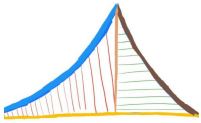
C Programming in Middle School



G. V. V. Sharma
Associate Professor,
Department of Electrical Engineering,
IIT Hyderabad

About this Book

This book introduces C programming for school children in middle school based on NCERT mathematics textbooks from Class 7 onwards.

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Contents

1 Integers

1.1 Do the following addition through a C program

$$17 + 23$$

Solution:

```
//Code by GVV Sharma
//Adding two integers
//April 14, 2025
#include <stdio.h>

//begin main function
int main(void)
{
//Declaring integers
int a = 17, b = 23;
//printing the sum
printf("%d\n",a+b);
        return 0;
}
//end main function
```

1.2 Do the following subtraction through a C program

$$7 - 9$$

Solution:

```
//Code by GVV Sharma
//Adding negative integer
//April 14, 2025
#include <stdio.h>

//begin main function
int main(void)
{
//Declaring integers
int a = 7, b = 9;
//printing the difference
printf("%d\n",a-b);
        return 0;
}
//end main function
```

1.3 Mulitply the following through a C program

$$4 \times (-8)$$

Solution:

```
//Code by GVV Sharma
//April 14, 2025
//Multiplication of numbers
#include <stdio.h>

int main(void)
{
int a = 4, b = -8;
printf("%d\n",a*b);
        return 0;
}
```

1.4 Perform the following division

$$(-100) \div 5$$

Solution:

```
//Code by GVV Sharma
//April 15, 2025
//division of numbers
#include <stdio.h>

int main(void)
{
int a = -100, b = 5;
printf("%d\n",a/b);
        return 0;
}
```

Compute the following

1.5 $(-75) + 18$
1.6 $19 + (-25)$
1.7 $27 + (-27)$
1.8 $(-20) + 0$
1.9 $(-35) + (-10)$
1.10 $(-10) + 3$
1.11 $17 - (-21)$
1.12 $8 \times (-2)$
1.13 $3 \times (-7)$
1.14 $10 \times (-1)$
1.15 $6 \times (-19)$
1.16 $12 \times (-32)$
1.17 $7 \times (-22)$
1.18 $15 \times (-16)$
1.19 $21 \times (-32)$
1.20 $(-42) \times 12$
1.21 $(-55) \times 15$
1.22 $(-5) \times (-6)$
1.23 $(-6) \times (-7)$
1.24 $3 \times (-1)$
1.25 $(-1) \times 225$
1.26 $(-21) \times (-30)$
1.27 $(-316) \times (-1)$
1.28 $(-81) \div 9$
1.29 $(-75) \div 5$
1.30 $(-32) \div 2$
1.31 $125 \div (-25)$
1.32 $80 \div (-5)$
1.33 $64 \div (-16)$
1.34 $(-30) \div 10$
1.35 $50 \div (-5)$
1.36 $(-36) \div (-9)$
1.37 $(-49) \div (-49)$

1.38 $13 \div [(-2) + 1]$
1.39 $(-31) \div [(-30) + (-1)]$
1.40 $[(-36) \div 12] \div (3)$
1.41 $[(-6) + 5] \div [(-2) + 1]$

Fill in the blanks

1.42 $20 \div$ _____ $= -2$
1.43 _____ $\div 4 = -3$

1.44 In a test (+5) marks are given for every correct answer and (-2) marks for every incorrect answer.
   a) Radhika answered all the questions and scored 30 marks though she got 10 correct answers.
   b) Jay also answered al the questions and scored (-12) marks though he got 4 correct answers. How many incorrect answers had they attempted?

1.45 A shopkeeper earns a profit of ₹1 by selling one pen and incurs a loss of 40 paise per pencil while selling pencils of her old stock.
   a) In a particular month she incurs a loss of ₹5. In this period she sold 45 pens. How many pencils did she sell in this period?
   b) In the next month she earns neither profit nor loss. If she sold 70 pens, how many pencils did she sell?

1.46 The temperature at 12 noon was 10°C above zero. If it decreases at the rate of 2°C per hour unitl midnight, at what time would the temperature be 8°C below zero?

1.47 In a class test (+3) marks are given for every correct answer and (-2) marks for every incorrect answer and no marks for not attempting any question.
   a) Radhika scored 20 marks. If she got 12 correct answers, how many questions has she attempted incorrectly?
   b) Mohini scores -5 marks in this test, though she has got 7 correct answers. How many questions has she attempted incorrectly?

1.48 An elevator descends a mine shaft at the rate of $6m/min$. If the descent starts from $10m$ above the ground, how long will it take to reach $-350m$.

1.49 What is the measure of the complement of each of the following angles?

   a) 45° b) 65° c) 41° d) 54°

1.50 What will be the measure of the supplement of each one of the following angles?

   a) 100° b) 90° c) 55° d) 125°

1.51 An exterior angle of a triangle is of measure 70° and one of its interior opposite angles is of measure 25°. Find the measure of the other interior opposite angle.

