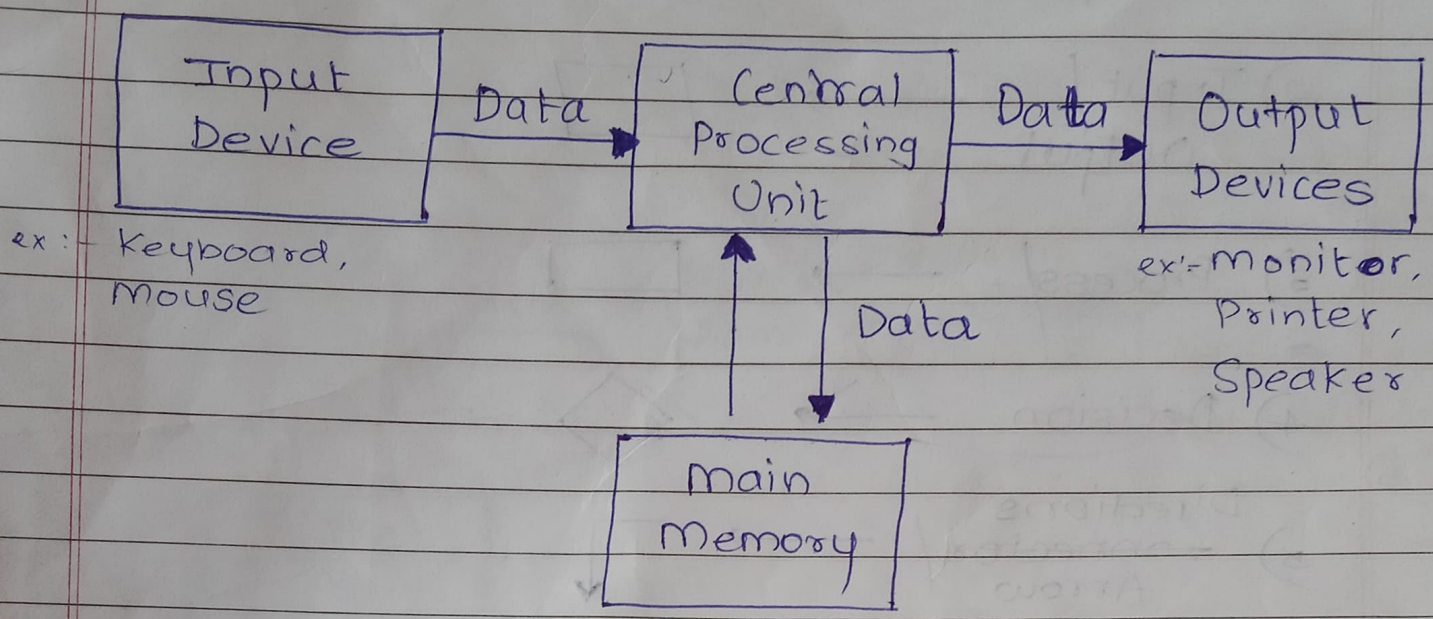
SUB:- C Programming

★ Components of Computer System:



★ Algorithm

→ Step by Step procedure to solve an problem / operation. it includes calculations, reasoning & data processing.

eg:- Addition

1. start
2. Take 2 no.s 'a' & 'b'
3. Calculate sum with '+' operator
4. stop

def — An algorithm is a procedure for solving problems. It includes calculations, reasoning, and data processing.

★ Flowchart

def — Graphical / Diagramatic representation of an algorithm with help of symbols & shapes is called flowchart.

