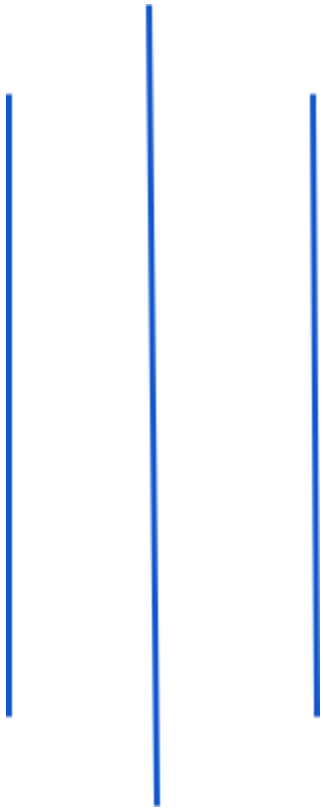
Tribhuvan University

Institute of Engineering

Thapathali Campus,Thapathali

LAB SHEET #2



Submitted by:

Name: Kishan Adhikari

Roll No. :THA077BCT021

Submitted to:

Department of Electronics and Computer Engineering

Date : 24th July 2021

Title:

Define the math operator '+' as PLUS, '-' as MINUS, '*' as MULT & '/' as DIVIDE using preprocessor directives and do the operations over variables (x, y) defined in the above question like z=x PLUS y.

Problem Analysis:

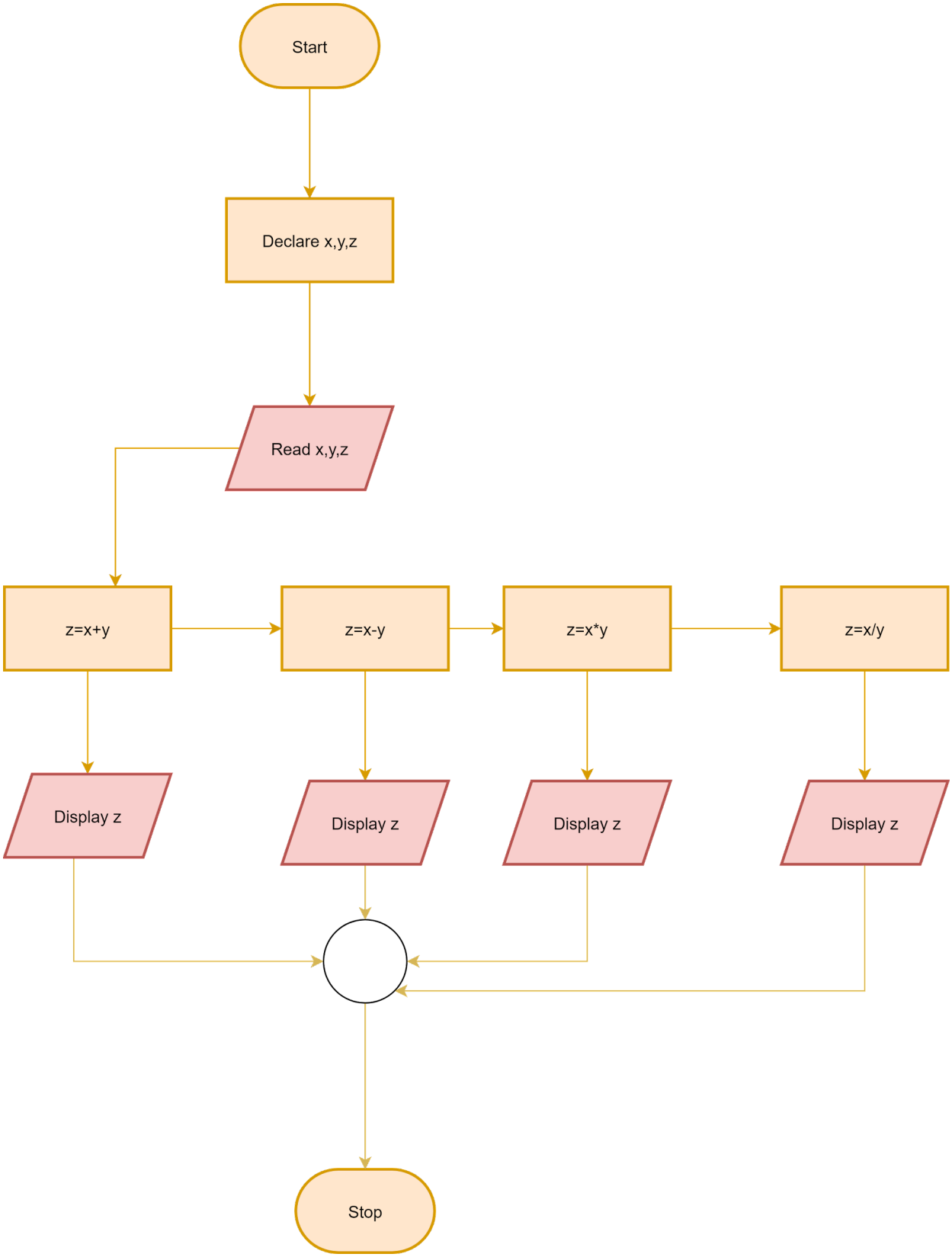
The problem is to define math operator(+,-,*,/) as PLUS, MINUS, MULT, DIVIDE respectively and perform mathematical operation.So,we use preprocessor directive and set value of these variables as +,-,*,and perform operation on x(int) ,y(int) by using these variables and store in z(int) as z=x PLUS y. Since we already defined PLUS as +,the expression becomes z=x+y.