1.52 The two interior opposite angles of an exterior angle of a triangle are 60° and 80°. Find the measure of the exterior angle.

1.53 Two angles of a triangle are 30° and 80°. Find the third angle.

1.54 One of the angles of a triangle is 80° and the other two angles are equal. Find the measure of each of the equal angles.

1.55 The three angles of a triangle are in the ratio 1:2:1. Find all the angles of the triangle. Classify the triangle in two different ways.

2 Decimal Numbers

Find

2.1 $\frac{2}{7} \times 3$
2.2 $\frac{9}{7} \times 6$
2.3 $\frac{1}{8} \times 3$
2.4 $\frac{13}{11} \times 6$
2.5 $\frac{2}{5} \times 2$
2.6 $3 \times 5\frac{1}{5}$
2.7 $5 \times 6\frac{3}{4}$
2.8 $7 \times 2\frac{1}{4}$
2.9 $4 \times 6\frac{1}{3}$
2.10 $6 \times 3\frac{1}{4}$
2.11 $8 \times 3\frac{2}{5}$
2.12 $\frac{1}{2} \times \frac{1}{7}$
2.13 $\frac{1}{5} \times \frac{1}{7}$
2.14 $\frac{1}{3} \times \frac{4}{5}$
2.15 $\frac{2}{3} \times \frac{1}{5}$
2.16 $\frac{8}{3} \times \frac{4}{7}$
2.17 $\frac{3}{4} \times \frac{2}{3}$
2.18 $\frac{2}{3} \times 2\frac{2}{3}$
2.19 $\frac{2}{7} \times \frac{7}{9}$
2.20 $\frac{3}{8} \times \frac{6}{4}$
2.21 $\frac{9}{5} \times \frac{3}{5}$
2.22 $\frac{1}{3} \times \frac{15}{8}$
2.23 $\frac{11}{2} \times \frac{3}{10}$
2.24 $\frac{4}{5} \times \frac{12}{7}$
2.25 $\frac{2}{5} \times 5\frac{1}{4}$
2.26 $6\frac{2}{5} \times \frac{7}{9}$
2.27 $\frac{3}{2} \times 5\frac{1}{3}$
2.28 $\frac{5}{6} \times 2\frac{3}{7}$
2.29 $3\frac{2}{5} \times \frac{4}{7}$
2.30 $2\frac{3}{5} \times 3$
2.31 $3\frac{4}{7} \times \frac{3}{5}$
2.32 $\frac{2}{3} \times \_\_\_ = \frac{10}{30}$
2.33 $\frac{3}{5} \times \_\_\_ = \frac{24}{75}$
2.34 $7 \div \frac{2}{5}$
2.35 $6 \div \frac{4}{7}$
2.36 $2 \div \frac{8}{9}$
2.37 $\frac{3}{5} \div \frac{1}{2}$
2.38 $\frac{1}{2} \div \frac{3}{5}$
2.39 $2\frac{1}{2} \div \frac{3}{5}$
2.40 $5\frac{1}{6} \div \frac{9}{2}$
2.41 $12 \div \frac{3}{4}$
2.42 $14 \div \frac{5}{6}$
2.43 $8 \div \frac{7}{3}$
2.44 $4 \div \frac{8}{3}$
2.45 $3 \div 2\frac{1}{3}$
2.46 $5 \div 3\frac{4}{7}$
2.47 $\frac{7}{3} \div 2$
2.48 $\frac{4}{9} \div 5$
2.49 $\frac{6}{13} \div 7$
2.50 $4\frac{1}{3} \div 3$
2.51 $3\frac{1}{2} \div 4$
2.52 $4\frac{3}{7} \div 7$
2.53 $\frac{2}{5} \div \frac{1}{2}$
2.54 $\frac{4}{9} \div \frac{2}{3}$
2.55 $\frac{3}{7} \div \frac{8}{7}$
2.56 $2\frac{1}{3} \div \frac{3}{5}$
2.57 $3\frac{1}{2} \div \frac{8}{3}$
2.58 $\frac{2}{5} \div 1\frac{1}{2}$
2.59 $3\frac{1}{5} \div 1\frac{2}{3}$
2.60 $2\frac{1}{5} \div 1\frac{1}{5}$
2.61 0.2×6
2.62 8×4.6
2.63 2.71×5
2.64 20.1×4
2.65 0.05×7
2.66 211.02×4
2.67 2×0.86
2.68 2.5×0.3
2.69 0.1×51.7
2.70 0.2×316.8
2.71 1.3×3.1
2.72 0.5×0.05
2.73 11.2×0.15
2.74 1.07×0.02
2.75 10.05×1.05
2.76 101.01×0.01
2.77 100.01×1.1
2.78 7.75×0.25
2.79 42.8×0.02
2.80 5.6×1.4
2.81 $0.4 \div 2$
2.82 $0.35 \div 5$
2.83 $2.48 \div 4$
2.84 $65.4 \div 6$
2.85 $651.2 \div 4$
2.86 $14.49 \div 7$
2.87 $3.96 \div 4$
2.88 $0.80 \div 5$
2.89 $7 \div 3.5$
2.90 $36 \div 0.2$
2.91 $3.25 \div 0.5$
2.92 $30.94 \div 0.7$
2.93 $0.5 \div 0.25$
2.94 $7.75 \div 0.25$
2.95 $76.5 \div 0.15$
2.96 $37.8 \div 1.4$
2.97 $2.73 \div 1.3$

