UNIT FOUR

DATA HANDLING

Unit Outcomes: After completing this unit, you should be able to:

- understand simple graphical representation of data
- know and calculate average of a given data

Introduction

You have some knowledge about data handling from your grade four mathematics. In this unit, you will deal with constructing bar graphs by collecting simple data from your lives. You will also deal with interpreting bar graphs and finding the average of numbers.

4.1. Further on Construction and Interpretation of Bar Graphs

Do you remember what you have studied in earlier grade about data handling? In this sub-unit you are going to study simple graphical representation of data.

The following Activities will help you get some idea on collecting data and drawing a graph to show your data.

Activity 4.1

Which is your favorite fruit?

Adugna made a list of fruits. He asked each student in the class to choose a favorite fruit from his list. He recorded the results of his survey in a table.

Fruit	Number of students
Banana	6
Pineapple	7
Mango	11
Orange	5
Papaya	8
Poam	3

Then the draw a picture graph.

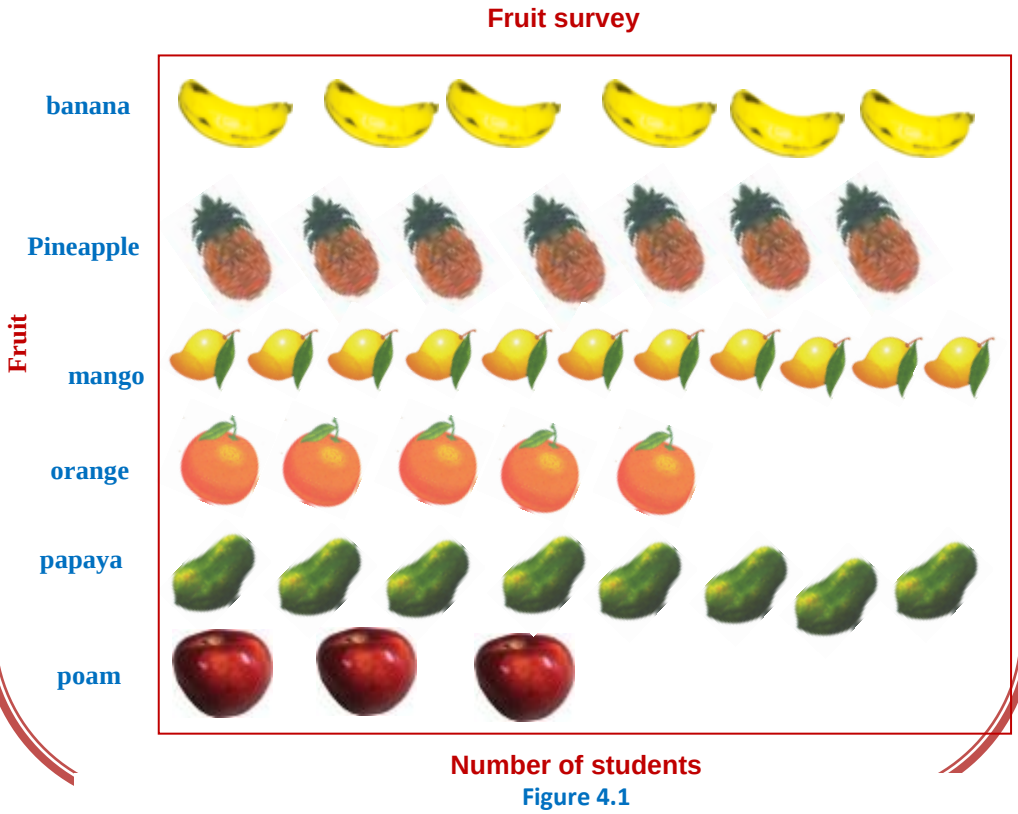


Figure 4.1

1. Which was the most liked of the fruits?
2. Which was the least liked fruit?
3. What is the total number of students surveyed?
   - Carry out a survey of fruit with the students in your class. Collect your data in a table. Draw a picture graph to show your data.