Macros variable	**Input variables**	**Processing variables/ calculations**	**Output variables**	**Necessary header files**
PlUS (+) MINUS(-) MULT(*) DIVIDE(/)	x(int) y(int) z(int)	z=x PLUS y z=x MINUS y z=x MULT y z=x DIVIDE y	z(int)	stdio.h

Algorithm:

1. Start
2. Define PLUS,MINUS,MULT,DIVIDE as +,-,*,/
3. Declare variables as:x(int),y(int),z(int)
4. Read x,y
5. Perform calculation as :z=x PLUS y
6. Display z
7. Perform calculation as :z=x MINUS y
8. Display x
9. Perform calculation as :z=x MULT
10. Display x
11. Perform calculation as :z=x DIVIDE y
12. Display x
13. Stop

Flowchart:


Start
Declare x,y,z
Read x,y,z
z=x+y
z=x-y
z=x*y
z=x/y
Display z
Display z
Display z
Display z
Stop

Source Code:

```
/*

 @Filename:preprocessor.c
 @Author:Kishan Adhikari
 @Created Date:2021/07/20
 Define the math operator '+' as PLUS, '-' as MINUS, '*' as MULT & '/' as
DIVIDE using
 preprocessor directives and do the operations over variables (x, y)
defined on above
 question like z=x PLUS y.

*/
#include <stdio.h>

//Preprocessor directive (it is stored before program compilation)
#define PLUS +
#define MINUS -
#define MULTIPLY *
#define DIVIDE /

int main()
{
 int x, y, z;
 printf("Enter value of x and y:\n");
 scanf("%d %d", &x, &y);
 z = x PLUS y; //PLUS is replaced by +
 printf("Value of z after PLUS is : %d\n", z);

 z = x MINUS y; //MINUS is replaced by -
 printf("Value of z after MINUS is : %d\n", z);

 z = x MULTIPLY y; //MULTIPLY is replaced by *
 printf("Value of z after MULTIPLY is : %d\n", z);

 z = x DIVIDE y; //Divide is replaced by /
 printf("Value of z after DIVIDE is : %d\n", z);

 return 0;
}
```

Output:

```
Enter value of x and y:
4 8
Value of z after PLUS is : 12
Value of z after MINUS is : -4
Value of z after MULTIPLY is : 32
Value of z after DIVIDE is : 0
```

Discussion and Conclusion:

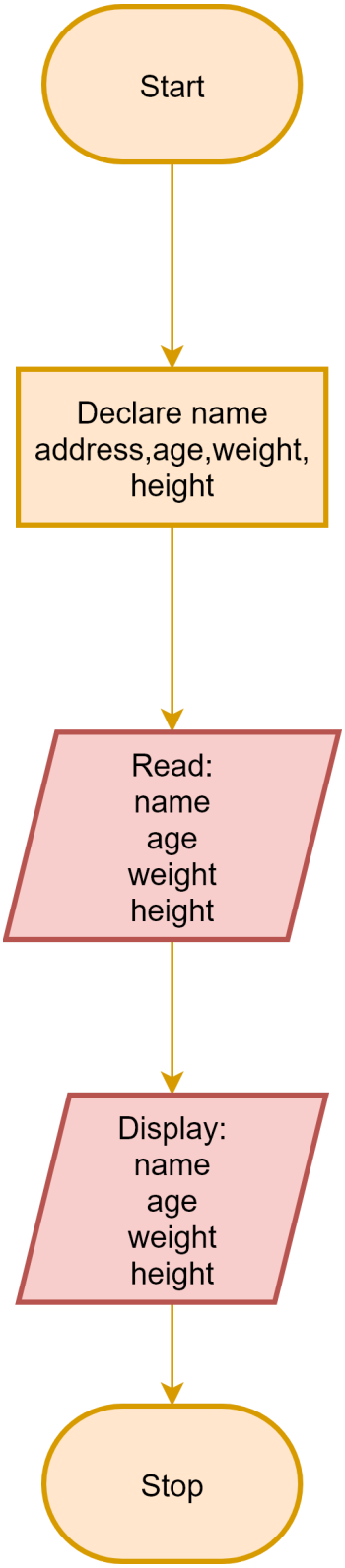
From this lab,I understood the basic structure of C programming including the meaning of header files ,use of preprocessor directive,and steps of problem solving as well as drawing flowchart.Hence the value of z was calculated.

Title:
Get input of your name, address, age in years, weight and height from keyboard and display the information using unformatted I/O (String I/O).

Problem Analysis:
The problem focuses on using unformatted I/O to get input of name, address,age,weight and height. Since unformatted I/O only takes a character variable as input ,we define name(char[20]), address(char[100]), age(char[3]), weight(char), height(char) variable.Then input is taken using fgets() and getchar() function.Then input is displayed using puts() and putchar() function.

