

# Data Representation and Interpretation

**By studying this lesson you will be able to;**

- construct an ungrouped frequency distribution from given raw data,
- find the mode, median and mean of data in the form of an ungrouped frequency distribution,
- construct a grouped frequency distribution from given raw data,
- identify the modal class and median class from a grouped frequency distribution.

In Grade 8 you learnt how to find the mode, median and mean of given raw data. Do the following review exercise to recall what was learnt.

### Review Exercise

1. The ages of the members of a school cricket team (rounded off to the nearest year) are given below.

15, 14, 15, 14, 14, 19, 17, 18, 17, 16, 18

For the above set of data, find the following.

- The range
- The mode
- The median
- The mean

2. Data collected by a certain weather station on the highest temperature (in degrees Celsius) recorded during each day of the first two weeks of a certain month is given below.

26, 28, 28, 29, 27, 28, 29, 30, 31, 28, 30, 31, 32, 27

For the above set of data, find the following.

- The range
- The mode
- The median
- The mean

## 28.1 Ungrouped frequency distribution

To extract the information we require from a given set of raw data, we need to first organize the data in a suitable way. For example, to find a representative value such as the median of a set of raw data, the data needs to be arranged in ascending or descending order.

When there are only a few values, they can easily be arranged in ascending or descending order. However when the number of data is large, arranging them in order and extracting information is not that easy. In such instances it is more appropriate to use tables.

Let us consider such an instance.

The marks obtained in a test by the students of a certain class are given below.

42, 70, 68, 68, 56, 62, 74, 74, 74, 56, 62, 85, 91, 91, 74, 74, 56, 68, 68, 68, 74

This information can be tabulated as follows.

**Note:** This table can be easily and accurately constructed by using tally marks.

Marks	Tally Marks	Number of Students (Frequency)
42	/	1
56	///	3
62	//	2
68	///	5
70	/	1
74	/// /	6
85	/	1
91	//	2

The frequencies are shown in the third column of this table. Let us first consider what is meant by frequency.

In the above data set, the value 42 occurs once, the value 56 occurs three times, etc. The **frequency** of a value is the number of times that value occurs in the data set.

Accordingly, if we consider the above data set,  
the frequency of 42 is 1,  
the frequency of 56 is 3,  
the frequency of 62 is 2, etc.

An **ungrouped frequency distribution** is a table containing the values of a data set and their respective frequencies.

The following is an ungrouped frequency distribution prepared using the above data set.

Marks	Number of Students (Frequency)
42	1
56	3
62	2
68	5
70	1
74	6
85	1
91	2

### The mode of the data in an ungrouped frequency distribution

You have learnt in Grade 8 that the **mode** of a data set is the value that is repeated the most in that data set. The largest value in the frequency column of the above table is 6. The value corresponding to the frequency 6 is 74. Therefore the mode of the above data set is 74.

### The median of the data in an ungrouped frequency distribution

You have learnt that the **median** of a data set is the value that occurs in the middle when the data is arranged in ascending or descending order.

There are 21 data in the above example. Therefore, when the data is arranged in ascending or descending order, the value that occurs in the middle is the 11th value. Now we need to find out what the 11th value is.

Let us consider how this is done.  
 Observe from the above table that,  
 the 1st value is 42,  
 the 2nd value is 56,  
 the 3rd value is also 56,  
 .  
 .  
 .  
 the 6th value is 62.

Accordingly, the 11th value can be found by considering the sums of the values in the frequency column as shown below.

Let us write the sums of the values in the frequency column by the side of the frequency table.

Marks	Frequency
42	1
56	3
62	2
68	5
70	1
74	6
85	1
91	2
	21

**Sum of the frequencies**

$$1$$

$$3 + 1 = 4$$

$$2 + 3 + 1 = 6$$

$$5 + 2 + 3 + 1 = 11$$

It can easily be seen by considering the sums of the frequencies in the frequency column that the value in the 11th position is 68.

When there is a large number of data, arranging it in ascending or descending order and identifying the middle value may not be very easy. The following method can be used to identify the middle position (the position of the median).

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**Note:** When the total number of data is an odd number, the middle position is obtained from  $\frac{\text{number of data} + 1}{2}$ .