Find

2.98 $\frac{1}{2}$ of
- a) $2\frac{3}{4}$
- b) $4\frac{2}{9}$

2.99 $\frac{5}{8}$ of
- a) $3\frac{5}{6}$
- b) $9\frac{2}{3}$

Find

2.100 $\frac{1}{4}$ of
- a) $\frac{1}{4}$
- b) $\frac{3}{5}$
- c) $\frac{4}{3}$

2.101 $\frac{1}{7}$ of
- a) $\frac{2}{9}$
- b) $\frac{6}{5}$
- c) $\frac{3}{10}$

2.102 In a class of 40 students $\frac{1}{5}$ of the total number of students like to study English, $\frac{2}{5}$ of the total number like to study Mathematics and the remaining students like to study Science.
- a) How many students like to study English?
- b) How many students like to study Mathematics?
- c) How many students like to study Science?

2.103 Vidya and Pratap went for a picnic. Their mother gave them a water bottle that contained 5 litres of water. Vidya consumed $\frac{2}{5}$ of the water. Pratap consumed the remaining water.
- a) How much water did Vidya drink?
- b) What fraction of the total quantity of water did Pratap drink?

2.104 Shaili plants 4 saplings in a row, in her garden. The distance between two adjacent saplings is $\frac{3}{4}m$. Find the distance between the first and the last sapling.

2.105 Lipika reads a book for $1\frac{3}{4}$ hours everyday. She reads the entire book in 6 days. How many hours in all were required by her to read the book.

2.106 A car runs $16km$ using 1 litre of petrol. How much distance will it cover using $2\frac{3}{4}$ litres of petrol.

2.107 The side of an equilateral triangle is $3.5cm$. Find its perimeter.

2.108 The length of a rectangle is $7.1cm$ and its breadth is $2.5cm$. What is its area?

2.109 Find the area of a rectangle whose length is $5.7cm$ and breadth is $3cm$.

2.110 A two wheeler covers a distance of $55.3km$ in one litre of petrol. How much will it cover in 10 litres of petrol?

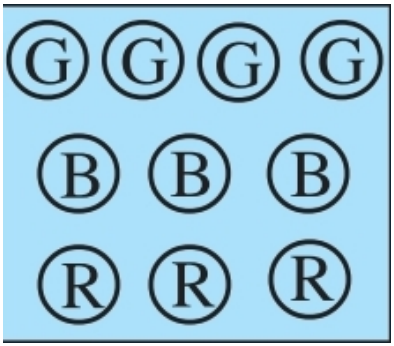
2.111 Savita was preparing a design to decorate her classroom. She needed a few coloured strips of paper of length $1.9cm$ each. She had a strip of coloured paper of length $9.5cm$. How many pieces of the required length will she get out of this strip?

2.112 Each side of a regular polygon is $2.5cm$ in length. The perimeter of the polygon is $12.5cm$. How many sides does the polygon have?

2.113 A car covers a distance of 89.1*km* in 2.2 hours. What is the average distance covered by it in 1 hour?

2.114 A vehicle covers a distance of 43.2*km* in in 2.4 litres of petrol. How much will it cover in one litre of petrol?

2.115 A collection of 10 chips with different colours is given in Fig. 2.115. Fill the table and find the percentage of chips of each colour.



(a) Chips

Colour	Number
Green	
Blue	
Red	
Total	

(b) Table

Fig. 2.115

2.116 Mala has a collection of bangles. She has 20 gold bangles and 10 silver bangles. What is the percentage of bangles of each type? Can you put it in the tabular form?

2.117 Out of 25 children in a class, 15 are girls. What is the percentage of girls?

2.118 Out of 32 students, 8 are absent. What per cent of the students are absent?

2.119 There are 25 radios, 16 of them are out of order. What per cent of radios are out of order?

2.120 A shop has 500 items, out of which 5 are defective. What per cent are defective?

2.121 There are 120 voters, 90 of them voted yes. What per cent voted yes?

2.122 A survey of 40 children showed that 25% liked playing football. How many children liked playing football?

2.123 Rahul bought a sweater and saved ₹200 when a discount of 25% was given. What was the price of the sweater before the discount?

2.124 9 is 25% of what number?

2.125 75% of what number is 15?

2.126 Out of 15,000 voters in a constituency, 60% voted. Find the percentage of voters who did not vote. Can you now find how many actually did not vote?