Input variables	**Function used**	**Output variables**	**Necessary header files**
name(char[20]), address(char[100]) age(char[3]), weight(char), height(char	printf() fgets() getchar() puts() putchar()	name(char[20]) address(char[100]) age(char[3]) weight(char), height(char	stdio.h

Flowchart:


Start
Declare name address,age,weight, height
Read: name age weight height
Display: name age weight height
Stop

Source code:

```
/*
@Filename:display.c
@Author:Kishan Adhikari
@Created Date:2021/07/20
Get input of your name, address, age in years, weight and height from
keyboard and display the information using unformatted I/O (String I/O)
*/
#include <stdio.h>
// #include "conio.h"
int main()
{
 char name[30], address[100], age[3], weight, height;
 printf("Enter your name:\n");
 fgets(name, 30, stdin);
 printf("your name is:\n");
 puts(name);

 printf("Enter your address:\n");
 fgets(address, 100, stdin);
 printf("your address is :\n");
 puts(address);

 printf("Enter your age:\n");
 fgets(age, 266, stdin);
 printf("your age is:\n");
 puts(age);

 printf("Enter your weight in kg:\n");
 fgets(age, 256, stdin);
 printf("your weight is:\n");
 puts(age);

 printf("Enter your height:\n");
 height = getchar();
 printf("your height in feet is:\n");
 putchar(height);
 puts("\n");
 return 0;
}
```

Output:

Enter your name:
Kishan Adhikari
your name is:
Kishan Adhikari

Enter your address:
Panchkhal
your address is :
Panchkhal

Enter your age:
19
your age is:
19

Enter your weight in kg:
80
your weight is:
80

Enter your height:
6
your height in feet is:
6

Discussion and Conclusion:

From this lab,I understood the basic structure of C programming including the meaning of header files ,unformatted Input/Output, and steps of problem solving as well as drawing flowchart.Hence the name, address, age,weight and height was displayed.

Title:

Write a program to input marks of 5 subjects (Physics, Chemistry, Math, English and Biology) for a student. Display the rank of each subject and also the result of total marks and percentage obtained with his/her rank in the class. The rank is categorized as fail (marks < 40%), pass and third division (marks between 40 to 55%), second (marks between 55 to 65%), first (marks between 65 to 80%), Distinction (marks between 80 to 95%),extraordinary (marks above 95 to100%)

Problem Analysis:

The problem is to take input from 5 subjects and find the rank of the student. We define five variables of int type as phy,chem,eng,bio and math.

Then we calculate obtained marks(int) as :

obtained marks=phy+chem+eng+bio+math

Percentage is calculated as:

Percentage=obtained marks/(total marks)*100

Percentage variable is stored as a float data type.

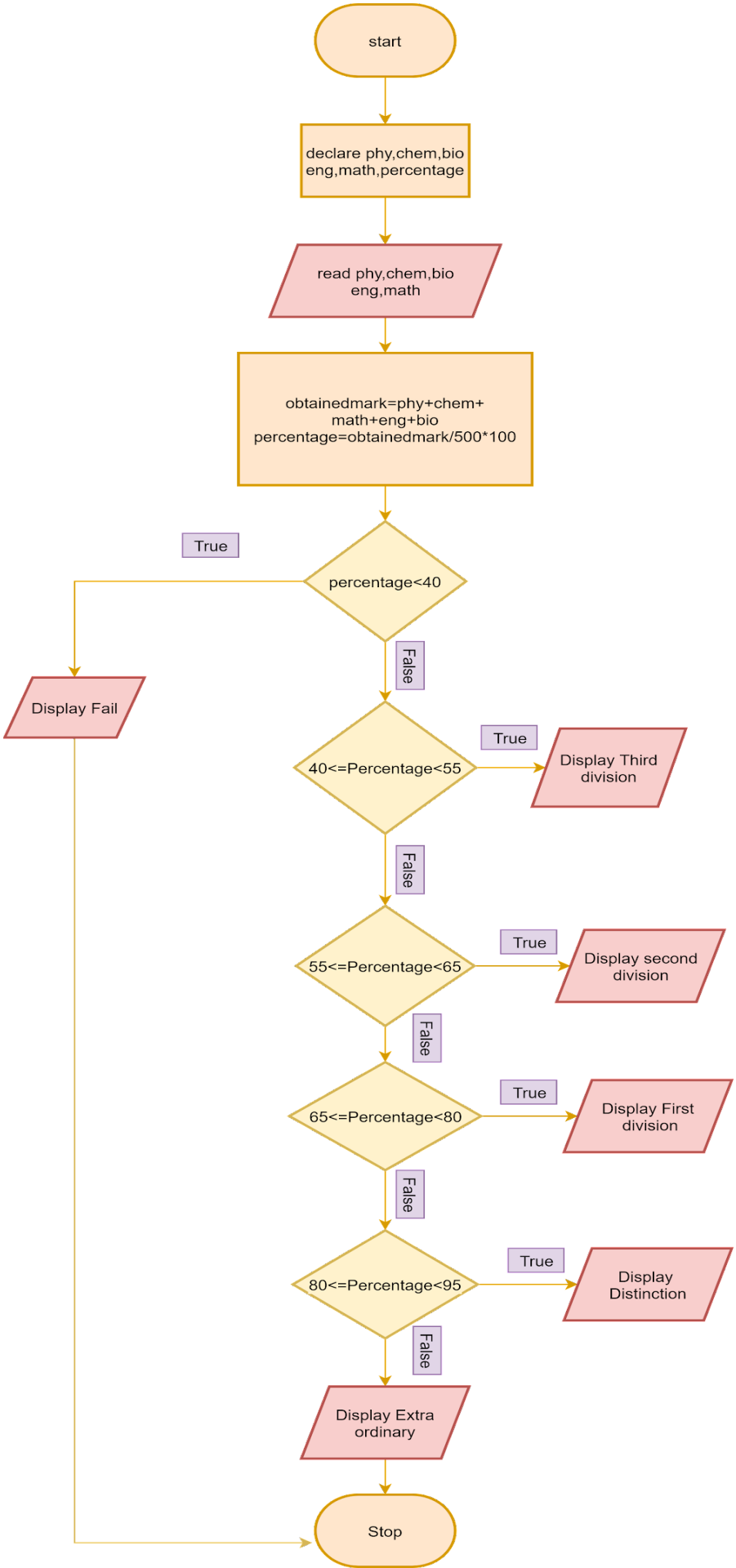
To check the rank we have to use conditional expression(if-else if -else). If Percentage is less than 40; print it as Fail.If $40 \leq Percentage < 55$;print it as a third division.If $55 \leq Percentage < 65$;print it as a second division.If $65 \leq Percentage < 80$;print it as a first division.If $80 \leq Percentage < 95$;print it as a distinction,otherwise Print it as extraordinary.