Activity 4.2

For a class of 40 students a survey showed:

Born on	Number
Monday	5
Tuesday	7
Wednesday	6
Thursday	7
Friday	9
Saturday	2
Sunday	4
Total	40

A graph to show days on which students were born

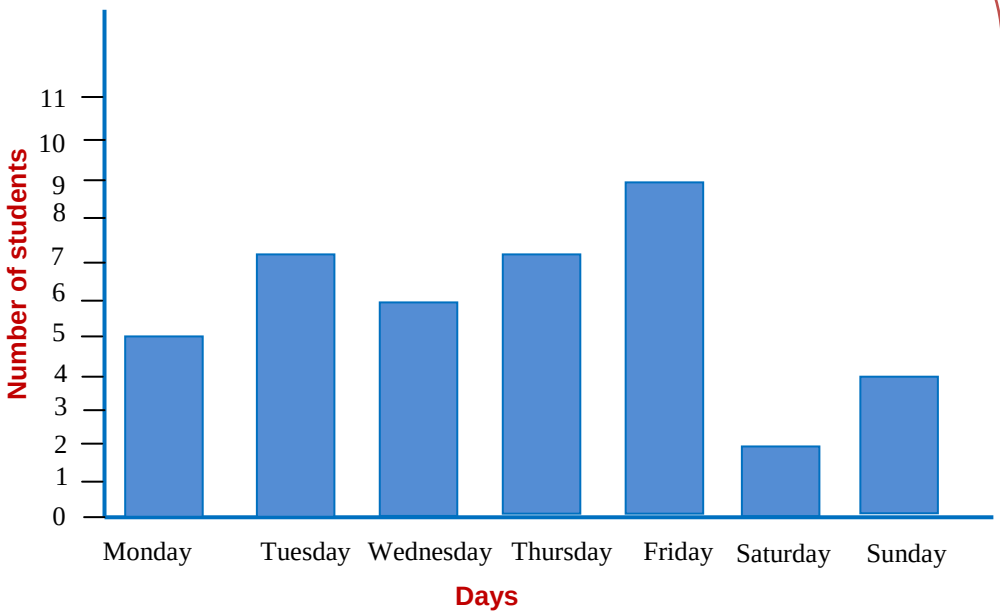


Figure 4.2

1. On which day were most students born?
2. On which day were very few students born?
3. On which day were the same number of students born?
   - Make a survey of birthdays in your class.
   - Draw a graph to show the results of your survey.

Activity 4.3

You will need a coin and some square cards all of the same size.

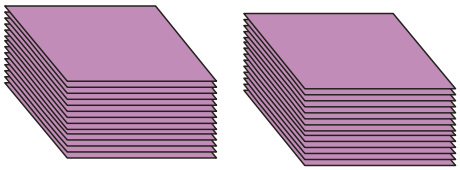


Figure 4.3

Toss the coin 10 times and record 'Head' or 'Tail' using the cards.

Your results might look like this:

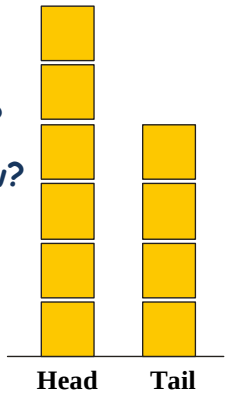


Figure 4.4

1. How many times did the 'Tail' show?
2. How many times did the 'Head' show?
3. Repeat the tossing of the coin 10 times. Did you get the same result?
4. Toss a coin 20 times. Record the 'Heads' or 'Tails' as shown below. This information is called data.

This is a useful way of recording data.

Head	8
Tail	12

The data can be shown on squared paper.

The number of 'Heads' and 'Tails' can easily be read by using the scale. So if the 'Heads' appear 8 times, you fill in 8 squares on the 'head' column.

The difference, if any, between the 'Head' and 'Tail' can be seen by comparing the heights of the coloured columns.

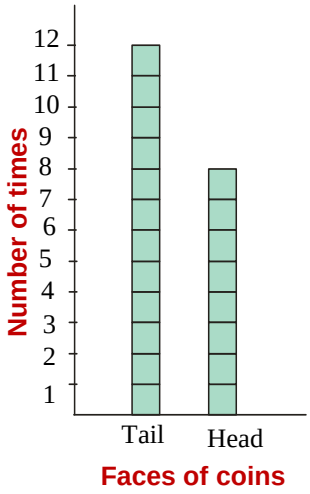


Figure 4.5

Data handling deals with collecting, organizing, and summarizing numerical facts. When the data is collected and displayed in a graph, you can look for trends and study details of the data.

A bar graph is a pictorial representation of numerical data by a number of bars of uniform width erected vertically (or horizontally) with equal spacing between the bars.

Bar graphs are used to compare numbers. The bar graph below shows the amount of money six children have. Bar graphs can be vertical or horizontal.