2.127 Meeta saves ₹4000 from her salary. If this is 10% of her salary. What is her salary?

2.128 A local cricket team played 20 matches in one season. It won 25% of them. How many matches did they win?

3 Programming

In a quiz, team A scored $a_1 = -40, a_2 = 10, a_3 = 0$ and team B scored $b_1 = 10, b_2 = 0, b_3 = -40$ in three successive rounds.

3.1 If the total scores are

$$a = a_1 + a_2 + a_3 \tag{3.0.1.1}$$

$$b = b_1 + b_2 + b_3 \tag{3.0.1.2}$$

which team scored more?

Solution:

```
//Code by Harini
//February 23, 2025
//Revised by GVV Sharma
//April 14, 2025
//add two sets of numbers and compare
#include <stdio.h>

//begin main function
int main() {
// first team scores
  int a1=-40,a2=10,a3=0;
// second team scores
  int b1=10,b2=0,b3=-40;

  //declaring scores variables
int a,b;
  //sum of scores
  a=a1+a2+a3;
  b=b1+b2+b3;
  //comparing scores
  if (a>b){
              printf("a scored more\n");
             }
  else if (a<b){
              printf("b scored more\n");
             }
  else {
              printf("they are equal\n");
}
//end comparison
  return 0;
}
```

```
//end main function
```

3.2 Write a function to compare the final scores. Check for the cases when $a = -40, b = -40$; $a = 30, b = 20$; $a = -20, b = -10$.

Solution:

```
//code by harini
//feb 23 2025
//code by GVV Sharma
//April 14 2025
//function to compare two numbers

#include <stdio.h>

//function to compare the numbers a and b
void compare(int a,int b){
        if (a>b){
        printf("a scored more\n");
}
 else if (a<b){
        printf("b scored more\n");
}
 else {
        printf("they are equal\n");
}
       }
//end function to compare the numbers a and b
//begin main function
int main() {
 int a=-40,b=-40;

 //call the function to compare the numbers
 compare(a,b);

 return 0;
}
//end main function
```

3.3 Use arrays and a for loop to evaluate

$$a = \sum_{i=0}^{2} a_i \tag{3.0.3.1}$$

$$b = \sum_{i=0}^{2} b_i \tag{3.0.3.2}$$

Solution:

```
//code by harini
//feb 23 2025
//revise by GVV Sharma
//April 14 2025
//compares sum of 2 arrays using a for loop
#include <stdio.h>

//compare function
void compare(int a,int b){
            if (a>b){
            printf("a scored more\n");
}
 else if (a<b){
            printf("b scored more\n");
}
 else {
            printf("they are equal\n");
}
          }
///end compare function
//begin main function
int main() {
          //Declaring arrays
int a1[]={-40,10,0};
int b1[]={10,0,-40};
//Initializing sums
int a=0,b=0;
   for (int i = 0; i <= 2; i++){
              a=a+a1[i];
              b=b+b1[i];
   }
//Call compare function
   compare(a,b);
 return 0;
}
//end main function
```

3.4 Revise the above code using only functions.

Solution:

```
//code by harini
//feb 23 2025
//revise by GVV Sharma
```

```
//April 14 2025
//using functions for arrays
#include <stdio.h>

//Declaring functions
void compare(int a,int b);
int sum(int a[]);

//begin main function
int main() {
        //Declaring arrays
int a1[]={-40,10,0};
int b1[]={10,0,-40};
//Initializing sums
int a=0,b=0;
//finding sum for A
a = sum(a1);
//finding sum for B
b = sum(b1);
//Call compare function
  compare(a,b);
 return 0;
}
//end main function

//compare function
void compare(int a,int b){
          if (a>b){
          printf("a scored more\n");
}
 else if (a<b){
          printf("b scored more\n");
}
 else {
          printf("they are equal\n");
}
         }
//end compare function
//sum function
int sum(int a1[]){
int a=0;
  for (int i = 0; i <= 2; i++){
           a=a+a1[i];
  }
  return a; //returning the sum to main
```

```
    }
//end sum function
```

3.5 Use files for the input data.

Solution:

```
//Code by GVV Sharma
//April 14 2025
//using files
#include <stdio.h>

//Declaring functions
void compare(int a,int b);
int sum(int a[]);

//begin main function
int main() {
        //Declaring arrays
int a1[3], b1[3];
//declare file pointer
FILE *fp;
int i;
//Initializing sums
int a=0,b=0;
        //Read a from file a.dat
        //Open file pointer
fp = fopen("a.dat", "r");

//load data from file to array a1
 for(i=0;i<=2;i++){
    fscanf(fp,"%d",&a1[i]);
   }

//Cose file pointer

fclose(fp);
        //Read a from file b.dat
        //Open file pointer
fp = fopen("b.dat", "r");

//load data from file to array b1
 for(i=0;i<=2;i++){
    fscanf(fp,"%d",&b1[i]);
   }
//Close file pointer
fclose(fp);
```

```
//finding sum for A
a = sum(a1);
//finding sum for B
b = sum(b1);
//Call compare function
   compare(a,b);
  return 0;
}
//end main function

//compare function
void compare(int a,int b){
            if (a>b){
            printf("a scored more\n");
}
  else if (a<b){
            printf("b scored more\n");
}
  else {
            printf("they are equal\n");
}
          }
//end compare function
//sum function
int sum(int a1[]){
int a=0;
   for (int i = 0; i <= 2; i++){
             a=a+a1[i];
   }
   return a; //returning the sum to main
   }
//end sum function
```