Input variables	Processing variables/calculation	Output variables	Necessary header files
phy(int) chem(int) math(int) eng(int) bio(int)	obtained marks= phy+chem+math+eng+bio percentage= (obtained marks/500)*100	percentage(float)	stdio.h

Algorithm:

1. Start
2. Declare : phy,chem,math,eng,bio(int)
3. Read : phy,chem,math,eng,bio
4. Calculate :obtained marks=phy+chem+math+eng+bio
5. Calculate percentage as:percentage=(obtained marks/500)*100
6. percentage<40 : true Display fail ,false goto 7
7. 40<=percentage<55:true Display third division ,false goto 8
8. 55<=percentage<65:true Display second division,false goto 9
9. 65<=percentage<80: true Display first division,false goto 10
10. 80<=percentage<95 :true Display Distinction ,false extraordinary
11. stop

Flowchart:


start
declare phy,chem,bio eng,math,percentage
read phy,chem,bio eng,math
obtainedmark=phy+chem+ math+eng+bio percentage=obtainedmark/500*100
percentage<40
True
Display Fail
False
40<=Percentage<55
True
Display Third division
False
55<=Percentage<65
True
Display second division
False
65<=Percentage<80
True
Display First division
False
80<=Percentage<95
True
Display Distinction
False
Display Extra ordinary
Stop

Source Code:

```
/*
 @Filename:result.c
 @Author:Kishan Adhikari
 @Created Date:2021/07/20
 Write a program to input marks of 5 subjects (Physics, Chemistry, Math, English and Biology) for a student. Display the rank of each subjects and also the result of total marks and percentage obtained with his/her rank in the class. The rank is categorized as fail (marks < 40%), pass & third division (marks between 40 to 55%), second (marks between 55 to 65%), first (marks between 65 to 80%), Distinction (marks between 80 to 95%), extra ordinary (marks above 95 to100%)
*/

#include <stdio.h>
int main()
{
 int phy, chem, math, eng, bio, Obtainedmarks;

 float Percentage;
 printf("Enter marks of Physics, Chemistry, Math, English and Biology:\n");
 scanf("%d%d%d%d%d", &phy, &chem, &math, &eng, &bio);
 printf("The marks of student in different subject is:\nPhysics\t\t%d\nChemistry\t%d\nMath\t\t%d\nEnglish\t\t%d\nBiology\t\t%d\n", phy, chem, math, eng, bio);
 Obtainedmarks = phy + chem + math + bio + eng;
 printf("obtained marks=%d\n", Obtainedmarks);
 Percentage = (Obtainedmarks / 500.0) * 100;
 printf("Per=%.2f%%\n", Percentage);

 if (Percentage < 40)
 {
   printf("The student is fail with %.2f%%\n", Percentage);
 }
 else if (Percentage >= 40 && Percentage < 55)
 {
```

```
   printf("The student is pass with third division and %.2f%%\n",
Percentage);
 }
 else if (Percentage >= 55 && Percentage < 65)
 {
   printf("The student is pass with second division and %.2f%%\n",
Percentage);
 }
 else if (Percentage >= 65 && Percentage < 80)
 {
   printf("The student is pass with first division and %.2f%%\n",
Percentage);
 }
 else if (Percentage >= 80 && Percentage < 95)
 {
   printf("The student is pass with distinction and %.2f%%\n",
Percentage);
 }
 else
 {
   printf("The student is extra ordinary with %.2f%%\n", Percentage);
 }
 return 0;
}
```

Output:

Enter marks of Physics, Chemistry, Math, English and Biology:
75 85 65 45 35
The marks of student in different subject is:
Physics 75
Chemistry 85
Math 65
English 45
Biology 35
obtained marks=305
Percentage=61.00%
The student is pass with second division and 61.00%

Discussion and conclusion:
From this Problem,I understood the use of if ,else-if and else statements to control flow of the program.Also use of logical operator,problem solving skill,use of format specifier etc was understood.Hence ,Rank of student was calculated.

Title:

Write a program to produce the output as shown below:

x	y	expressions	results
6	3	x=y+3	x=6
6	3	x=y-2	x=1
6	3	x=y*5	x=15
6	3	x=x/y	x=2
6	3	x=x%y	x=0

Source code:

```
/*
@Filename:display.c
@Author:Kishan Adhikari
@Created Date:2021/07/20
```

```
Write a program to produce the output as shown below:
x     y          expressions     results
6 |   3    |     x=y+3           6
6 |   3    |     x=y-2           1
6 |   3    |     x=y*5           15
6 |   3    |     x=x/y           2
6 |   3    |     x=x%y           0
*/
#include <stdio.h>
int main()
{
 int x = 6, y = 3;
 printf("x\ty\texpressions\tresults\n");
 printf("%d |\t%d  |\tx=y+3   |\t%d\n", x, y, y + 3); //\t is tab spacing
 printf("%d |\t%d  |\tx=y-2   |\t%d\n", x, y, y - 2);
 printf("%d |\t%d  |\tx=y*5   |\t%d\n", x, y, y * 5);
 printf("%d |\t%d  |\tx=x/y   |\t%d\n", x, y, x / y);
 printf("%d |\t%d  |\tx=x%y   |\t%d\n", x, y, x % y);
 return 0;
}
```