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The number of data in the above data set = 21  
 When the data is arranged in ascending order,

$$\begin{aligned} \text{the position where the median is located} &= \frac{21 + 1}{2} \\ &= 11 \end{aligned}$$

The value in the 11th position is 68. Therefore, the median of the data set is 68; that is, the median of the marks is 68.

## The mean of the data in an ungrouped frequency distribution

You have learnt in Grade 8 that to find the mean of a data set, the sum of all the data values needs to be divided by the number of data values.

Let us see how the mean of the data in an ungrouped frequency distribution is found by considering the above example.

As indicated previously, the value 42 occurs once, the value 56 occurs 3 times, etc. To find the mean, the sum of all the values has to be found.

Let us use a table of the following form to find this sum.

Marks	Frequency $f$	$fx$
42	1	$42 \times 1 = 42$
56	3	$56 \times 3 = 168$
62	2	$62 \times 2 = 124$
68	5	$68 \times 5 = 340$
70	1	$70 \times 1 = 70$
74	6	$74 \times 6 = 444$
85	1	$85 \times 1 = 85$
91	2	$91 \times 2 = 182$
	21	1455

The sum of the data values = 1455

$$\begin{aligned} \text{The mean of the data set} &= \frac{1455}{21} \\ &= 69.29 \end{aligned}$$

$$\approx 69 \text{ (rounding off to the nearest whole number)}$$

$\therefore$  the mean of the marks that the students obtained is 69 to the nearest whole number.

### Example 1

The masses of 36 grade 3 students of a primary school are given below.  
(Mass in kilogrammes)

27 25 20 23 21 26 20 23 21 22 24 25  
26 24 23 23 26 24 26 20 24 22 24 25  
26 22 23 26 22 24 23 25 24 21 27 27

- i. Find the range of the above set of data.
- ii. Construct an ungrouped frequency distribution using the above information.
- iii. For the above data set, find the following using the frequency distribution.
  - (a) Mode
  - (b) Median
  - (c) Mean

- i. The largest value of the data set = 27  
The smallest value of the data set = 20  
 $\therefore$  the range of the data set =  $27 - 20$   
 $= 7$   
7

ii.

Mass $x$ (Kg)	Frequency $f$	Sum of the frequencies
20	3	3
21	3	6
22	4	10
23	6	16
24	7	23
25	4	27
26	6	33
27	3	36

- iii. a. The mode of the data set = 24 kg

There are 36 values in this data set. Since 36 is an even number, when this data set is arranged in ascending or descending order, we obtain two middle values. In such a case, the median of the data set is the average of the middle two values.

Let us first find the positions of the middle two values.

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**Note:** When the total number of data is even, the positions of the middle two values are obtained from  $\frac{\text{number of data}}{2}$  and  $\frac{\text{number of data}}{2} + 1$ .

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b. The positions of the middle two values =  $\frac{36}{2}$  and  $\frac{36}{2} + 1$   
 = 18 and 19

Therefore the middle two values are in the 18th and 19th positions.

The value in the 18th position = 24

The value in the 19th position = 24

$$\begin{aligned} \therefore \text{the median of the data set} &= \frac{24 + 24}{2} \\ &= \frac{48}{2} \\ &= \underline{\underline{24 \text{ kg}}} \end{aligned}$$

c.

Mass $x$ (Kg)	Frequency $f$	$f \times x$
20	3	60
21	3	63
22	4	88
23	6	138
24	7	168
25	4	100
26	6	156
27	3	81
Sum of the data values	36	854

Sum of the data values = 854

Number of data values = 36

$$\therefore \text{mean of the data set} = \frac{854}{36} \text{ kg}$$

$$= \underline{\underline{23.72 \text{ kg}}} \text{ (to the nearest second decimal place)}$$



### Exercise 28.1

1. The data collected at a certain weather station on the highest temperature (in degrees Celsius) recorded on each day of the month of December in the year 2016 is given below.

28 26 28 28 29 30 28 26 27 27

28 26 25 24 24 25 25 26 27 28

28 27 26 28 27 28 29 30 28 27 27

- What is the range of this data set?
- Construct an ungrouped frequency distribution to find the mode, median and mean of the data set.
- Find the mode of the data set using the above constructed frequency distribution.
- Find the median of the above set of temperatures.
- Find the mean of the above set of temperatures.

2. In a certain market, bags containing lime of mass 100 g each are available for sale. The number of limes in each bag is given below.