3.6 Revise the files program using pointer arrays

Solution:

```
//Code by GVV Sharma
//April 14 2025
//using pointer arrays
#include <stdio.h>
#include <stdlib.h>

//Declaring functions
void compare(int a,int b);
int sum(int a[], int m);
```

```
//begin main function
int main() {
//declare pointer arrays
int *a1,*b1,m = 3;
//Initializing sums
int a=0,b=0,i;
//File pointer
FILE *fp;

//Create a1
a1= (int *)malloc(m * sizeof( a1));
b1= (int *)malloc(m * sizeof( b1));

        //Read a from file a.dat
        //Open file pointer
fp = fopen("a.dat", "r");

//load data from file to array a1
 for(i=0;i<=2;i++){
   fscanf(fp,"%d",&a1[i]);
  }

//Cose file pointer

fclose(fp);
        //Read a from file b.dat
        //Open file pointer
fp = fopen("b.dat", "r");

//load data from file to array b1
 for(i=0;i<=2;i++){
   fscanf(fp,"%d",&b1[i]);
  }
//Close file pointer
fclose(fp);

//finding sum for A
a = sum(a1,m);
//finding sum for B
b = sum(b1,m);
//Call compare function
compare(a,b);

//free memory
```

```
free(a1);
free(b1);
 return 0;
}
//end main function

//compare function
void compare(int a,int b){
            if (a>b){
            printf("a scored more\n");
}
 else if (a<b){
            printf("b scored more\n");
}
 else {
            printf("they are equal\n");
}
          }
//end compare function
//sum function
int sum(int *vec,int m){
int a=0;
  for (int i = 0; i < m; i++){
             a=a+vec[i];
  }
  return a; //returning the sum to main
  }
//end sum function
```

3.7 Revise the files program using only functions

Solution:

```
//Code by GVV Sharma
//April 14 2025
//using functions for all
#include <stdio.h>
#include <stdlib.h>

//Declaring functions
void compare(int a,int b);
int sum(int a[], int m);
int *loadVec(char *str,int m);
int *createVec(int m);

//begin main function
int main() {
```

```
//Initializing sums
int a=0,b=0,m = 3;
//declare pointer arrays
int *a1,*b1;
        //Read a from file a.dat
a1= loadVec("a.dat",m);
b1= loadVec("b.dat",m);
        //Read b from file b.dat

//finding sum for A
a = sum(a1,m);
//finding sum for B
b = sum(b1,m);
//Call compare function
compare(a,b);
 return 0;
}
//end main function

//compare function
void compare(int a,int b){
          if (a>b){
          printf("a scored more\n");
}
 else if (a<b){
          printf("b scored more\n");
}
 else {
          printf("they are equal\n");
}
         }
//end compare function
//sum of vector elements
int sum(int *vec,int m){
int a=0;
  for (int i = 0; i < m; i++){
           a=a+vec[i];
  }
  return a; //returning the sum to main
  }
//end sum function
//loading file data into vector
int *loadVec(char *str,int m){
FILE *fp;
int i;
```

```
int *vec=createVec(m);
        //Open file pointer
fp = fopen(str, "r");

//load data from file to array a1
 for(i=0;i<m;i++){
    fscanf(fp,"%d",&vec[i]);
  }

//Cose file pointer

fclose(fp);
return vec;
}

//end loading file data into vector
//Defining the function for vector creation
int *createVec(int m)
{
 int *vec;

 //Allocate memory to the pointer
vec = (int *)malloc(m * sizeof( vec));
 return vec;
}
```

Use ifelse for the following

3.8 $25 \times (-21) = (-21) \times 25$

3.9 $(-48) \div (8) = 48 \div (-8)$

3.10 $(-23) \times 20 = 23 \times (-20)$

3.11 $90 \div (-45) = (-90) \div 45$

3.12 $(-136) \div 4 = 136 \div (-4)$

3.13 $(-15) \times [(-7) + (-1)] = (-15) \times (-7) + (-15) \times (-1)$

3.14 $10 \times [6 + (-2)] = 10 \times 6 + 10 \times (-2)$

3.15 $10 \times [6 - (-2)] = 10 \times 6 - 10 \times (-2)$

3.16 $(-15) \times [(-7) - (-1)] = (-15) \times (-7) - (-15) \times (-1)$

3.17 $18 \times [(7) + (-3)] = 18 \times (7) + 18 \times (-3)$

3.18 $(-21) \times [(-4) + (-6)] = (-21) \times (-4) + (-21) \times (-6)$

3.19 An angle is greater than $45°$. Is its complementary angle greater than $45°$or equal to $45°$or less than $45°$?

3.20 Is there a triangle whose sides have lengths $10.2cm, 5.8cm$ and $4.5cm$?

3.21 The lengths of two sides of a triangle are $6cm$ and $8cm$. Between which two numbers can length of the third side fall?

