartile

Example 11 Find the range and the interquartile range of each set of data below

a) 45, 48, 50, 60, 64

b) 11, 18, 13, 15, 21, 17, 14, 20

**Exercise 11** Find the range and the interquartile range of each set of data below

a) 11,13,14,15,17

b) 17,4,6,10,12,12 13,17

Example 11 Find the range and the interquartile range of each set of data below

a)

$x$	1	2	3	4	5
$f$	3	10	15	12	4
$c.f$	3	13	28	40	44

b)

$x$	0	1	2	3	4	5
$f$	10	14	20	26	20	10

Homework Text Book exercise 7.2.1 and 7.2.2 page 154 and 156

2.2 Finding the range and interquartile range of grouped data.

**For grouped data**

Range = mid - point of highest class - mid point of the lowest class

Interquartile range can be obtained by using a formula or an ogive (refer to formula for a median )

Example 11 Find the range and the interquartile range of each set of data below {Ans 40 , 17.71} For each of data, draw an ogive to determine the interquartile range . Compare your answer between using a formula and an ogive )

a)

$x$	20-29	30-39	40-49	50-59	60-69
$f$	1	8	10	6	5
$c.f$					

b)

$x$	26-30	31-35	36-40	41-45	46-50	26-30
$f$	14	18	26	30	12	14
$c.f$						

Homework Text Book exercise 7.2.3 and 7.2.4 page 157 and 160

2.3 Determining the variance and the standard deviation of ungrouped data and grouped data

Variance and standard deviation

a) Ungroup data

$$\text{variance, } \sigma^2 = \frac{\sum (x - \bar{x})^2}{N} \text{ or } \sigma^2 = \frac{\sum x^2}{N} - \bar{x}^2, \text{ where } \bar{x} = \text{mean of the set of data, } N = \text{total frequency}$$

$$\text{Standard deviation, } \sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{N}} \text{ or } \sigma = \sqrt{\frac{\sum x^2}{N} - \bar{x}^2}$$

b) Grouped data

$$\text{variance, } \sigma^2 = \frac{\sum fx^2}{\sum f} - \bar{x}^2, \text{ where } x = \text{mid-point of the class}$$

$$\text{Standard deviation, } \sigma = \sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2}$$

**Example /Exercise 11** Find the variance and standard deviation of each set of data below

a) 1,4,6,10,14 [ Ans 20.8 , 4.56 ]

b) 4,3,5,6,8,10 [Ans 5.667 ; 2.238 ]

**Example/ Exercise 12** Find the variance and standard deviation of each set of data below

a) [ answer 4.193 ]

x	26	28	30	32
f	10	12	15	11

b)

x	1	2	3	4	5
f	3	10	15	12	4

**Example/ Exercise 12** Find the variance and standard deviation of each set of data below

<p>a)</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="padding: 5px;"><math>x</math></td> <td style="padding: 5px;">26-30</td> <td style="padding: 5px;">31-35</td> <td style="padding: 5px;">36-40</td> <td style="padding: 5px;">41-45</td> </tr> <tr> <td style="padding: 5px;"><math>f</math></td> <td style="padding: 5px;">14</td> <td style="padding: 5px;">18</td> <td style="padding: 5px;">26</td> <td style="padding: 5px;">30</td> </tr> <tr> <td style="padding: 5px;"> </td> <td style="padding: 5px;"> </td> <td style="padding: 5px;"> </td> <td style="padding: 5px;"> </td> <td style="padding: 5px;"> </td> </tr> <tr> <td style="padding: 5px;"> </td> <td style="padding: 5px;"> </td> <td style="padding: 5px;"> </td> <td style="padding: 5px;"> </td> <td style="padding: 5px;"> </td> </tr> </table>	$x$	26-30	31-35	36-40	41-45	$f$	14	18	26	30											<p>b) [ ans 122.67 ; 11.08 ]</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="padding: 5px;">mass kg</td> <td style="padding: 5px;">20-29</td> <td style="padding: 5px;">30-39</td> <td style="padding: 5px;">40-49</td> <td style="padding: 5px;">50-59</td> <td style="padding: 5px;">60-69</td> </tr> <tr> <td style="padding: 5px;">No of student</td> <td style="padding: 5px;">1</td> <td style="padding: 5px;">8</td> <td style="padding: 5px;">10</td> <td style="padding: 5px;">6</td> <td style="padding: 5px;">5</td> </tr> <tr> <td style="padding: 5px;"> </td> <td style="padding: 5px;"> </td> <td style="padding: 5px;"> </td> <td style="padding: 5px;"> </td> <td style="padding: 5px;"> </td> <td style="padding: 5px;"> </td> </tr> <tr> <td style="padding: 5px;"> </td> <td style="padding: 5px;"> </td> <td style="padding: 5px;"> </td> <td style="padding: 5px;"> </td> <td style="padding: 5px;"> </td> <td style="padding: 5px;"> </td> </tr> </table>	mass kg	20-29	30-39	40-49	50-59	60-69	No of student	1	8	10	6	5												
$x$	26-30	31-35	36-40	41-45																																									
$f$	14	18	26	30																																									
mass kg	20-29	30-39	40-49	50-59	60-69																																								
No of student	1	8	10	6	5																																								