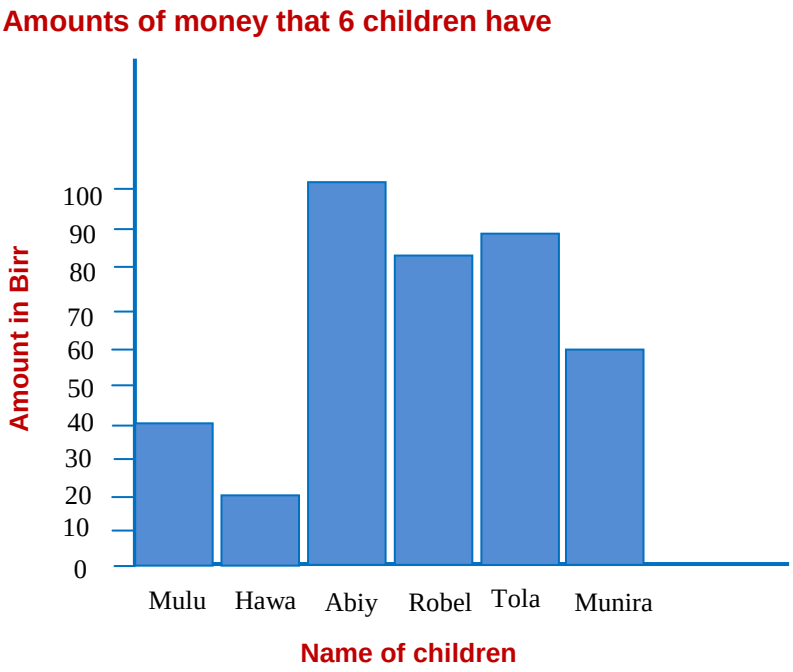


Figure 4.6

To read the graph:

- Find the bar marked Mulu on the horizontal axis
- Follow this bar to the end
- Look to the vertical axis. Read the number.

Mulu has Birr 40.

Use the bar graph to answer each of the following questions and check your answer with the solution given.

a) Who has most money?

b) Who has least money?

c) Has Tola less money than Munira?

d) Has Abiy more money than Robel?

e) How much money do the children have altogether?

Solution: a) Abiy b) Hawa c) No d) yes e) Birr 390

Example 1

The size of shoes worn by 30 students in a certain school are given below. Show the results of the survey on a bar graph. This information is called **raw data**. What conclusions can you draw from it?

34	37	36	37	36	34	37	38	35	37
37	34	35	37	34	36	34	36	38	34
38	37	36	37	34	35	38	37	36	37

Solution: First, we organize the information on a table.

Shoes sizes	Number of students
34	7
35	3
36	6
37	10
38	4
Total	30

Now you can draw a bar graph showing all the information on shoe sizes.

- Suitable titles for the graph would be size of shoes worn by 30 students.
- The horizontal axis is labeled 'shoe size'
- The vertical axis is labeled 'number of students'.
- What does each vertical square represent?

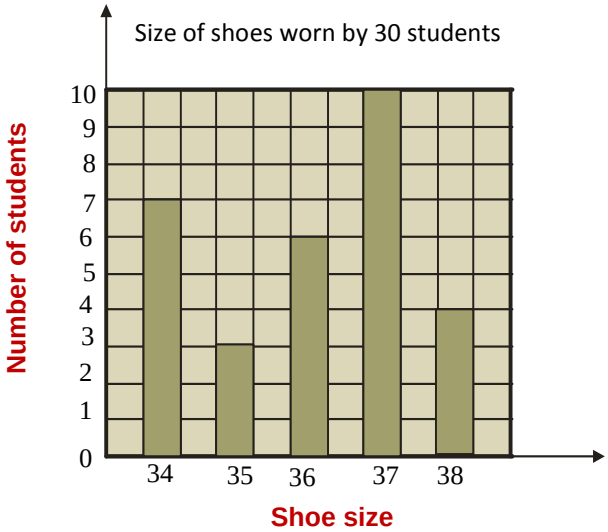


Figure 4.7

You can use the table and the bar graph to answer these questions.

a) What is the most common size of shoe worn by children at the school?

b) Which size is not common in the class?

c) How many different sizes of shoe are worn by the 30 children at the school?

Check your answer with the given solution

Solution: (a) 37 (b) 35 (c) 5

Note: Whenever you draw a bar graph you must have:

- a title
- labels on the horizontal and vertical axes to show what they represent.

All of these features must be included when drawing a graph, because they are essential when interpreting the graph.