Symbol

1) Start/ end ~~stop~~ →

2) Input/ Output →

3) Process/ →

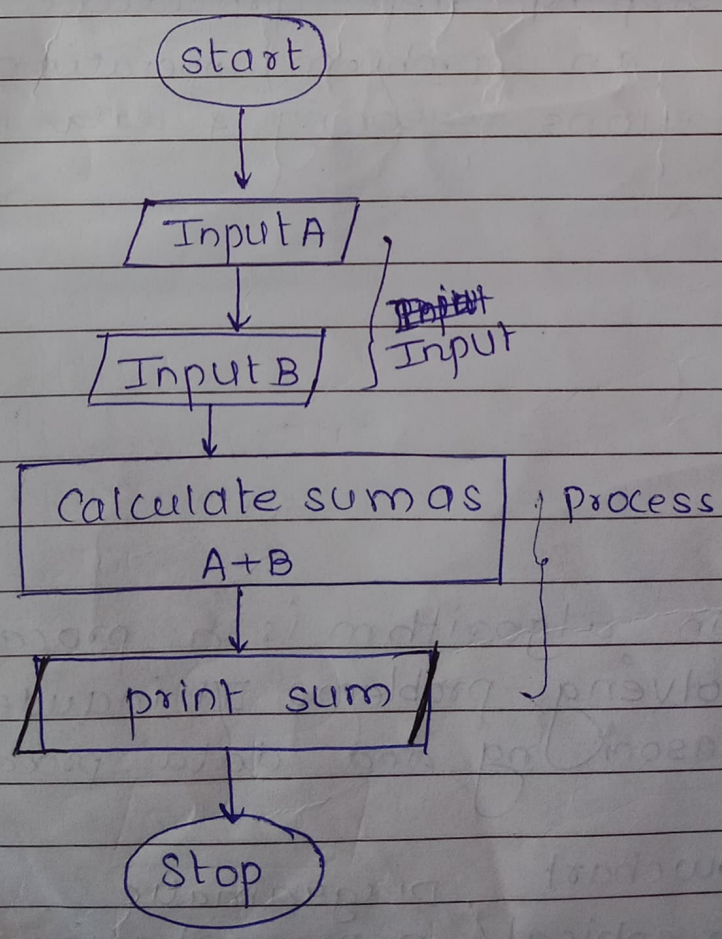
4) Decision →

5) ~~Connector~~ Directions/ Arrow →

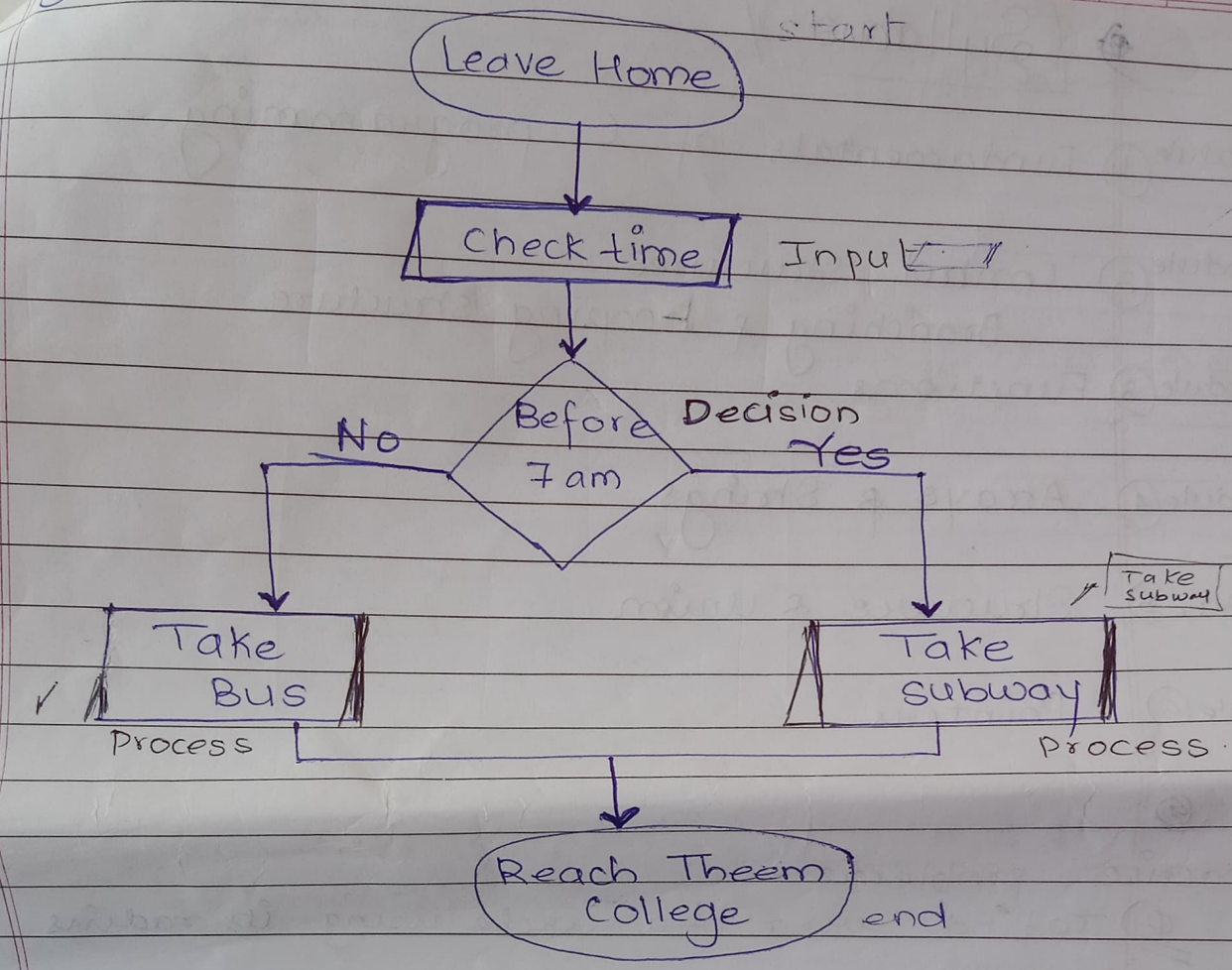
6) Connector →

Example:- ①

Addition:-



No, yes are conditions therefore Decision box



HW ★ fundamentals of CP

1) Identifers :- are user defined word used to name of entities like variables, arrays, functions.

2) Constants :- is any value that cannot be changed during program execution.
It is any number, single character or character string is known as a constant.

3) Variable :- are containers for storing data values, a memory location for a data type.