Homework Text Book exercise 7.2.6 page 165 and 7.2.7 page 168

**12030**

*Students will be able to:*

- 2.8 Determine the effects on range, interquartile range, variance and standard deviation for a set of data when:
- each data is changed uniformly;
  - extreme values exist;
  - certain data is added or removed.
- 2.9 Compare measures of central tendency and dispersion between two sets of data.

- 2.4 Determining the effects on range, interquartile range, variance and standard deviation for a set of data when:
- each data is changed uniformly;
  - extreme values exist;
  - certain data is added or removed.

- When a number is **added or subtracted** from each value in the data, the measures of dispersion **do not change**.
- When each value in the data is **multiplied by a number k**, the measures of dispersion **will be change**.
  - new range =  $k \times$  original range
  - new interquartile range =  $k \times$  original interquartile range
  - new variance =  $k^2 \times$  original variance
  - new standard deviation =  $k \times$  original standard deviation
- When an extreme value exists in a set of data,
  - the range becomes vary big and will not give accurate information.
  - the interquartile range is not affected because the extremes values is not taken into account.
  - the variance becomes much bigger .

Example/ Exercise 12 Solve the following problems [ ans a) 24 ; 32 ]

<p>a) The range and the variance of a set of data are 12 and 13 respectively. If each value in the set is multiplied by 2 and then subtracted by 5, find</p> <p>(a) the new range (b) the new variance (c) the new standard deviation</p>	<p>a) The range and the variance of a set of data is 30, interquartile range of 5 and standard deviation of 2.5 Each value in the set is divided by 4 and then added by 5 find</p> <p>(a) the new range (b) the new variance (c) the new standard deviation</p>
---	---

Find the range, the interquartile and the variance of a set of data 3, 5, 6, 8, 11, 13. From the result, find the range, interquartile range and variance of each set of data below.

<p>a) 4, 6, 7, 9, 12, 14</p>	<p>b) 6, 10, 12, 16, 22, 26</p>
<p>c) 0, 2, 3, 5, 8, 10</p>	<p>d) <math>\frac{3}{2}, \frac{5}{2}, \frac{6}{2}, \frac{8}{2}, \frac{11}{2}, \frac{13}{2}</math></p>

<p>a) Given the value of <math>\sum x</math> and <math>\sum x^2</math> of a set of 6 numbers are 39 and 271 respectively. If a number 5 is taken out from the set, find the new mean and standard deviation</p>	<p>b) A set of data <math>x_1, x_2, x_3, x_4, x_5</math> has a mean of 10 and a variance of 4. When a value <math>x_6</math> is added to the set of data, the mean remains unchanged find</p> <p>a) the value of <math>x_6</math> [ ans 10] b) the variance of the new set of data [ 3.333]</p>
---	---

USING A SCIENTIFIC CALCULATOR

Weight (kg)	Mid-point	Frequency
50-54	52	10
55-59	57	11
60-64	62	22
65-69	67	29
70-74	72	12
75-79	77	16