Group work 4.1

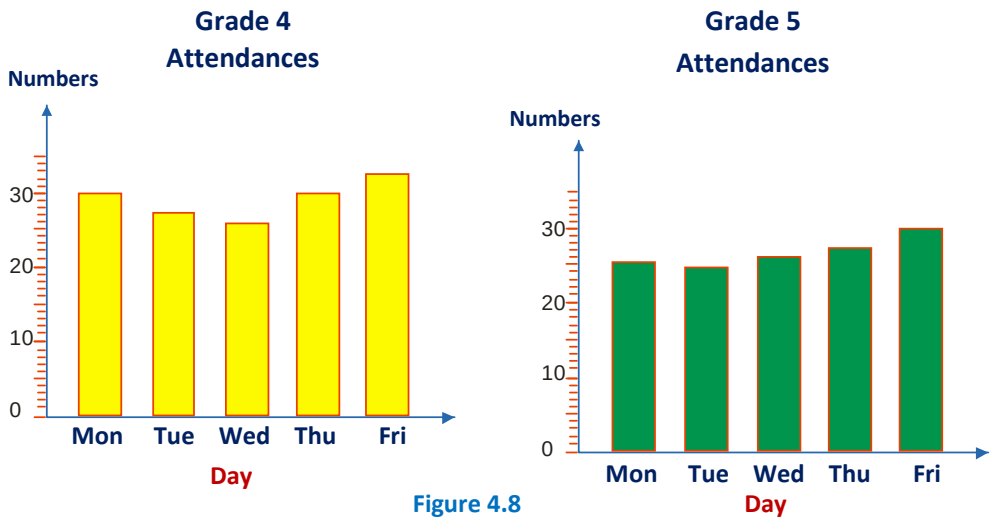


Figure 4.8

The bar graphs show the attendances in grade 4 and grade 5 classes last week.

a) **How many Grade 4 children were in school on:**

1. Monday? ☐
2. Thursday? ☐
3. Wednesday? ☐
4. Friday? ☐

b) **How many Grade 5 children were in school on:**

5. Friday? ☐
6. Wednesday? ☐
7. Tuesday? ☐
8. Thursday? ☐

c) **Which class had most children on:**

9. Tuesday? ☐
10. Friday? ☐
11. Wednesday? ☐
12. Monday? ☐

d) **There are 32 children in Grade 4. How many were absent on:**

13. Tuesday? ☐
14. Friday? ☐

e) **There are 30 children in Grade 5. How many were absent on:**

15. Monday? ☐
16. Wednesday? ☐

Example 2

The bar graph shown below represents children's age in a certain village. You can use the bar graph to answer each of the following questions (Remember to check your answer with the solution given).

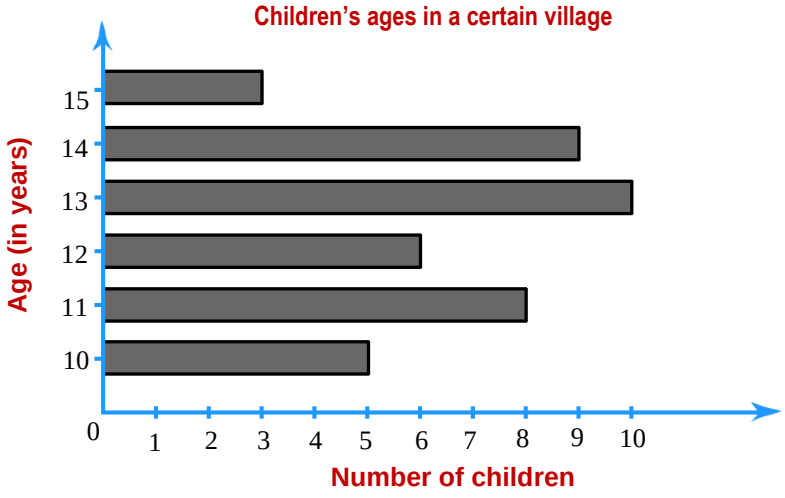


Figure 4.9

a) How many children are 13 years of age?

b) How many children are less than 16 years of age?

c) How many children are over 13 years old?

d) How many children are 10 years old?

e) How many children are under 14 years old?

f) How many children are there altogether in the village?

Solution

a) 10 b) 41 c) 12 d) 5 e) 29 f) 41

Exercise 4A

1. The green club members planted trees around a foot ball field.
   a) How many of each type of tree did they plant?
   b) What was the total number of trees planted?
   c) Which type of tree is most planted?

d) Which type of tree is least planted?

e) The club members want to plant more trees so that there will be the same number of each. How many of each tree should they plant?