5 3 4 6 2 3 4 5 3 4 6 5 3 4

4 2 4 3 5 3 3 4 2 5 3 2 4 3

- What is the range of this data set?
- Construct an ungrouped frequency distribution using this data.
- Find the mode of the data set.
- Find the median of the data set.
- Find the mean number of limes in a bag (to the nearest whole number).

3. Information on the number of units of electricity consumed daily during a certain period by a certain business establishment is given in the following ungrouped frequency distribution.

Number of units of electricity consumed in a day	8	9	10	11	12	13	14
Number of days	3	5	8	6	4	3	1



- i. What is the range of the above data set?
  - ii. Find the mode of the above data set.
  - iii. Find the median of the above data set.
  - iv. Find the mean number of units of electricity consumed per day during the period in which the data was collected.
4. An ungrouped frequency distribution prepared with the information collected on the number of patients who received treatment in the Out Patient Department of a certain hospital each day during a certain period is given below.

<b>Number of patients who received treatment during a day</b>	29	30	31	32	33	34	35
<b>Number of days</b>	2	4	6	8	12	6	2

- i. Find the range of this data set.
- ii. Find the following for this data set.
  - a. Mode
  - b. Median
  - c. Mean

## 28.2 Grouped frequency distributions

In this section we will identify what a grouped frequency distribution is, the need for grouped frequency distributions and how they are constructed.

To do this, let us consider the following example.

The marks obtained by a group of students in a certain test is given below.

21	26	28	32	34
36	36	38	39	39
39	40	41	41	41
41	42	45	48	48
52	53	56	66	68
70	75	80	81	83

The highest mark obtained is 83 and the lowest mark obtained is 21.  
Therefore the range =  $83 - 21 = 62$ .

Since the range is large and there are many distinct data values, if we try to prepare an ungrouped frequency distribution, we will end up with a fairly long table. In such instances we consider the range of the data set and prepare a table of intervals such that each data value belongs to exactly one of the intervals. These intervals are called **class intervals**. A frequency distribution prepared using class intervals is called a **grouped frequency distribution**.

The following is an example of a grouped frequency distribution.

Class Interval	Frequency
10 - 19	3
20 - 29	6
30 - 39	5
40 - 49	2

This distribution has four class intervals.

Any data value which is equal to one of 10, 11, 12, 13, 14, 15, 16, 17, 18 and 19 belongs to the class interval 10 – 19.

Since there are 10 values in the class interval 10 – 19, the **class size (or class width)** is considered to be 10. The class sizes of the other class intervals are defined similarly.

The frequency corresponding to the class interval 10 – 19 is 3. This means that the data set has only 3 values belonging to this class interval.

Now let us consider how a grouped frequency distribution is prepared.

When preparing a grouped frequency distribution, we need to first decide on either the size of the class intervals or the number of class intervals we want to have.

When we have decided on the size of the class intervals, the number of class intervals can be obtained as follows.

- Find the range of the data set.
- Divide the range by the size of a class interval.
- The number of class intervals is the nearest whole number greater or equal to the above obtained value.

Consider the following example which was discussed earlier.

The marks obtained by a group of 30 students in a certain test are given below.

21	26	28	32	34	36	36	38	39	39
39	40	41	41	41	41	42	45	48	48
52	53	56	66	68	70	75	80	81	83

Suppose we want to separate this data set into class intervals of size 10.

Let us first find the number of class intervals.

The largest value of this data set = 83

The smallest value of this data set = 21

$$\begin{aligned}\text{The range} &= 83 - 21 \\ &= 62\end{aligned}$$

Since we want the size of the class intervals to be 10,

$$\text{the number of class intervals} = \frac{62}{10}$$

$$= 6.2$$

$$\approx 7 \quad (\text{when rounded off to the nearest whole number greater than the obtained value})$$

Accordingly, if we take the class size to be 10, we obtain a grouped frequency distribution with 7 class intervals.

Since the smallest value in the data set is 21, let us prepare the frequency distribution starting with the value 20. The first class interval will then consist of the ten integers 20, 21, 22, 23, 24, 25, 26, 27, 28 and 29. The next class interval will consist of the next 10 integers and so on.

Accordingly, we obtain the following class intervals.