3. Now enter SD (standard deviation) mode. Press

MODE 2

SD 0

4. Input all data obtained in step 2.

5 2 SHIFT . 1 0 M+

n= 10

5 7 SHIFT . 1 1 M+

n= 21

6 2 SHIFT . 2 2 M+

n= 43

6 7 SHIFT . 2 9 M+

n= 72

7 2 SHIFT . 1 2 M+

n= 84

7 7 SHIFT . 1 6 M+

n= 100

5. An estimate of the mean is

SHIFT S-VAR 2 1 =

$\bar{x}$  65.5

6. To find the standard deviation of weight, press

SHIFT S-VAR 2 2 =

$\sigma_n$  7.466592262

EXAMPLE OF SPM QUESTIONS

<p><b>1.</b></p> <table border="1"> <tr> <td>mass kg</td> <td>41-45</td> <td>46-50</td> <td>51-55</td> <td>56-60</td> <td>61-65</td> </tr> <tr> <td>frequency</td> <td>2</td> <td>6</td> <td>8</td> <td>10</td> <td>4</td> </tr> </table> <p>The table shows the frequency distribution of mass of students in a certain class. Without drawing an ogive, determine the median for this data { ans 54.875 } [ 4 marks ]</p>	mass kg	41-45	46-50	51-55	56-60	61-65	frequency	2	6	8	10	4	<p><b>2.</b></p> <table border="1"> <tr> <td>Length(cm)</td> <td>51-55</td> <td>56-60</td> <td>61-65</td> <td>66-70</td> <td>71-75</td> </tr> <tr> <td>Frequency</td> <td>2</td> <td>8</td> <td>10</td> <td>6</td> <td>4</td> </tr> </table> <p>The table shows the frequency distribution of the length of leaves of a type of plant. Calculate the length of the leaves [ 4 marks ] [ ans 63.33 ]</p>	Length(cm)	51-55	56-60	61-65	66-70	71-75	Frequency	2	8	10	6	4
mass kg	41-45	46-50	51-55	56-60	61-65																				
frequency	2	6	8	10	4																				
Length(cm)	51-55	56-60	61-65	66-70	71-75																				
Frequency	2	8	10	6	4																				
<p>3 The sum of 10 numbers is 170. The sum of these numbers is 3040. Find the variance of these 10 numbers [ 3 marks ] Ans ; 15 ]</p>	<p>4. Given a set of data ( <math>k-2</math>), <math>k</math>, <math>k</math>, <math>(5k-2)</math>, where <math>k \neq 0</math>, find the value of <math>k</math> for which the mean equals the standard deviaton. [ 4 marks ] Ans <math>k = 2</math></p>																								
<p>5. The mean and the standard deviation for the numbers 1,3,5,6 and 8 are 8 and 4.6 and 2.42 respectively. Find in terms of <math>k</math> for each of the following</p> <p>a) The mean for the numbers <math>1 + k</math>, <math>3 + k</math>, <math>5+k</math>, <math>6+ k</math> and <math>8+k</math> { Ans <math>\frac{5k + 23}{5}</math> }</p> <p>b) The standard deviation for the numbers <math>k + 4</math>, <math>3k + 4</math>, <math>5k+4</math>, <math>6k+4</math> and <math>8k + 4</math> { ans <math>2.42k</math> }</p> <p>[ 4 marks ]</p>	<p>6. The mean and standard deviation for the numbers <math>x_1, x_2, \dots, x_n</math> are 6.5 and 1.5 respectively. Find the</p> <p>(a) mean for numbers: <math>x_1 + 6, x_2+6, \dots, x_n + 6</math>.</p> <p>(b) standard deviation for the numbers: <math>4x_1, 4x_2, \dots, 4x_n</math>.</p> <p>[ 4 marks ]</p> <p>[ ans 12.5, b) 6</p>																								
<p>7. The list of numbers <math>x - 1, x+6, 2x-1, 2x+3, x+3</math> and <math>x - 2</math> has a mean of 8. Find</p> <p>(a) the value of <math>x</math> [ ans 5 ]</p> <p>(b) the variance [ 12.67 ]</p> <p>[ 6 marks ]</p>	<p>8 The mean of the data 2, <math>k</math>, <math>3k, 11, 12</math> and 17 which has been arranged in an ascending order, is <math>m</math>. If each element of the data is reduced by 2, the new median is <math>\frac{8}{9} m</math>. Find</p> <p>(a) the value of <math>m</math> and <math>k</math> [ANS 9; 3]</p> <p>(b) the variance of the new data [ ANS 27 ]</p> <p>[ 6 Maks ]</p>																								