3.22 Is it possible to have a triangle with the following sides?

a) $2cm, 3cm, 5cm$

b) $3cm, 6cm, 7cm$
c) $6cm, 3cm, 2cm$

3.23 The lengths of two sides of a triangle are $12cm$ and $15cm$. Between what two measures should the length of the third side fall?

Which is greater?

3.24 $\frac{1}{2}$ of $\frac{3}{4}$ or $\frac{3}{5}$ of $\frac{5}{8}$

3.25 $\frac{1}{2}$ of $\frac{6}{7}$ or $\frac{2}{3}$ of $\frac{3}{7}$

Use arrays for the following

3.26 $(-12) \times (-11) \times (10)$
3.27 $(9) \times (-3) \times (-6)$
3.28 $(-18) \times (-5) \times (-4)$
3.29 $(-3) \times (-6) \times (-2) \times (-1)$

Use recursion for the following

3.30 $(-1) \times (-2) \times (-3) \times (-4)$

Use matrices for the following

3.31 The difference in the measures of two complementary angles is $12°$. Find the measures of the angles.
3.32 Among two supplementary angles the measure of the larger angle is $44°$ more than the measure of the smaller. Find their measures

Identify which of the following pairs of angles are complementary and which are supplementary.

3.33 $65°$, $115°$
3.34 $63°$, $27°$
3.35 $130°$, $50°$
3.36 $45°$, $45°$
3.37 $112°$, $68°$
3.38 $80°$, $10°$

4 Data Handling

4.1 Find

a) 2.7×4 b) 1.8×1.2 c) 2.3×4.35

and arrange the products in descending order.

4.2 Find the average of $4.2, 3.8$ and 7.6.
4.3 Ashish studies for 4 hours, 5 hours and and 3 hours respectively on three consecutive days. How many hours does he study daily on an average?
4.4 A batsman scored the following number of runs in 6 innings.

$$36, 35, 50, 46, 60, 55$$

Calculate the mean runs scored by him in an inning.

4.5 The ages in years of 10 teachers of a school are

$$32, 41, 28, 54, 35, 26, 23, 33, 38, 40$$

a) What is the age of the oldest teacher and that of the youngest teacher?
b) What is the range of the ages of the teachers?
c) What is the mean age of these teachers?

4.6 Organize the following marks in a class assessment, in tabular form with columns as marks and frequency.

a) Which number is the highest?
b) Which number is the lowest?
c) What is the range of the data?
d) Find the arithmetic mean.

4.7 A cricketer scores the following runs in eight innings.

$$58, 76, 40, 35, 46, 45, 0, 100$$

Find the mean score.

4.8 Generate the following table using a C program

Player	Game 1	Game 2	Game 3	Game 4
A	14	16	10	10
B	0	8	6	4
C	8	11	Did not Play	13

Fig. 4.8

and answer the following questions.

a) Find the mean to determine $A's$ average number of points scored per game.
b) Who is the best performer?

4.9 The marks out of 100 obtained by a group of students in a science test are 85, 76, 90, 85, 39, 48, 56, 95, 81 and 75. Find the

a) Highest and lowest marks obtained by the students.
b) Range of marks obtained.
c) Mean marks obtained by the group.

4.10 The enrolment in a school during six consecutive years was as follows

$$1555, 1670, 1750, 2013, 2540, 2820$$

Find the mean enrolment of the school for this period.

4.11 The rainfall (in mm) in a city on 7 days a week was recorded as in Table 4.11. Generate this table using a C program.

Player	Game 1	Game 2	Game 3	Game 4
A	14	16	10	10
B	0	8	6	4
C	8	11	Did not Play	13

Fig. 4.11

4.12 Find the range of the rainfall in the given data.
4.13 Find the mean rainfall for the week.
4.14 On how many days was the rainfall less than the mean rainfall
4.15 The height of 10 girls was measured in cm and result was as follows

135, 150, 139, 128, 151, 132, 146, 149, 143, 141.

a) What is the height of the tallest girl?
b) What is the height of the shortest girl?
c) What is the range of the data?
d) What is the mean height of the girls?
e) How many girls have heights more than the mean height?

4.16 To find out the weekly demand for different sizes of shirt, a shopkeeper kept records of sales of sizes as shown in (4.16). This is the record for a week. Find the mode of the data.

Size (in inches)	90 cm	95 cm	100 cm	105 cm	110 cm	Total
Number of Shirts Sold	8	22	32	37	6	105

Fig. 4.16

4.17 Find the mode of the given set of numbers

1, 1, 1, 2, 2, 2, 2, 3, 4, 4

.

