

Algebra



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ABOUT THIS BOOK

This book introduces quadratic equations, complex numbers and other concepts in algebra. All problems in the book are from NCERT mathematics textbooks from Class 9-12. Exercises are from CBSE and JEE exam papers.

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April 14, 2025

Github: <https://github.com/gadepall/algebra>

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and

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1 **Integers**

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1 INTEGERS

1.0.1 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
```

1.0.2 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
```

Compute the following

$$1.0.3 \quad (-75) + 18$$

$$1.0.4 \quad 19 + (-25)$$

$$1.0.5 \quad 27 + (-27)$$

$$1.0.6 \quad (-20) + 0$$

$$1.0.7 \quad (-35) + (-10)$$

$$1.0.8 \quad (-10) + 3$$

$$1.0.9 \quad 17 - (-21)$$

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.

1.0.10 If the total scores are

$$a = a_1 + a_2 + a_3 \quad (1.0.10.1)$$

$$b = b_1 + b_2 + b_3 \quad (1.0.10.2)$$

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
```

1.0.11 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
```

1.0.12 Use arrays and a for loop to evaluate

$$a = \sum_{i=0}^2 a_i \quad (1.0.12.1)$$

$$b = \sum_{i=0}^2 b_i \quad (1.0.12.2)$$

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

```

1.0.13 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

```

1.0.14 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]);
    }

    //Close 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

```

1.0.15 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]);
}

//Close 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

```