Syllabus

module 1 Fundamentals of C programming

module 2 Control structures
Branching & Looping structure

module 3 Functions

module 4 Arrays & Strings

module 5 Structure & Union

module 6 Pointers

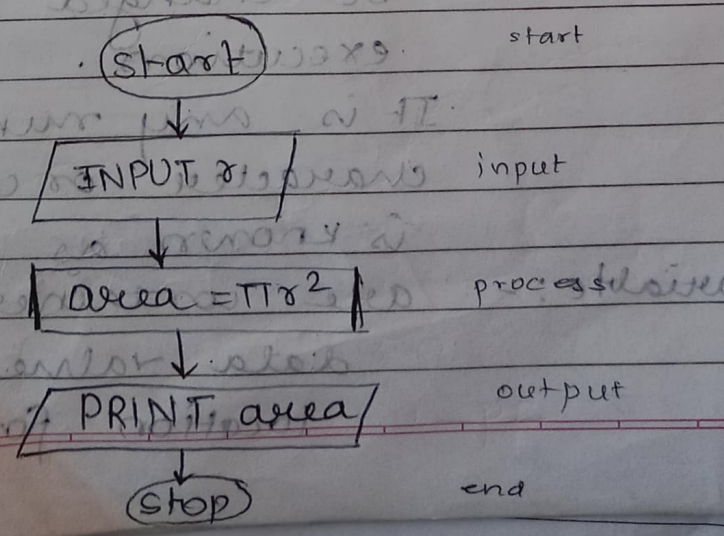
Practice problems :-

Q) To find area of a circle using its radius

ans → 1) Algorithm :-

1) START
2) INPUT r
3) LET area = πr^2
4) PRINT area
5) STOP

2) Flowchart :-



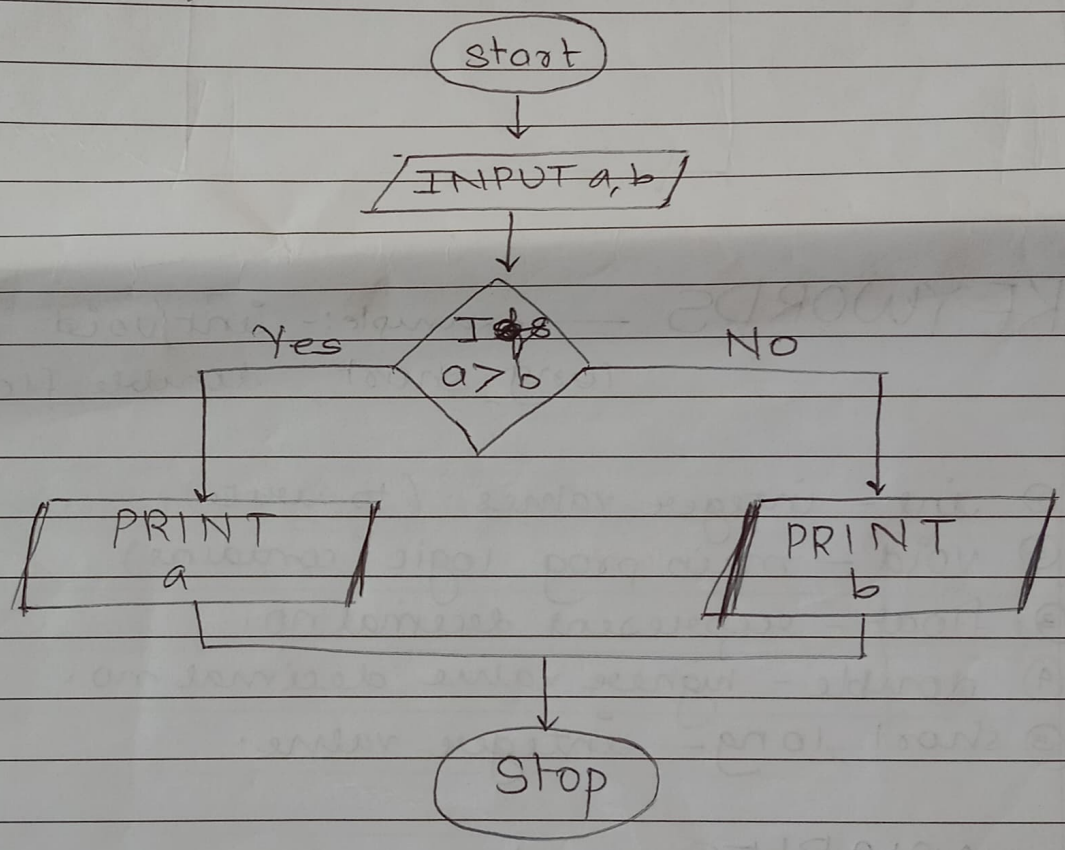
PAGE No.
DATE / /

To find the largest between 2 no.s

Algorithm:-

1) START
2) INPUT a, b
3) IF a>b THEN PRINT a
   OR ELSE PRINT b
4) STOP

Flowchart:-



Structure of C Program:-

```
#include <stdio.h>
#include <conio.h>
void main()
{
    int a,b,c;
    printf("Enter number\n");
    scanf("%d %d",&a,&b);
```

header file

main body comes in

scanf & printf is written in "next line"

integer

variable declaration

output

reading inputting value

only integer value

previous output my doubt ni hore next slide vr open

clrscr();

condition

```
c=a+b,
printf ("%d", c);
getch();
}
```

output to be shown

Output:-

Enter number :-
5 , 6
11

KEYWORDS — example:- int, void, char, long, short, double, float, main,

1. int - integer values. (to write)
2. void - main prog logic (contains)
3. float - represent decimal no.
4. double - higher value decimal no.
5. short, long - integer value.

VARIABLES :- whose value changes

variable

ex:- int a=10;
a = 20;

IDENTIFIERS :- unique name given to variable & function.

1. n_a12 — u can use no.s
2. sum_p2

Examples :-

i) 1a ✗ not an identifier

ii) sum ✓ is an identi

iii) a b ✗ space cannot be used

iv) a ? b ✗

v) p_q ✓ underscore is used.