4.18 Following are the margins of victory in the football matches of a league. Find the mode of this data.

1, 3, 2, 5, 1, 4, 6, 2, 5, 2, 2, 2, 4, 1, 2, 3, 1, 1, 2, 3, 2, 6, 4, 3, 2,
1, 1, 4, 2, 1, 5, 3, 3, 2, 3, 2, 42, 1, 2.

Find the mode of

4.19

2, 6, 5, 3, 0, 4, 3, 2, 4, 5, 2, 4

4.20

$$2, 4, 16, 12, 14, 14, 16, 14, 10, 14, 18, 14$$

4.21

$$2, 2, 2, 3, 3, 4, 5, 5, 5, 6, 6, 8$$

4.22

$$12, 14, 12, 16, 15, 13, 14, 18, 19, 12, 14, 15, 16, 15, 16, 16,$$
$$15, 17, 13, 16, 16, 15, 15, 13, 15, 17, 15, 14, 15, 13, 15, 14$$

4.23 Heights (in cm) of 25 children given below

$$168, 165, 163, 160, 163, 161, 162, 164, 163, 162, 164, 163, 160,$$
$$163, 160, 165, 163, 162, 163, 164, 163, 160, 165, 163, 162$$

What is the mode of their heights? What do we understand by mode here?

4.24 Find the median of the group of 17 students with the following heights (in cm)

$$106, 110, 123, 125, 117, 120, 112, 115,$$
$$110, 120, 115, 102, 115, 115, 109, 115, 101$$

4.25 Your friend found the median and the mode of a given data. Describe and correct your friends error if any

$$35, 32, 35, 42, 38, 32, 34$$

Median = 42, Mode = 32.

4.26 Find the median of the data: 24, 36, 46, 17, 18, 25, 35.

4.27 The scores in mathematics test (out of 25) of 15 students is as follows

$$19, 25, 23, 20, 9, 20, 15, 10, 5, 16, 25, 20, 24, 12, 20$$

Find the mode and median of this data. Are they same?

4.28 The runs scored in a cricket match by 11 players is as follows

$$6, 15, 120, 50, 100, 80, 10, 15, 8, 10, 15$$

Find the mean, mode and median of this data. Are the three same?

4.29 The weights (in kg.) of 15 students of a class are

$$38, 42, 35, 37, 45, 50, 32, 43, 43, 40, 36, 38, 43, 38, 47$$

a) Find the mode and median of this data.
b) Is there more than one mode?

4.30 Find the mode and median of the data

$$13, 16, 12, 14, 19, 12, 14, 13, 14$$

4.31 The data

$$6, 4, 3, 8, 9, 12, 13, 9$$

has mean 9. True or False?

4.32 Two hundred students of 6th and 7th classes were asked to name their favourite colour so as to decide upon what should be the colour of their school building. The results are shown in the following table in Fig. 4.32. Represent the given data on a bar graph

Favourite Colour	Red	Green	Blue	Yellow	Orange
Number of Students	43	19	55	49	34

Fig. 4.32

Answer the following questions with the help of the bar graph

a) Which is the most preferred colour and which is the least preferred?

b) How many colours are there in all? What are they?

4.33 Following data in Fig. 4.33 gives total marks (out of 600) obtained by six children of a particular class. Represent the data on a bar graph.

Students	Ajay	Bali	Dipti	Faiyaz	Geetika	Hari
Marks Obtained	450	500	300	360	400	540

Fig. 4.33

4.34 Consider the following two collections of data in Fig. 4.34 giving the average daily hours of sunshine in two cities Aberdeen and Margate for all the twelve months of the year. These cities are near the south pole and hence have only a few hours of sunshine each day. In a particular month, which city has more sunshine hours? Explain through a double bar graph.

In Margate

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Average hours of Sunshine	2	$3\frac{1}{4}$	4	4	$7\frac{3}{4}$	8	$7\frac{1}{2}$	7	$6\frac{1}{4}$	6	4	2

In Aberdeen

Average hours of Sunshine	$1\frac{1}{2}$	3	$3\frac{1}{2}$	6	$5\frac{1}{2}$	$6\frac{1}{2}$	$5\frac{1}{2}$	5	$4\frac{1}{2}$	4	3	$1\frac{3}{4}$

Fig. 4.34

4.35 A mathematics teacher wants to see, whether the new technique of teaching she applied after quarterly test was effective or not. She takes the scores of the 5 weakest children in the quarterly test (out of 25) and in the half yearly test (out of 25) which are listed in Fig. 4.35. Is her technique effective?

Students	Ashish	Arun	Kavish	Maya	Rita
Quarterly	10	15	12	20	9
Half yearly	15	18	16	21	15

Fig. 4.35

4.36 Sale of English and Hindi books in the years 1995, 1996, 1997 and 1998 are given below in Fig. 4.36.

Years	1995	1996	1997	1998
English	350	400	450	620
Hindi	500	525	600	650

Fig. 4.36

Draw a double bar graph and answer the following questions

a) In which year was the difference in the sale of the two language books least?.
b) Can you say that the demand for English books rose faster? Justify.