Output:

```
x       y       expressions     results
6 |     3   |     x=y+3   |       6
6 |     3   |     x=y-2   |       1
6 |     3   |     x=y*5   |       15
6 |     3   |     x=x/y   |       2
6 |     3   |     x=x%y   |       0
```

Title:

Given x=3.0, y=12.5, z= 523.3, A=300.0, B=1200.5, C=5300.3, Write a program to display the following (hint: use formatted output):

```
x      y      z      =      |3.0              |12.5             |523.3
a      b      c      =      |300.0            |1200.5           |5300.3
-------------------------------------------------------------------------------
x      y      z      =      |          3.00 |          12.50|         523.30|
a      b      c      =      |        300.00 |        1200.50|       52300.30|
```

Source code:

```
/*
@Filename:output.c
@Author:Kishan Adhikari
@Created Date:2021/07/20

Given x=3.0, y=12.5, z= 523.3, A=300.0, B=1200.5, C=5300.3, Write a
program to display
the following (hint: use formatted output):

x       y       z       =       |3.0    |12.5           |523.3
a       b       c       =       |300.0  |1200.5         |5300.3
-------------------------------------------------------------------------
-
x       y       z       =       |        3.00|           12.50|
523.30|
a       b       c       =       |      300.00|         1200.50|
5300.30|
*/
```

```
#include <stdio.h>
int main()
{
 float x = 3.0, y = 12.5, z = 523.3, A = 300.0, B = 1200.5, C = 5300.3;
 printf("\n");
 printf("x\ty\tz\t=\t |%.1f\t |%.1f\t\t |%.1f\n", x, y, z);

 printf("a\tb\tc\t=\t |%.1f\t |%.1f\t |%.1f\n", A, B, C);

 for (int i = 0; i < 75; i++)
 {
   printf("-");
 }
 printf("\n");
 printf("x\ty\tz\t=\t |\t  %.2f|\t\t  %.2f|\t   %.2f|\n", x, y, z);

 printf("a\tb\tc\t=\t |\t%.2f|\t\t%.2f|\t  %.2f|\n", A, B, C);
```

```
 return 0;
}
```

Output:

```
x       y       z       =       |3.0    |12.5           |523.3
a       b       c       =       |300.0  |1200.5         |5300.3
--------------------------------------------------------------------------------
x       y       z       =       |       3.00|          12.50|          523.30|
a       b       c       =       |      300.00|         1200.50|         5300.30|
```

Title:

Given the three numbers a(=8), b(=4),c and constant value PI=3.1415, calculate and display
the following result using macros (preprocessor directives)
a. c= PI * mult(a,b) //the macro mult(a,b) perform the multiplication of a & b(a*b)
b. c= PI * sum(a,b) //the macro mult(a,b) perform the sum of a & b (a+b)
c. c= PI * sub(a,b) //the macro mult(a,b) perform the subtraction of a & b (a-b)
d. c= PI * div(a,b) //the macro mult(a,b) perform the division of a & b (a/b)

Source code:

```
/*
@Filename:macros.c
@Author:Kishan Adhikari
```

```
@Created Date:2021/07/20
Given the three numbers a(=8), b(=4),c and constant value PI=3.1415,
calculate and display
the following result using macros (preprocessor directives)
a. c= PI * mult(a,b) //the macro mult(a,b) perform the multiplication of a
& b(a*b)
b. c= PI * sum(a,b) //the macro mult(a,b) perform the sum of a & b (a+b)
c. c= PI * sub(a,b) //the macro mult(a,b) perform the subtraction of a & b
(a-b)
d. c= PI * div(a,b) //the macro mult(a,b) perform the division of a & b
(a/b)
*/

#include <stdio.h>
#define PI 3.14
#define mult(a, b) a *b //preprocessor as a function
#define sum(a, b) a + b
#define sub(a, b) a - b
#define div(a, b) a / b
int main()
{
 int a = 8, b = 4;
 printf("The value of a+b is: %d\n", sum(a, b));
 printf("The value of a-b is: %d\n", sub(a, b));
 printf("The value of a*b is: %d\n", mult(a, b));
 printf("The value of a/b is: %d\n", div(a, b));
 return 0;
}
```

Output:

The value of a+b is: 12
The value of a-b is: 4
The value of a*b is: 32
The value of a/b is: 2

Title:

Demonstrate the differences among getch(), getche(), getchar().