CONSTANTS :- value is not change, constant value.

ex :- ~~TESTALL~~ PI = 3.14

#define PI = 3.14

Convert decimal to Binary

	no	
2	14	0
	7	1
	3	1
	1	

remin der

remin der

remin der

write from down to up

Binary :- $(1110)_2$

Explaination :- 14 is given no :-

∴ 2×7 = 14 ⟶ 14 - 14 = 0

∴ reminder 0

then 7 so we know 2×3 = 6

7 - 6 = 1 ∴ reminder is 1

then 3, so we know 2×1 = 2

3 - 2 = 1 ∴ reminder is 1

if mouse or key board is stuck. alt + space bar. restart desktop.

turpoc.

Convert Binary to decimal

start from back to front

$(10111)_2$

give power from 0 to n.

$\rightarrow 1\times2^0 + 1\times2^1 + 1\times2^2 + 0\times2^3 + 1\times2^4$

$= 1 + 2 + 4 + 0 + 16$

$= (23)_{10}$

base as 10.

Operators: ex:- +, -, *, %

a + b

operands a + b

structure: example.

```
#include <stdio.h>
#include <conio.h>
void main ()
{
int a, // variable declaration.
printf ("Enter a number");
scanf ("%d", &a);
printf ("The entered number is");
get ch();
}
```

space

if we write here int main() then we should write getch=0

```
#include <stdio.h>
#include <conio.h>
void main()
{
int a=6, // variable declaration
printf ("Enter a number");
scanf ("%d, &a);
printf (" The enter number is");
get ch();
}
```

Q. write an algorithm to show addition of two numbers.

→ Algorithm :-

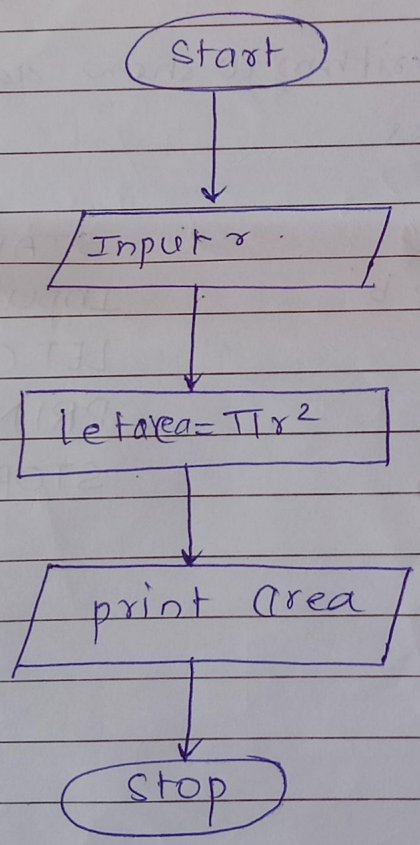
① start	START
② Inplut 'a' & 'b'	Input 'a' & 'b'
③ let c = a+b	LET C = a+b
④ print c	PRINT C
⑤ Stop	STOP

flowchart :-

Q. write algo & flow chart of area of circle (πR^2) formula

→ ① START
② Input radius r
③ let area = πr^2
④ print C
⑤ STOP

flowchart :-



Q. write algorithm & flow chart for 'a' no. 'a' is > then no. 'b'

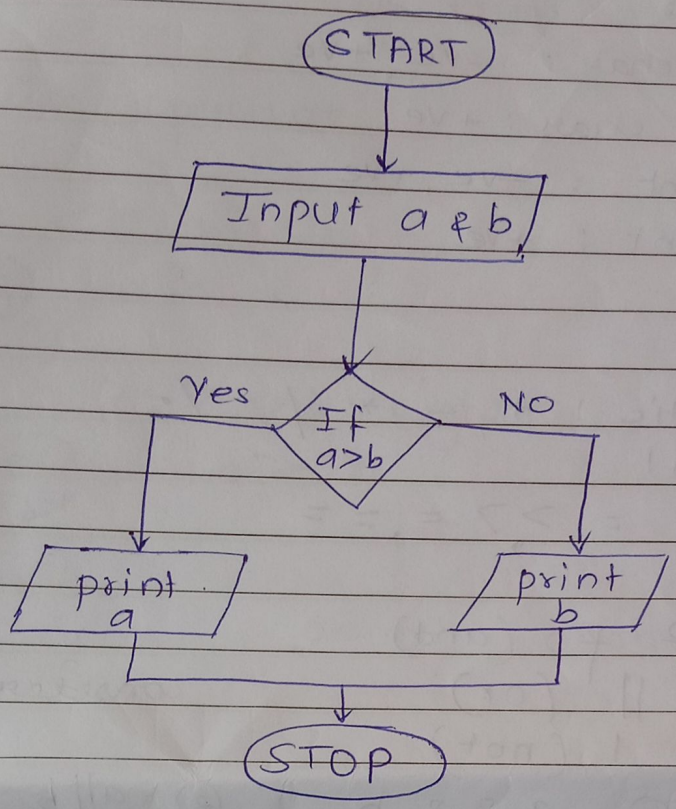
→ algo :- ① START
② INPUT 'a' & 'b'
③ If a is greater then b
④ print a or ~~print~~ if not then print b
⑤ stop