20 - 29

30 - 39

40 - 49

50 - 59

60 - 69

70 - 79

80 - 89

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**Note:** Although we commenced the first class interval from 20, we could have started with the value 21 too (or some other suitable value). If we started with 21, the class intervals would have been 21 – 30, 31 – 40, 41 – 50, etc.

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Now, let us find the number of values that fall into each class interval by using tally marks.

Class Interval (Marks)	Tally Marks	Frequency
20 - 29	///	3
30 - 39	<del>///</del> ///	8
40 - 49	<del>///</del> ////	9
50 - 59	///	3
60 - 69	//	2
70 - 79	//	2
80 - 89	///	3

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**Note:** It is not necessary to include the tally marks column in a frequency distribution.

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When we have decided on the number of class intervals, we can find the size of the class intervals (class size) as follows.

- Find the range of the data set by subtracting the smallest value of the data set from the largest value.
- Divide the range by the number of class intervals. (In general, the number of class intervals is taken to be less than 10.)
- Round off the value that is obtained to the nearest whole number greater or equal to it and take this value to be the size of the class intervals.

Let us consider how to construct a grouped frequency distribution with 5 class intervals using the above data set. Let us first find the size of the class intervals.

$$\begin{aligned}
 \text{The largest value of this data set} &= 83 \\
 \text{The smallest value of this data set} &= 21 \\
 \text{The range} &= 83 - 21 \\
 &= 62
 \end{aligned}$$

Since we require 5 class intervals,

$$\text{the size of each class interval} = \frac{62}{5}$$

$$= 12.4$$

$\approx 13$  (nearest whole number greater than the obtained value)

Accordingly, we prepare a grouped frequency distribution with 5 class intervals of size 13.

<b>Class Interval</b>	<b>Frequency</b>
20 - 32	4
33 - 45	14
46 - 58	5
59 - 71	3
72 - 84	4

As shown above, we can construct grouped frequency distributions according to our requirements, based on the given data set.

Consider the first grouped frequency distribution we constructed. We took 20 - 29 as the first class interval, 30 - 39 as the second class interval, etc. We were able to do this because there were no values between 29 and 30 or between 39 and 40, etc. Observe that this feature is seen in the second grouped frequency distribution we constructed too.

However, if we have a data set consisting of values which are lengths or times or masses, it is necessary to start the second class interval with the value that the first class interval ends, to start the third class interval with the value that the second class interval ends, and so on.

Let us now consider such an example.

The masses of 20 students in a class are given below to the nearest kilogramme.

31	31	31	32	32
32	32	33	33	34
34	34	35	36	36
38	39	39	40	41

Let us construct a grouped frequency distribution with 4 class intervals of size 3 each.

Let us take the first class interval as 30 – 33, the next class interval as 33 – 36, etc.

30 - 33

33 - 36

36 - 39

39 - 42

Here, the second class interval commences with the same value that the first class interval ends. The reason is because the data set consists of masses and masses need not be integral values. For example, we may have students whose masses are 33.2 kg, 33.5 kg, 33.8 kg, etc., which are between 33 kg and 34 kg, or 36.5 kg, 36.9 kg, etc., which are between 36 kg and 37 kg etc. Therefore, in such situations, each class interval needs to commence with the same value that the previous class interval ends (except for the first class interval).

Here, the first class interval ends with 33 and the second class interval commences with the same value 33. A question arises as to which class interval the value 33 belongs. The value 33 can be taken to belong to either one of these two intervals.

However, it is important to state the convention that is being used.

In this lesson we will consider the class intervals to be as follows.

Here,

the values greater than 30 but less than or equal to 33 belong to the class interval 30 -33,

the values greater than 33 but less than or equal to 36 belong to the class interval 33 – 36,

the values greater than 36 but less than or equal to 39 belong to the class interval 36 – 39, and

the values greater than 39 but less than or equal to 42 belong to the class interval 39 – 42.

The grouped frequency distribution prepared according to this convention is given below.

Class Interval	Frequency
30 - 33	9
33 - 36	6
36 - 39	3
39 - 42	2

**Note:** When constructing a grouped frequency distribution, it should be remembered that the class intervals need to be selected by taking the nature of the data into consideration.

### Exercise 28.2

1. The data collected by an electricity metre reader on the electricity consumption of each of the households in a certain housing scheme during the month of January 2017 is given below.