Source code:

```
/*
@Filename:Unfomatted.c
@Author:Kishan Adhikari
@Created Date:2021/07/25
@Operating system:Windows 10
@IDE :VSCode 1.58
@Compiler:Mingw-w64-GCC 8.1.0
Demonstrate the differences among getch(), getche(), getchar().
*/

#include <stdio.h>
#include <conio.h> //for getch,getche function
int main()
{
    char a;
    char Name[20];
    char address[20];
    /*unformatted input/output*/

    //getch : Reads a single character from the user at the console,
without echoing it (does not requires enter key to be pressed)
    printf("Running getch()\n");
    printf("Enter something:\n");
    a = getch();
    printf("The character you entered is %c:\n", a);

    //getche
    //Reads a single character from the user at the console, and echoing
it. (does not requires enter key to be pressed)
    printf("\n");
    printf("Running getche():\n");
    printf("Enter something:\n");
    a = getche();
    printf("\n");
    printf("The character you entered is:%c\n", a);
```

```
    //getchar
    //it echoes a pressed character and requires Enter key to be pressed
    printf("\n");
    printf("Running getchar():\n");
    a = getchar();
    printf("The character you entered is %c: \n", a);


    return 0;
}
```

Output:

Running getch()
Enter something:
The character you entered is a:

Running getche():
Enter something:
b
The character you entered is:b

Running getchar():
c
The character you entered is c:

Title:

Demonstrate the difference between scanf() & gets(), printf() & puts()

Source code:

```
/*
@Filename:Unfomatted.c
@Author:Kishan Adhikari
@Created Date:2021/07/25
@Operating system:Windows 10
@IDE :VSCode 1.58
```

```c
@compiler:Mingw-w64-GCC 8.1.0
Demonstrate the difference between scanf() & gets(), printf() & puts().
*/

#include <stdio.h>
int main()
{
    char address[20];
    char name[20];
    printf("Enter your address:"); //printf display character inside
double quote (f in printf is formatted)
    //gets:Reads a single string entered by the user at the console (can
read after space also (Hello world))
    gets(address); //it is not recommended to use gets() as it keeps
reading character until enter is pressed (suffer buffer overflow) use
fgets() instead
    printf("your address is:");
    puts(address); //puts() : display string to screen

    printf("\n");
    printf("Enter your name:\n");
    scanf("%s", name); //scanf take input from user and store in variable
(it doesn't read  after space)
    printf("scanf() store value of name :%s", name);
    return 0;
}
```

Output:

Enter your address:Panchkhal 3,kavre
your address is:Panchkhal 3,kavre

Enter your name:
Kishan Adhikari
scanf() store value of name :Kishan

Title:

Write a program to take a character input from keyboard and check if it is a number or alphabet using character functions below:

a. Alphanumeric => isalnum()
b. Blank character => isblank()
c. Alphabetic => isalpha()
d. Control character => iscntrl()
e. Number-digit => isdigit()
f. Upper case => isupper()
g. Lower case => islower()
h. Hexadecimal digit => ixdigit()
i. Graphical character => isgraph()

Source Code:

```
/*
@Filename:check.c
@Author:Kishan Adhikari
@Created Date:2021/07/20
Write a program to take a character input from keyboard and check if it is
a number or alphabet or special character using character functions below:
a. Alphanumeric => isalnum()
b. Blank character => isblank()
c. Alphabetic => isalpha()
d. Control character => iscntrl()
e. Number-digit => isdigit()
f. Upper case => isupper()
g. Lower case => islower()
h. Hexadecimal digit => ixdigit()
i. Graphical character => isgraph()

*/

#include <stdio.h>
#include <ctype.h> //library to check type of character
int main()
{
 char c;
 printf("Enter any character:\n");
 scanf(" %c", &c);

 if isalnum (c)
```

```
{ //1,2,4
  printf("%c is a alphanumeric.\n", c);
}

if isblank (c)
{
  printf("%c is a blank.\n", c);
}

if isalpha (c) //a,A,b,c
{
  printf("%c is a alphabet.\n", c);
}

if iscntrl (c)
{
  printf("%c is a control character.\n", c);
}

if isdigit (c) //1,2,3
{
  printf("%c is a digit.\n", c);
}

if isupper (c) //"A","B"
{
  printf("%c is a Uppercase.\n", c);
}

if islower (c) //"a","b","c"
{
  printf("%c is a lowercase.\n", c);
}
if isxdigit (c) //hexadecimal
{
  printf("%c is a hexadecimal.\n", c);
}

if isgraph (c) //that form ASCII arts
{
```

```
   printf("%c is a graphical character.\n", c);
 }

 return 0;
}
```

Output:

Enter any character:
7
7 is a alphanumeric.
7 is a digit.
7 is a hexadecimal.
7 is a graphical character.

Title:

Write a program to take a character input from keyboard and check if it is a number or alphabet or special character using ASCII CODE

Source code:

```
/*@Filename:ASCII.c
@Author:Kishan Adhikari
@Created Date:2021/07/20
Write a program to take a character input from keyboard and check if it is
a number or
alphabet or special character using ASCII CODE
*/

#include <stdio.h>
int main()
```

```
{
 char ch;

 printf("Enter character :\n");
 scanf("%c", &ch);

 printf("%c=%d\n", ch, ch);
 if (ch >= 97 && ch <= 122) //lowercase character  has ascii value between
97 to 122
 {
   printf("%c is lowercase alphabet\n", ch);
 }
 else if (ch >= 65 && ch <= 90) //uppercase character  has ascii value
between 65 to 90
 {
   printf("%c is uppercase character\n", ch);
 }
 else if (ch >= 48 && ch <= 57) //number has ascii value between 48 to 57
 {
   printf("%c is a number\n", ch);
 }
 else if (ch >= 0 && ch <= 31 || ch == 127) //control character has ascii
value between 0 to 31 and 127 (tab,enter)
 {
   printf("%c is a control character\n", ch);
 }
 else if (ch >= 128 && ch <= 255) //graphical character has ascii
valuebetween 128 to 255
 {
   printf("%c is a graphical character\n", ch);
 }
 else if (ch >= 32 && ch <= 47 || ch >= 58 && ch <= 64 || ch >= 91 && ch
>= 93 || ch <= 123 && ch <= 126) //special character has ascii
valuebetween 32 to 47 ,58-64,91-93,123-126 (!,@,#)
 {
   printf("%c is a special character\n", ch);
 }
 return 0;
}
```

Output:

```
kiran@kiran:~/Documents/VScode/cprogram/Lab/lab#2$ ./asc
Enter character :
7
7=55
7 is a number
kiran@kiran:~/Documents/VScode/cprogram/Lab/lab#2$ ./asc
Enter character :
A
A=65
A is uppercase character
```

Title:

Write a program to find the largest and smallest among three entered numbers and also
display whether the identified largest/smallest number is even or odd.