4.37 Number of children in six different classes are given below in Fig. 4.37. Represent the data on a bar graph.

Class	Fifth	Sixth	Seventh	Eighth	Ninth	Tenth
Number of Children	135	120	95	100	90	80

Fig. 4.37

a) How would you choose a scale?
b) Which class has the maximum number of children? And the minimum?
c) Find the ratio of students of class sixth to the students of class eight.

4.38 The performance of a student in 1st Term and 2nd Term is given in Fig. 4.38. Draw a double bar graph choosing appropriate scale and answer the following

Subject	English	Hindi	Maths	Science	S. Science
1st Term (M.M. 100)	67	72	88	81	73
2nd Term (M.M. 100)	70	65	95	85	75

Fig. 4.38

a) In which subject, has the child improved his performance the most?
b) In which subject is the improvement the least?
c) Has the performance gone down in any subject?

4.39 Consider this data in Fig. 4.39 collected from a survey of a colony.

Favourite Sport	Cricket	Basket Ball	Swimming	Hockey	Athletics
Watching	1240	470	510	430	250
Participating	620	320	320	250	105

Fig. 4.39

a) Draw a double bar graph choosing an appropriate scale. What do you infer from the bar graph?
b) Which sport is most popular?
c) Which is more preferred, watching or participating in sports?

5 Math Library

5.1 Determine whether the triangle whose lengths of sides are $3cm, 4cm, 5cm$ is a right-angled triangle.

5.2 $\triangle ABC$ is right-angled at C. If $AC = 5cm$ and $BC = 12cm$ find the length of AB.
5.3 PQR is a triangle, right-angled at P. If $PQ = 10cm$ and $PR = 24cm$, find QR.
5.4 ABC is a triangle, right-angled at C. If $AB = 25cm$ and $AC = 7cm$, find BC.
5.5 A $15m$ long ladder reached a window $12m$ high from the ground on placing it against a wall at a distance a. Find the distance of the foot of the ladder from the wall.
5.6 Which of the following can be the sides of a right triangle?
   a) $2.5cm, 6.5cm, 6cm$.
   b) $2cm, 2cm, 5cm$.
   c) $1.5cm, 2cm, 2.5cm$.
5.7 A tree is broken at a height of $5m$ from the ground and its top touches the ground at a distance of $12m$ from the base of the tree. Find the original height of the tree.
5.8 Find the perimeter of the rectangle whose length is $40cm$ and a diagonal is $41cm$.
5.9 The diagonals of a rhombus measure $16cm$ and $30cm$. Find its perimeter.

6 Random Numbers

6.1 Take a board marked from -104 to 104 as shown in the figure.
6.2 Take a bag containing two blue and two red dice. Number of dots on the blue dice indicate positive integers and number of dots on the red dice indicate negative integers.
6.3 Every player will place his/her counter at zero.
6.4 Each player will take out two dice at a time from the bag and throw them.
6.5 After every throw, the player has to multiply the numbers marked on the dice.
6.6 If the product is a positive integer then the player will move his counter towards 104; if the product is a negative integer then the player will move his counter towards -104.
6.7 The player who reaches either -104 or 104 first is the winner.

104	103	102	101	100	99	98	97	96	95	94
83	84	85	86	87	88	89	90	91	92	93
82	81	80	79	78	77	76	75	74	73	72
61	62	63	64	65	66	67	68	69	70	71
60	59	58	57	56	55	54	53	52	51	50
39	40	41	42	43	44	45	46	47	48	49
38	37	36	35	34	33	32	31	30	29	28
17	18	19	20	21	22	23	24	25	26	27
16	15	14	13	12	11	10	9	8	7	6
–5	– 4	–3	–2	–1	0	1	2	3	4	5
– 6	–7	– 8	–9	–10	–11	–12	–13	–14	–15	–16
–27	–26	–25	–24	–23	–22	–21	–20	–19	–18	–17
–28	–29	–30	–31	–32	–33	–34	–35	–36	–37	–38
– 49	–48	–47	–46	–45	–44	–43	–42	–41	–40	–39
– 50	–51	–52	–53	–54	–55	–56	–57	–58	–59	– 60
–71	–70	–69	–68	–67	–66	–65	–64	–63	–62	–61
–72	–73	–74	–75	–76	–77	–78	–79	–80	–81	–82
–93	–92	–91	–90	–89	–88	–87	–86	–85	–84	–83
–94	–95	–96	–97	–98	–99	–100	–101	–102	–103	–104

Fig. 6.7

6.8 Write a program to simulate the game. Give the inputs manually.

6.9 Revise the program by generating the inputs using randomly as follows

a) Generate the numbers on all the dice using a uniform distribution ranging from 1 to 6.

b) Simulate the blue and red dice through a Bernoulli distribution having values 1 and -1.