63 68 75 54 56 58 85  
90 73 63 76 62 69 78  
50 74 64 58 88 85 72  
71 53 82 68 73 67 75  
74 67 69 62 66 74 70  
84 72 69 59 67 78 72

Construct a grouped frequency distribution using the above data.

2. The marks obtained in a mathematics test by a group of Grade 9 students of a certain school are given below.

34 27 45 12 63 35 54 29  
42 68 73 54 26 11 63 54  
33 69 62 38 53 48 63 61  
60 44 67 61 79 65 47

- i. Find,
    - (a) the highest mark obtained by a student
    - (b) the lowest mark obtained by a student.
  - ii. Find the range of the data set.
  - iii. For the above data set, construct a grouped frequency distribution with 7 class intervals.
3. The heights (in centimetres) of the Grade 4 students of a certain primary school are given below. Construct a suitable grouped frequency distribution.

124 124 138 125 122 129 122 128 131 127 125 120 125  
120 121 125 120 132 127 124 126 130 125 131 122 130  
129 128 125 122 133 138 125 123 126 125 135 126 132

### 28.3 Finding the modal class and median class from a grouped frequency distribution

We learnt how to construct a grouped frequency distribution in the previous section. Now let us consider how the modal class and the median class can be found from a grouped frequency distribution.

When we are given a grouped frequency distribution, we will not be able to identify the mode and the median as the raw data is not available to us. In such situations we consider the modal class and the median class.

The **modal class** is the class interval with the highest frequency. The **median class** is the class interval to which the median belongs.

#### Example 1

A grouped frequency distribution prepared with the marks obtained by a group of students in a certain test is given below.

From this distribution, find

- i. the modal class
- ii. the median class.



Marks	Frequency	Sum of the frequencies
10 - 20	3	3
21 - 30	4	7
31 - 40	6	13
41 - 50	7	20
51 - 60	11	31
61 - 70	4	35

i. Since the highest frequency is 11, the modal class is 51 – 60.

ii. The position of the median of the data set =  $\frac{35 + 1}{2}$   
 $= 18$

The median class is the class interval to which the 18th value belongs. Therefore, the median class is 41 - 50.

### Example 2

A grouped frequency distribution prepared using the ages of the employees of a certain establishment is given below.

Find,

- i. the modal class
- ii. the median class.

Age	Frequency	Sum of the frequencies
20 - 27	3	3
27 - 34	5	8
34 - 41	11	19
41 - 58	6	25
48 - 55	3	28

i. The highest frequency = 11  
 $\therefore$  the modal class = 34 – 41

ii. The positions of the middle two values =  $\frac{28}{2}$  and  $\frac{28}{2} + 1$   
 $= 14$  and  $15$

The class interval that contains the 14th value = 34 – 41  
 The class interval that contains the 15th value = 34 – 41  
 $\therefore$  the median class 34 - 41.

 **Exercise 28.3**

1. The number of sweep tickets sold each day during the month of March of year 2016 by a certain sweep ticket seller is given below.

380 390 379 402 370 385 397 386 377 405  
 400 381 390 375 392 384 391 385 387 395  
 390 393 373 386 378 395 379 396 395 391  
 373

- i. What is the maximum number of sweep tickets that were sold on a day during this period?
- ii. What is the minimum number of sweep tickets that were sold on a day during this period?
- iii. Find the range of this data set.
- iv. Construct a grouped frequency distribution of class size 6.
- v. Using the table,
  - a. find the modal class
  - b. find the median class.

2. The number of books loaned by a school library during 30 days of the first term of the year 2016 is given below.

27 20 33 37 40 25 15 29 33 32  
 29 32 25 36 16 35 37 28 34 27  
 41 36 40 28 27 23 32 33 24 38

- i. What is the range of this data set?
- ii. Using this data set, construct a grouped frequency distribution consisting of the class intervals 15 – 19, 20 – 24, etc., of class size 5.
- iii. Using the table, find the number of days in which 30 or more books have been loaned.
- iv. How many days are there in which more than 25 but less than 30 books were loaned?
- v. What is the modal class?
- vi. To which interval does the median of the number of books loaned each day during this period belong?

### Miscellaneous Exercise

1. The ungrouped frequency distribution given below has been prepared with the information collected on the number of coconuts that were plucked from each coconut tree in an estate, during a certain season.