<p>9. The table shows the marks obtained by a group of pupils</p> <table border="1" data-bbox="115 163 812 258"> <tr> <th>Marks</th> <th>1-20</th> <th>21-40</th> <th>41-60</th> <th>61-80</th> <th>81-100</th> </tr> <tr> <td>No of pupils</td> <td>6</td> <td>7</td> <td>13</td> <td>10</td> <td>4</td> </tr> </table> <p>a) On a graph paper, draw a histogram and use it to estimate the modal mark. [ans 54] [3 marks]</p> <p>b) By calculating the cumulative frequency, find the median mark, without drawing an ogive [ans 51.27] [4 marks]</p> <p>c) Calculate the mean mark. [ans 50] [3 marks]</p>	Marks	1-20	21-40	41-60	61-80	81-100	No of pupils	6	7	13	10	4	<p>10. The table shows the age distribution of 100 villagers</p> <table border="1" data-bbox="950 163 1474 352"> <tr> <th>Age</th> <th>No of villagers</th> </tr> <tr> <td>1 – 20</td> <td>25</td> </tr> <tr> <td>21 – 40</td> <td>40</td> </tr> <tr> <td>41 – 60</td> <td>23</td> </tr> <tr> <td>61 – 80</td> <td>7</td> </tr> <tr> <td>81 - 100</td> <td>5</td> </tr> </table> <p>Without drawing a graph, calculate</p> <p>(i) the median [ans 33]</p> <p>(ii) the third quartile, of their age [49.20] [6 marks]</p>	Age	No of villagers	1 – 20	25	21 – 40	40	41 – 60	23	61 – 80	7	81 - 100	5
Marks	1-20	21-40	41-60	61-80	81-100																				
No of pupils	6	7	13	10	4																				
Age	No of villagers																								
1 – 20	25																								
21 – 40	40																								
41 – 60	23																								
61 – 80	7																								
81 - 100	5																								
<p>11. The table shows the distributions of scores obtained by 9 students</p> <table border="1" data-bbox="115 594 812 688"> <tr> <th>Score</th> <th>2</th> <th>4</th> <th>5</th> <th><math>x</math></th> <th><math>y</math></th> <th>18</th> </tr> <tr> <td>No of student</td> <td>1</td> <td>2</td> <td>3</td> <td>1</td> <td>1</td> <td>1</td> </tr> </table> <p>The scores are arranged in an ascending order. Given the mean score is 7 and the third quartile is 10, find the values of <math>x</math> and <math>y</math> [ans <math>x = 9, y = 11, x = 7, y = 13, x = 6, y = 14</math>.] [5 marks]</p>	Score	2	4	5	$x$	$y$	18	No of student	1	2	3	1	1	1	<p>12 set of examination marks <math>x_1, x_2, x_3, x_5, x_6</math>, has a mean of 7 and a standard deviation of 1.4, Find</p> <p>i) the sum of the marks, <math>\sum x</math> [ans 42]</p> <p>ii) the sum of the squares of the marks <math>\sum x^2</math> [ans 305.76]</p> <p>each mark is multiplied by 4 and then 3 is added to it. Find</p> <p>i) the mean [ans 31]</p> <p>ii) the variance [ans 31.36]</p> <p>for the new set of marks</p>										
Score	2	4	5	$x$	$y$	18																			
No of student	1	2	3	1	1	1																			
<p>13. A set of data consists of 10 number The sum of the numbers is 150 and the sum of the squares of the numbers is 2760.</p> <p>(a) Find the mean and variance of the 10 numbers [3 marks]</p> <p>[ans 15; 51]</p> <p>b) Another numbers is added to the set of data and the mean increases by 2. Find</p> <p>(i) the value of this number'</p> <p>(ii) the standard deviation of the set of 11 numbers [4 marks]</p> <p>[ans 37 ; 9.293]</p>																									

<b>Number of grand children</b>	1 – 5	6 – 10	11 – 15	16 – 20
<b>Number of families</b>	8	$x$	$y$	6

TABLE 1

Table 1 shows the distribution of the number of grand children for a total of  $N$  families in a certain village. The min and varians of the distribution is 9.5 and 40.25 respectively.

- (a) Calculate the value of  $N$ . [7 marks]
- (b) Without drawing any graph, calculate the median. [3 marks]