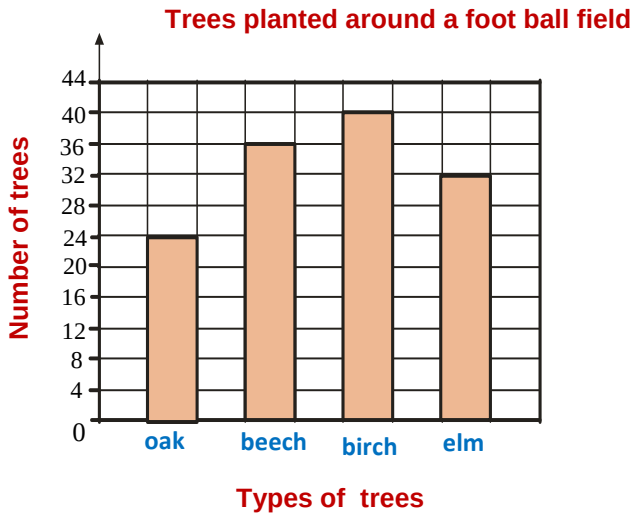
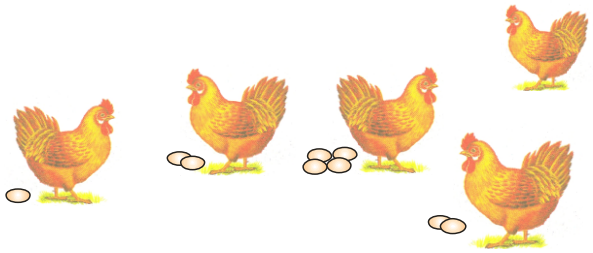


Figure 4.10

2. Abdu had a poultry farm. He collected eggs daily from Monday to Sunday. (Figure 4.12)

In one week he recorded the numbers he collected in this table.

(i) Complete the table by using the bar graph that Abdu draws.



Eggs collected daily in a week

Figure 4.11

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Number of eggs	45					

ii) a) How many eggs were collected on Monday?

b) On which days were 25 eggs collected?

c) On which days were most eggs collected?

d) On which days were least eggs collected?

e) How many more eggs were collected on Saturday than Friday?

f) What was the total number of eggs collected in one week?

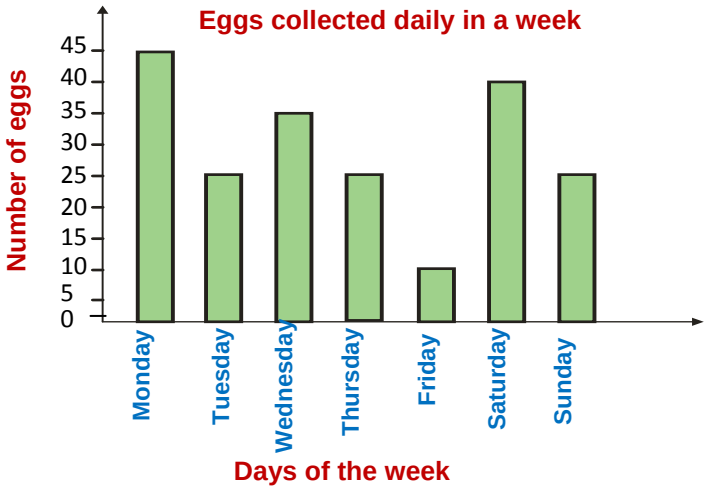


Figure 4.12

3. Eyerusalem's test marks (out of ten) in five subjects were:

- English 5
- Mathematics 8
- Basic science 4
- Social studies 7
- Music 9

Draw a bar graph showing:

a) the subjects on the horizontal axis

b) marks on the vertical axis

Remember to label the axes and give your bar graph a precise title.

4. Lemlem recorded the marks of her class in a Mathematics test marked out of 10.

4	1	7	6	0	3	8	7	2	4	5	0	3	7
8	9	7	5	0	3	2	1	8	9	3	7	10	1
6	8	9	10	3	7	6	2	5	8	10	7		

a) Draw a chart (table)

b) Draw a bar graph

5. Students in grade 5 of a certain school investigate where insects are found. (Figure 4.13)

a) How many insects were found

(i) On leaves

(ii) Under stones

(iii) On flowers?

b) How many more were found in the grass than

(i) Under stones

(ii) In the air

(iii) On flowers?

c) What was the total number of insects found?