Number of coconuts	Frequency
8	3
10	5
12	8
13	7
14	5
15	2

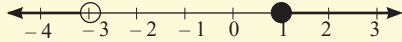
- i. Find the mode of the data set.
  - ii. Find the median of the data set.
  - iii. Find the mean number of coconuts plucked from a tree in this estate.
2. The circumferences (in centimetres) of a pile of rubber tree trunks that were purchased to cut planks are given below.

95 112 118 86 103 102 94 98 80 97  
87 105 85 103 95 106 98 94 110 102  
103 105 90 110 96 100 89 104 98 114  
106 98 98 112 86 105 97 107 96 92  
115

- i. Prepare a grouped frequency distribution consisting of 8 class intervals.
- ii. Find the modal class from this distribution.
- iii. Find the median class.

## Revision Exercise – Third term. Part – I

1. Represent all the solutions of  $x - 3 < -1$  on a number line.
2. What is the inequality represented on the number line.



3. Children below 13 years of age ( $S$ ) → ← boys ( $M$ )

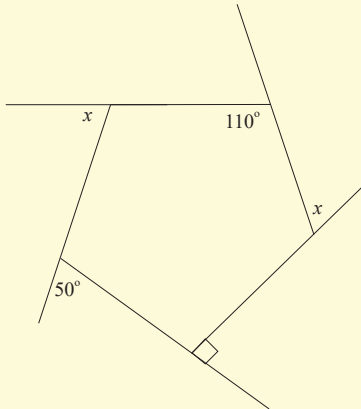
In the Venn diagram drawn to illustrate the information on the grade 9 students of a certain school, shade the region which represents the girls who are below 13 years of age and express it in terms of  $S$  and  $M$ .

4. Write the elements in  $B'$  based on the information in the Venn diagram.

5. In the parallelogram  $ABCD$ ,  $BC = 20$  cm,  $BL = 10$  cm and  $DM = 18$  cm. Calculate the perimeter of  $ABCD$ .

6. A number is picked randomly from a set of 20 identical cards numbered 1 to 20. What is a probability of drawing a triangular number?
7. Let  $A$  denote the set of the letters of the word “numbers”. If a letter is drawn randomly from this set, what is the probability of it being “m”?

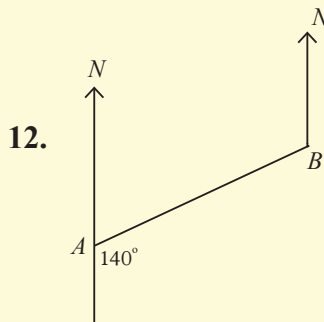
8. Find the value of  $x$  based on the information in the figure.



9. In a certain regular polygon, an interior angle is  $150^\circ$  more than an exterior angle. Find the number of sides it has.

10. Simplify  $\frac{x+1}{2} - \frac{3x-2}{6}$ .

11. Simplify  $\frac{a+1}{a-3} - \frac{4-2a}{a-3}$ .



According to the information in the given figure, find

- (i) the bearing of  $B$  from  $A$
- (ii) the bearing of  $A$  from  $B$ .

13. A scale diagram is drawn to the scale of 1: 50 000. If the direct distance between the two cities  $A$  and  $B$  is 8 km, what is the length of the line segment in the scale diagram that represents this distance?

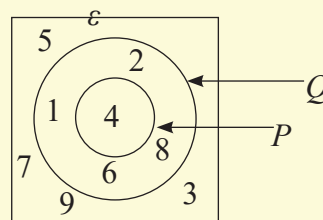
14. If the mean of the collection of data 12, 8,  $x$ , 5, 10 is 10, find the median.

**Revision Exercise – Third Term**  
**Part - II**

1. (A) Fill in the blanks in the following, by using either the symbol  $\subset$  or  $\in$  based on the information in the given Venn diagram.

- i.  $4 \subset Q$   
 iii.  $P \subset \varepsilon$   
 v.  $P \cap Q \subset P$

- ii.  $7 \subset Q$   
 iv.  $P \subset Q$



- (B) i. Write  $n(P')$ .  
 ii. How many subsets does  $Q'$  have? Write four of these subsets.