Source code:

```
/*@Filename:oddeven.c
@Author:Kishan Adhikari
@Created Date:2021/07/20
 Write a program to find the largest and smallest among three entered numbers and also
 display whether the identified largest/smallest number is even or odd.
*/

#include <stdio.h>

int main()
{
```

```
 int a, b, c, temp, temp2;
 printf("Enter three number:\n");
 scanf("%d %d %d", &a, &b, &c);
 if (a > b && a > c)
 {
   printf("%d is greatest number\n", a);

   temp = a;
 }
 else if (b > c && b > a)
 {
   printf("%d is greatest number\n", b);

   temp = b;
 }
 else
 {
   printf("%d is greatest number.\n", c);

   temp = c;
 }
 (temp % 2 == 0) ? printf("%d is even\n", temp) : printf("%d is odd\n",
temp);
 if (a < b && a < c)
 {
   printf("%d is smallest number\n", a);

   temp2 = a;
 }
 else if (b < c && b < a)
 {
   printf("%d is smllest number\n", b);

   temp2 = b;
 }
 else
 {
   printf("%d is smallest number.\n", c);

   temp2 = c;
```

```
 }

 (temp2 % 2 == 0) ? printf("%d is even\n", temp2) : printf("%d is odd\n",
temp2);
 return 0;
}
```

Output:

```
Enter three number:
7 8 15
15 is greatest number.
15 is odd
7 is smallest number
7 is odd
kiran@kiran:~/Documents/VScode/cprogram/Lab/lab#2$ ./odd
Enter three number:
4 9 159
159 is greatest number.
159 is odd
4 is smallest number
4 is even
```

Title:

Write a program to check whether input alphabet is vowel or not using if-else and switch statement.

Source code (if-else):

```
/*@Filename:vowel.c
@Author:Kishan Adhikari
@Created Date:2021/07/20
Write a program to check whether input alphabet is vowel or not using
if-else and switch
statement.
*/
#include <stdio.h>
int main()
{
 char input;
 printf("Enter any alphabet: ");
```

```
 scanf("%c", &input);
 int lowercase = (input == 'a' || input == 'e' || input == 'i' || input ==
'o' || input == 'u');  //' ' is used in c for string
 int uppercase = (input == 'A' || input == 'E' || input == 'I' || input ==
'O' || input == 'U');
 if (lowercase || uppercase)
 {
   printf("%c is a vowel\n", input);
 }

 else
 {
   printf("%c is consonant.\n", input);
 }
 return 0;
}
```

Source Code (switch):

```
/*@Filename:switch.c
@Author:Kishan Adhikari
@Created Date:2021/07/20
 Write a program to check whether input alphabet is vowel or not using
if-else and switch statement.
*/

#include <stdio.h>
int main()
{
 char input;
 printf("Enter any alphabet: ");
 scanf("%c", &input);
 int lowercase = (input == 'a' || input == 'e' || input == 'i' || input ==
'o' || input == 'u'); //gives 1 if vowel is input
 int uppercase = (input == 'A' || input == 'E' || input == 'I' || input ==
'O' || input == 'U');
```

```c
 switch (lowercase || uppercase)
 {
 case 1:
   printf("%c is vowel\n", input);
   break;

 default:

   printf("%c is composite\n", input);
   break;
 }
 return 0;
}
```

Output:

```
kiran@kiran:~/Documents/VScode/cprogram/Lab/lab#2$ ./vowel
Enter any alphabet: q
q is consonant.
kiran@kiran:~/Documents/VScode/cprogram/Lab/lab#2$ ./vowel
Enter any alphabet: e
e is a vowel
kiran@kiran:~/Documents/VScode/cprogram/Lab/lab#2$ gcc switch.c -o switch
kiran@kiran:~/Documents/VScode/cprogram/Lab/lab#2$ ./switch
Enter any alphabet: o
o is vowel
kiran@kiran:~/Documents/VScode/cprogram/Lab/lab#2$ ./switch
Enter any alphabet: w
w is composite
```

Title:

Write a program to get input of two or higher digit integer number and display in reverse order.

Source code:

```
/*
@Filename:reverse.c
@Author:Kishan Adhikari
@Created Date:2021/07/20

To reverse an integer:
 set reverse variable to zero
 let 1572 be an integer;
 remainder=num%10
 reverse=(reverse*10)+remainder
 num=num/10
 do above operation until number become zero
  iteration   number  remainder(by 10)       reverse        num/10
   first       1572     2                  (0*10)+2=2        157
   second      157      7                  (2*10)+7=27        15
   third       15       5                  (27*10)+5=275       1
   fourth      1        1                  (275*10)+1=2751     0
since num is zero loop breaks.

*/
#include <stdio.h>
int main()
{
 int num, remainder = 0, reverse = 0;
 printf("Please enter number of two or more digits:\n");
 scanf("%d", &num);
 while (num != 0)
 {
   remainder = num % 10;
   reverse = remainder + reverse * 10;
   num /= 10;
 }
 printf("The reverse of number is:%d\n", reverse);
 return 0;
}
```

Output:

Please enter number of two or more digits:
145
The reverse of number is:541

Title:
Write a program that asks a number and test the number whether it is multiple of 5 or not, divisible by 7 but not by eleven.