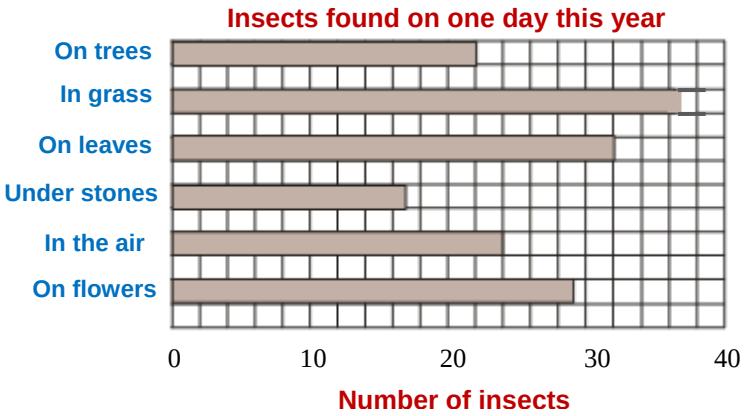
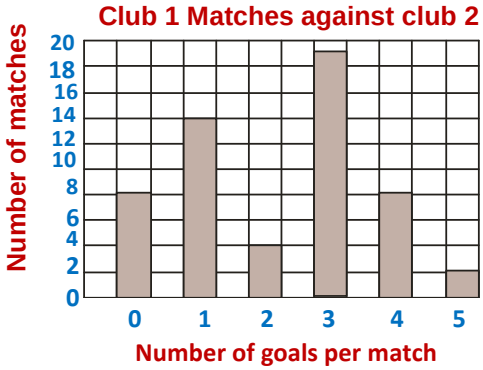


Figure 4.13

6. The bar graph shows goals scored when foot ball club 1 played against foot ball club 2.



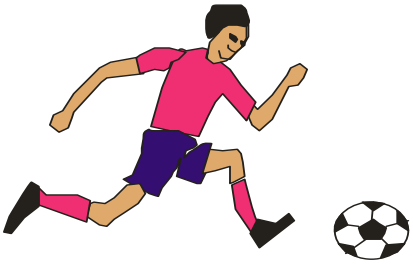


Figure 4.14

a) In how many matches did club 1 score 2 goals?
b) In how many matches did club 1 score more than 3 goals
c) What was the most commonly occurring number of goals scored in the matches?
d) In how many matches did the team score no goals?
e) How many matches were played between club 1 and club 2 altogether?

7. The students in Nega's class have taken a test in mathematics. Here are the results out of 10.

Student's Name	Score	Student's Name	Score
Yishak	7	Abeba	8
Omer	6	Danayt	6
Aman	4	Aklil	5
Obang	5	Ashkuti	6
Naod	8	Konjit	6
Semira	6	Yaregal	5
Senayt	6	Sofia	2
Hana	4	Ekubay	7
Kelemua	6	Kasim	7
Yalew	9	Shentema	6
Derartu	7	Habib	8
Mahlet	6	Amare	10
Yonas	9	Dilbo	7
Nega	10	Yafet	5
Aregawi	7	Siyane	9

Complete the following table by putting the data given in Nega's class.

Marks scored in mathematics test											
Score	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Number of students	**0**	**0**	**1**	**0**	**2**						

Draw a bar graph showing 'score' on the horizontal axis and 'number of students' on the vertical axis.

4.2. The Average of Numbers

Activity 4.4

The table represents marks of six subjects of a student in grade five in first semester.

Subject	Marks out of 100
Civics	70
English	80
Maths	60
Basic science	90
Social study	50
Sport	70

- **Add the marks**
- **Divide the total mark by 6.**
- **Write the result**
- **What do you call this result?**
- **What is the student's average mark?**

In this sub-unit you will deal with finding the average of numbers.

The **average** is found by adding the values of the data and dividing by the total number of values. or average $= \frac{\text{Total number of value}}{\text{number of values}}$. For example, the **average** of 3, 2, 6, 5 and 4 is found by adding $3 + 2 + 6 + 5 + 4 = 20$ and dividing by 5; hence the average of the data is $20 \div 5 = 4$.

Definition 4.1: The **average** of numbers is the sum of the values, divided by the total number of values.

Example 3

The chart shows how many students took part in sport activities. You can read from the given data that most students took part in foot ball and fewest took part in volley ball. Find the average number of students who took part in sport activities.

Activities	Number of students
Foot ball	72
Tennis	40
Basket ball	48
Volley ball	24
Fast walking	60
Running	56

Figure 4.15

Solution:

The total number of students = 72 + 40 + 48 + 24 + 60 + 56

= 300

Average number of student in sport activities = $\frac{\text{total number of students}}{\text{total number of sport activities}}$

Average = $\frac{300}{6}$

$\therefore$ Average = 50

Example 4

Students in Grades 1 – 6 collected money for seedlings. Find the average amount of money collected.