: control F9.

PAGE No.
DATE

How to save :-
C drive
- bin
save as.
↓
C\TC\BIN\
hello.c

flowchart :-



P1 Q Print helloworld ..

```
#include <stdio.h>
#include <conio.h>
void main()
{
printf ("Hello world");
getch();
}
```

P2 Q

```
#include <stdio.h>
#include <conio.h>
Void main()
{
int a;
printf ("Enter a number");
scanf ("%d", &a);
printf ("The entered number is");
getch();
}
```

Qualifiers

signed char : -ve, +ve
unsigned char : +ve
signed int : -ve, +ve
unsigned int : +ve

Operators

1) Arithmatic : +, -, *, /, %
2) Relational
   <<, <=, >>, >=, ==
3) Logical
   && (and)
   || (or)
   ! (not)

eg :- ① a && b
0 && 1
output : 0

② a || b
0 || 1
1

③ 1 || 1 => 1
0 || 0 => 0
0 || 1 => 1

consider (multiplication, addition)

Assignment

-=
*=
+=
/=

eg ① a -= b
a = a - b

Increment

a++ eg a = 5, a = 6

Decrement

a-- eg a = 4

Conditional operator

?:

eg: a = 5, b = 3
a > b ? a + b : a - b

∴ 0101

∴ 5

condition is true then $a+b = 5+3 = 8$
↓ 1

★ Bitwise Operator

<< shift left

(eg) $a << b$

>> shift right

(e.g) $a >> b$

$a = 5$

a = 0000 0000 0000 0101 → binary number

$a << 1$

0000 0000 0000 1010

$a >> 1$

0000 0000 0000 0010

★ Complement Operator

~

(eg) $a = 1010$

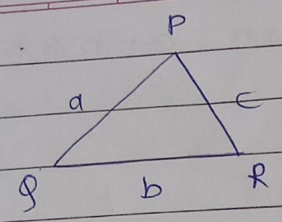
$\sim a = 0101$

,

(eg) a, b

int	%d
float	%f, %e, %g
char	%c
double	%lf

example 1



$$s = \frac{a+b+c}{2}$$

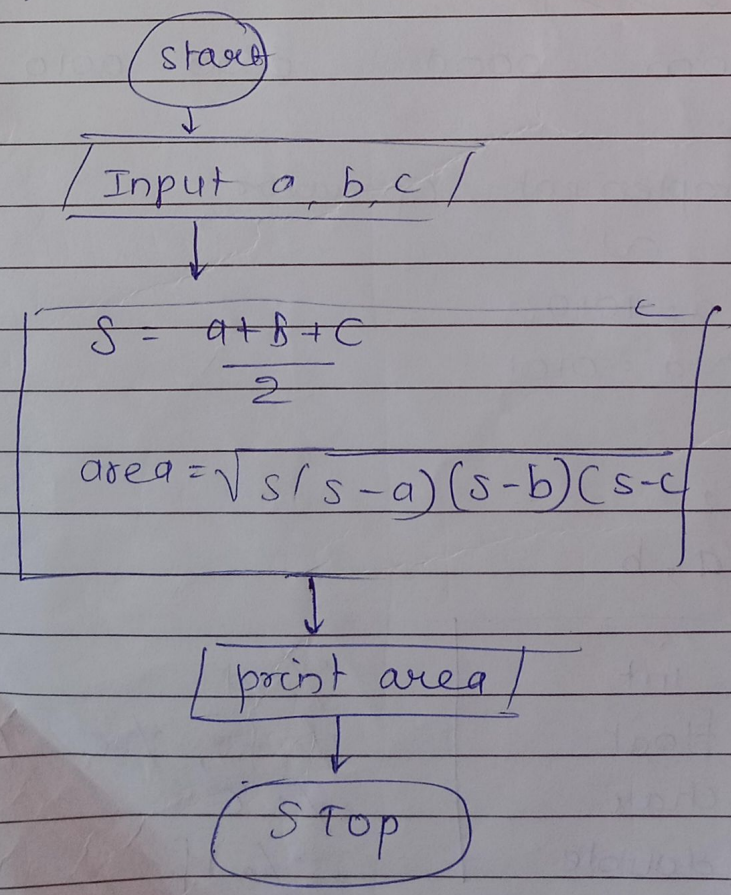
Algorithm

1. START
2. Input a, b, c
3. Let $s = \frac{a+b+c}{2}$, $area = \sqrt{s(s-a)(s-s)(s-c}$

   formula

4. print area
5. STOP.

flow chart



PAGE No.
DATE / /

* Types of constant

① Numeric constant
124, 450, -27

② Non-numeric constant
'A', 'B', \n, \t
→ character

③ String
"Hello", "Theem"