Source code:

```
/*
@Filename:multiple.c
@Author:Kishan Adhikari
@Created Date:2021/07/24
Write a program that asks a number and test the number whether it is
multiple of 5 or not,
divisible by 7 but not by eleven.
*/
#include <stdio.h>
int main()
{
 int num;
 printf("Enter a number:\n");
 scanf("%d", &num);
 if (num % 5 == 0)
 {
   printf("%d is multiple of 5\n", num);
 }
 else if (num % 7 == 0 && num % 11 == 0)
 {
   printf("%d is multiple of 7 and multiple of 11\n", num);
 }
 else if (num % 7 == 0 && num % 11 != 0)
 {
   printf("%d is multiple of 7 but not multiple of 11\n", num);
 }
 else
 {
```

```
   printf("%d is not multiple of 5 and 7.\n", num);
 }
 return 0;
}
```

Output:

```
Enter a number:
77
77 is multiple of 7 and multiple of 11
kiran@kiran:~/Documents/VScode/cprogram/Lab/lab#2$ ./multiple
Enter a number:
125
125 is multiple of 5
kiran@kiran:~/Documents/VScode/cprogram/Lab/lab#2$ ./multiple
Enter a number:
49
49 is multiple of 7 but not multiple of 11
kiran@kiran:~/Documents/VScode/cprogram/Lab/lab#2$ ./multiple
Enter a number:
71
71 is not multiple of 5 and 7.
```

Title:

Write a program to check whether the entered year is leap year or not (a year is leap if it is divisible by 4 and divisible by 100 or 400.)

Source code:

```
/*
 @Filename:leap.c
 @Author:Kishan Adhikari
 @Created Date:2021/07/20
 Write a program to check whether the entered year is leap year or not (a
year is leap if it is
 divisible by 4 and divisible by 100 or 400.)

 An extra day is added to the calendar almost every four years as February
29, and the day is called a leap day.
 It corrects the calendar for the fact that our planet takes approximately
365.25 days to orbit the sun.
 A leap year contains a leap day.
```

```
In the Gregorian calendar, three conditions are used to identify leap
years:

 The year can be evenly divided by 4, is a leap year, unless:
 The year can be evenly divided by 100, it is NOT a leap year, unless:
 The year is also evenly divisible by 400. Then it is a leap year.
This means that in the Gregorian calendar, the years 2000 and 2400 are
leap years, while 1800, 1900, 2100, 2200, 2300 and 2500 are NOT leap
years.

*/

#include <stdio.h>
int main()
{
 int year;
 printf("Enter year: \n");
 scanf("%d", &year);
 if (year % 4 == 0 && year % 100 != 0 || year % 400 == 0) // year is
divided by 4 but year is not divide by 100 or year is divided by 100
 {
   printf("%d is a leap year.\n", year);
 }
 else
 {
   printf("%d is not a leap year.\n", year);
 }
 return 0;
}
```

Output:

```
kiran@kiran:~/Documents/VScode/cprogram/Lab/lab#2$ ./leap
Enter year:
2100
2100 is not a leap year.
kiran@kiran:~/Documents/VScode/cprogram/Lab/lab#2$ ./leap
Enter year:
2000
2000 is a leap year.
```

Title:

Write a program to read the values of coefficients a, b and c of a quadratic equation ax2+bx+c=0 and find roots of the equation.

Source code:

```
/*
@Filename:quadratuc.c
@Author:Kishan Adhikari
@Created Date:2021/07/22
Write a program to read the values of coefficients a, b and c of a
quadratic equation
ax2+bx+c=0 and find roots of the equation.

roots of quadratic equation=-b (+/-)sqrt(b2-4ac)/(2a)
Discriminant=b2-4ac
when Discriminant >0; real roots exists
when Discriminant<0; imaginary root exists
*/

#include <stdio.h>
#include <math.h>

int main()
{
 int a, b, c;
 float root1, root2, real, img;
 printf("Enter value of a,b,c: \n");
 scanf("%d %d %d", &a, &b, &c);
 float Discriminant = (b * b - 4 * a * c);
 if (Discriminant >= 0)
 {
   root1 = (-b + sqrt(Discriminant)) / (2 * a);
   root2 = (-b - sqrt(Discriminant)) / (2 * a);
   printf("Roots of quadratic equation are: %.2f, %.2f \n", root1, root2);
 }
 else
 {
   real = -b / (2 * a);  //real part of root
```

```
   img = (sqrt(-Discriminant)) / (2 * a);  //since discriminant is already
negative we use - sign to make it positive
   printf("Roots of quadratic equation are:%.2f+%.2fi , %.2f-%.2fi\n",
real, img, real, img);
 }

 return 0;
}
```

Output:

```
kiran@kiran:~/Documents/VScode/cprogram/Lab/lab#2$ ./quad
Enter value of a,b,c:
1 4 4
Roots of quadratic equation are: -2.00, -2.00
kiran@kiran:~/Documents/VScode/cprogram/Lab/lab#2$ ./quad
Enter value of a,b,c:
2 1 8
Roots of quadratic equation are:0.00+1.98i , 0.00-1.98i
```