Solution: You can use table to describe the bar graph easily as follows.

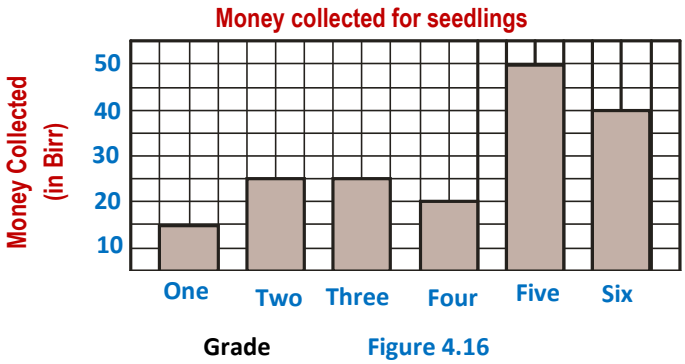


Figure 4.16

Money collected for seedlings						
Grade	**One**	**Two**	**Three**	**Four**	**Five**	**Six**
Amount (in Birr)	**15**	**25**	**30**	**20**	**50**	**40**

$$\text{Average amount of money collected} = \frac{\text{total amount of money collected}}{\text{total number of grades}}$$

$$\text{Average} = \frac{15+25+30+20+50+40}{6} = \frac{180}{6}$$

$\therefore$ average = Birr 30

When you work out problems that involve travel, you need to find the speed:

$$\text{Speed} = \frac{\text{distance}}{\text{time taken}}$$

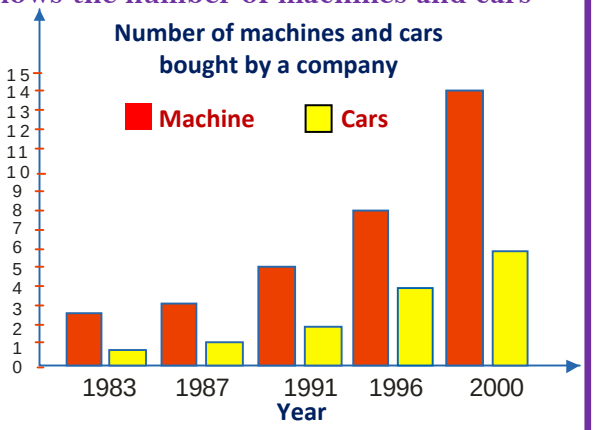
Since the speed probably varies over the whole journey, we usually consider the **average** speed:

$$\text{Average speed} = \frac{\text{total distance}}{\text{total time taken}}$$

Group work 4.2

The bar graph given below shows the number of machines and cars bought by a company.

1. Find the average number of machines bought by the company in five years
2. Find the average number of cars bought by the company in five years.



Example 5

The driver of a lorry covered a distance of 200 kilometers in 4 hours. What was his average speed?

Solution

Distance covered = 200 kilometers

Time taken = 4 hours

Average speed = $\frac{\text{total distance}}{\text{total time taken}} = \frac{200}{4} =$ 50 km per hour

Exercise 4B

1. The ages of 20 students in a class were recorded as follows. 12, 13, 12, 13, 12, 12, 10, 15, 14, 10, 16, 12, 13, 14, 10, 11, 12, 13, 14, 15 organize this information in a table showing ages and number of students. Find the average age of the students.
2.

Name of students	Test score of 6 students out of 10			
	Test 1	Test 2	Test 3	Test 4
Alexander	8	7	6	9
Kelifa	9	5	7	8
Mihiret	6	8	7	5
Dejenie	4	5	6	7
Bosena	6	4	5	6
Merima	10	8	9	9

Use the above table of datas to answer each of the following questions.

a) What is Alexander's average test score?
b) What is Bosena's average test sore?
c) What is Merima's average test score?
d) What is the average test score of students in Test 1?
e) What is the average test score of students in Test 3?

3. What should be the value of x if the average of the numbers 2, 4, 6, 5 and x is 10?

4. This table shows the rainfall at a certain town from January to August

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Rain fall(mm)	10	15	5	10	20	20	15	10

What was the average rainfall?

5. Shewaye rode her bicycle for three hours from Town A to Town B which is 9 kilometers long. What was Shewaye's average speed?

6. The table below shows visitors of a certain place in a week.

Days	Mon	Tues	Wed	Thur	Fri	Sat	Sun
Number of visitors	64	73	70	80	84	90	120

a) Find the average number of visitors per day.

b) On which days was the number of visitors above average?