- (C)  $\varepsilon = \{\text{counting numbers from 1 to 20}\}$   
 $A = \{\text{multiples of 3 from 1 to 20}\}$   
 $B = \{\text{multiples of 2 from 1 to 20}\}$

- i. List out the elements in the above three sets.  
 ii. Represent the above sets in a suitable manner in a Venn diagram.  
 iii. Write the elements of the sets given below using the set (ii) above.

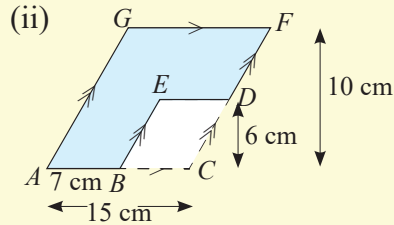
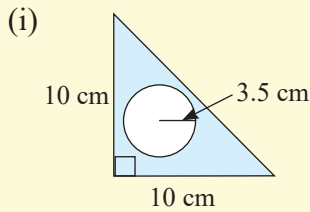
- a.  $A$                   b.  $B$                   c.  $A \cap B$                   d.  $A \cup B$                   e.  $A'$                   f.  $B'$

2. The number of milk packets that were sold in a canteen of a certain school during 50 days is given below.

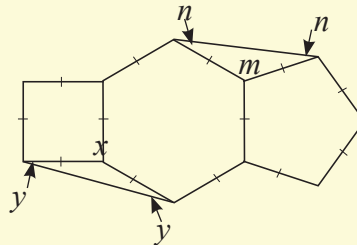
31	34	38	40	44	43	45	47	45	50
53	52	58	55	54	53	61	63	65	66
66	68	64	63	66	67	62	63	66	70
71	73	74	75	76	72	73	72	74	81
82	82	82	83	83	84	8	85	92	96

- i. Write the range of the data.  
 ii. By taking the class intervals as 30-40, 40-50, 50-60 etc., construct a grouped frequency distribution using all the above data.  
 iii. Find the modal class and the median class using the above frequency distribution.

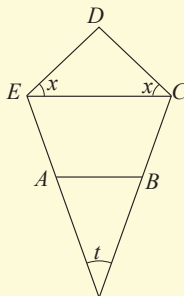
3. (a) calculate the areas of the figures given below.



4. (1) An interior angle of a certain regular polygon is  $100^\circ$  more than an exterior angle.
- Calculate the magnitude of an exterior angle
  - Calculate the number of sides the polygon has.
- (2) The ratio of an interior angle to an exterior angle of a regular polygon is 3:1. Find the sum of the interior angles
- (3) The sum of the exterior angles of a regular polygon is five times the sum of the interior angles. Find the number of sides the polygon has.
- (4) Four interior angles of a certain polygon are  $160^\circ$ ,  $140^\circ$ ,  $130^\circ$  and  $110^\circ$  respectively. The exterior angles corresponding to the remaining interior angles are  $30^\circ$  each. Calculate the number of sides the polygon has.
- (5) A certain creation is made up of square, a regular hexagon and a regular pentagon connected together as shown below. Calculate the values of the angles  $x$ ,  $y$ ,  $m$ , and  $n$ . (Thanuja,  $x$  is not placed properly.)



(6)  $ABCDE$  is a regular pentagon.



- Find the value of a vertex angle of the regular pentagon.
- Find the value of  $x$ .
- Show that the straight lines  $EC$  is parallel to  $AB$ .
- Find the value of  $t$ .

5. A. i. Solve the inequality  $x - 1 \leq -3$ ; and represent the set of solutions on a number line.

ii. solve the inequality  $\frac{2x}{3} > -2$ ; and represent all the solutions on a number line.

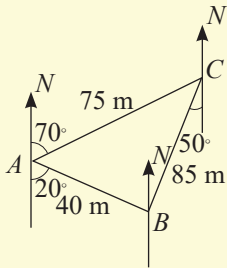
B. A container of capacity 10 l has 3 l of water in it. If another  $x$  litres of water is poured into it, the volume of water in the container satisfies the inequality  $3 + x \leq 10$ . Solve this inequality and find the maximum volume of water that can be poured into the container.

C. Simplify.

i.  $\frac{m+1}{3} - \frac{1+2m}{2} + \frac{3m+2}{4}$

ii.  $\frac{a+5}{a+3} - \frac{2-a}{3+a} + \frac{a}{a+3}$

6. A. The location of three points  $A$ ,  $B$  and  $C$  on a horizontal ground is shown in the sketch given below.



i. Find the bearing of  $B$  from  $A$ .

ii. Find the bearing of  $A$  from  $B$ .

iii. Find the bearing of  $A$  from  $C$ .