7. The bar graph shows the points scored by each player in a high school basket ball game.

a) How many players scored over 10 points?

b) Find the average of the points scored.

c) How many players scored below average?

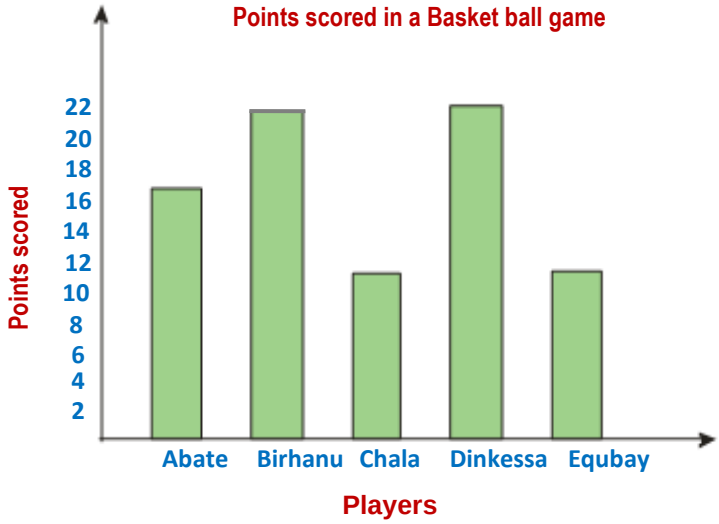


Figure 4.17

UNIT SUMMARY

Important facts you should know:

- **Data handling** deals with collecting, organizing, and summarizing numerical facts. When the data is collected and displayed in a graph, you can look for trends and study details of the data.
- A **bar graph** is a pictorial representation of numerical data by a number of bars of uniform width erected vertically or horizontally with equal spacing between the bars.
- Whenever you draw a bar graph you must have:
  - a title
  - labels on the horizontal and vertical axes to show what they represent
- The **average** of numbers is the sum of the values, divided by the total number of values.

REVIEW EXERCISE

1. Identify whether each of the following statements is true or false.
   a. The fewest number of students absent were on Tuesday and Thursday.
   b. The highest number of students absent was on Monday.
   c. The total number of students absent on the week days is equal to 6.

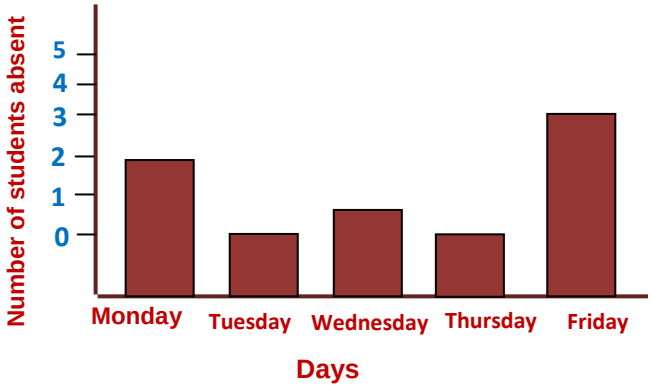


Figure 4.18

2. Children in a certain village investigate where insects are found.

   a. Draw a bar graph using the information in this table.
   b. What was the total number of insects found?
   c. How many more were found in the grass than
      (i) on leaves (ii) on trees

Insects found

On trees	28
In grass	36
On leaves	32
under stones	18
In the air	23
On flowers	16

Figure 4.19

3. The scores of a group of college students is given as: 98, 100, 84, 88, 92, 96, 90, 78, 50, 61, 89, 85, 75. Find the average score. How many of the scores are greater than average score?

4. The following bar graph shows the number of teachers who ordered hot drinks during tea break in a given morning. What is the percentage of teachers who ordered Coffee?

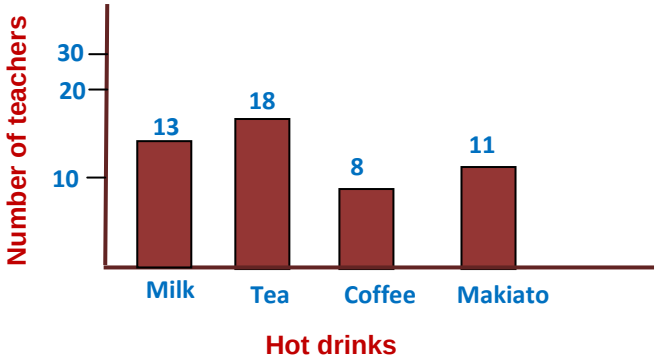


Figure 4.20

A. 16%

B. 18%

C. 8%

D. 22%