B. A water tank in a school located to the left of a straight road running from North to South is observed on a bearing of  $230^\circ$  from the point  $A$  which is located on the straight road. The same tank is observed from the point  $B$  which is 140 m to the South of point  $A$ , on a bearing of  $300^\circ$

i. Draw a sketch depicting the above information.

ii. Draw a scale diagram by using a suitable scale and find the distance from the water tank to the points  $A$  and  $B$ .

iii. Find the minimum distance from the road to the water tank.



7. The information on the number of customers that came to a certain bank on several days is given below.

The number of customers	65	66	67	68	69	70	71	72
Number of days	2	5	8	10	12	8	6	4

- i. Find the range of the above data.
- ii. Find the mode and the median of the data.
- iii. Prepare a suitable table to find the mean of the above distribution.

## Glossary

### A

Algebraic fractions

விசீய னாற

அட்சரகணிதப் பின்னம்

### B

Bearing

திருண்டய

திசைகோள்

### C

Circle

வானீகய

வட்டம்

Class Intervals

பனீதி பூனீகர

வகுப்பாயிடைகள்

Clockwise

திக்கிணாலர்ந

வலஞ்சுழி

Common Denominator

பொடி னரச

பொதுப் பகுதி

Compass

மாலிமாவ

திசையறிகருவி

Compliment of sets

கூலக அனுபூரகய

நிரப்பித் தொடை

### D

Data

தினீ

தரவு

Denominator

னரச

பகுதி

Disjoint sets

விசூகீநீ கூலக

மூட்டற்ற தொடைகள்

Distance

திர்

தூரம்

### E

Equal

பமாத வி

சமன்

Equal sets

பமகூலக

சம தொடைகள்

Equivalent fractions

கூலக னாற

சமவலுப் பின்னம்

Equivalent sets

கூலக கூலக

சமவலுத் தொடைகள்

Equally likely outcomes

பமசீ னலு பூதிபீல

சமமாய் நிகழத்தக்க

Event

சிடீயீய

நிகழ்ச்சி

Exterior angle

லாதிர் கைனீய

புறக்கோணம்

### F

Finite sets

பரீமீக கூலக

முடிவுள்ள தொடைகள்

Frequency distribution

பண்டாத வலுபீயீய

மீடிறன் பரம்பல;

**G**

Greater than  
Grouping

வீலாட வே  
ஊழலனய

பெரிது  
கூட்டமாக்கல்

**H**

Hexagon  
Horizontal Plane

ஊபுய  
கிரீசீலய

அறுகோணி  
கிடைத்தளம்

**I**

Inequality  
Infinite sets  
Interior angle  
Intersection of sets

ஊஊலானா  
ஊபரீலீன குலக  
ஊலானீலர கீலீனய  
குலக சீடீனய

சமனிலி  
முடிவில் தொடைகள்  
அகக்கோணம்  
தொடை இடைவெட்டு

**L**

Less than  
Least common multiple  
Location

குலா வே  
குலா ல பூலூ ஊலாகாரய  
பிசிபீல

சிறிது  
புலது மடஙகு களுள் சிறிது  
அமைவு

**N**

Numerator

லய

தொகுதி

**O**

Out come

புதிபீலய

பேறு

**P**

Parallelogram  
Pentagon

ஊலானீலராபுய  
பலாலபுய

இணைகரம்  
ஐங்கோணி

**Q**

Quadrilateral

லகுரபுய

நாற்பக்கல்

**R**

Random experiments

Rectilinear closed plane

Regular polygons

අනුච්ඡේදන

සරල රේඛීය සංවෘත

සවිධි බහු අස්ඵ

ආරම්භක පරිච්ඡේදන

ඛණ්ඩක

ආරම්භක බහුඅස්ඵ

**S**

Sample space

Sub sets

නියැදි අවකාශය

උපකුලක

මාතෘකා වෙනස

උපකුලක

**T**

Trapezium

Triangle

ත්‍රැපීසියම

ත්‍රිකෝණය

ඡායාරූපය

ඡායාරූපය

**U**

Union of sets

කුලක මේලය

කුලක මේලය

## Lesson Sequence

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