example :-

```
#include <stdio.h>
# include <conio.h>
voin main()
{
  int a ;
  clsrc() ;
printf ("Enter a number\h");
scanf ("%d," & a);

printf (" Enter number is %d," a);
  getch();
}
```

output

```
Enter any number: 20
Enter a number is : 20
```

② write programm to find sum of two.

```
#include <stdio.h>
# include <conio.h>
void main()
{
int a,b,c;
clrscr();
printf("Enter two number\n");
scanf("%d %d", &a &b);
printf("%d", &c);
getch();
}
```

★ Arithmetic operator

① 5+2=7 → operation of any integer will give integer value.

② 5.0/2 = 5.0/2.0
= 2.5 (float)

$$\begin{array}{r} 3 \\ 3\overline{)9} \\ -9 \\ \hline 0 \end{array}$$

③ 5%2 = 1

④ 6%3 = 0

⑤ 9%3 = 0

% means modulus.

reminder of (2/5, 3/6, 9/3) any

★ Relational operator

a=5 b=8

a>b=0

a<b=1

If condition is True then 1
if false then 0

$a <= b = 1$ — if is not equal but a is less than b so 1

$a >= b = 0$

$a == b = 0$

$a != b = 1$ — $a \neq b$ (! means not)

★ Logical operator

① AND (&&) (multiplication)

i) 1 && 0 = 0

ii) 0 && 1 = 0

iii) 1 && 1 = 1

iv) 0 && 0 = 0

② OR (||) (addition)

i) 1 || 0 = 1

ii) 0 || 1 = 1

iii) 1 || 1 = 1 — only for this is 1

iv) 0 || 0 = 0

★ Assignment

$a = 5$, $b = 4$

i) $a += b$ ∴ $a = a + b$ $= 5 + 4 = 9$

ii) $a -= b$ ∴ $a = a - b$ $= 5 - 4 = 1$

iii) $a *= b$ ∴ $a = a * b$ $= 5 * 4 = 20$

iv) $a /= b$ ∴ $a = a / b$ $= 5/4 = 1.25$

=, +=, -=, *=, /=, %=

★ Conditional

? :

$a = 5$, $b = 3$

$a > b$? $a+b$: $a-b$

If this is true then $a+b$ equation
If false then consider $a-b$ equation

★ XOR (a^b)

OR (addition)	XOR
$1 \| 1 = 1$	$1 \wedge 1 = 0$
$1 \| 0 = 1$	$1 \wedge 0 = 1$
$0 \| 0 = 0$	$0 \wedge 0 = 0$
$0 \| 1 = 1$	$0 \wedge 1 = 1$

same no XOR is zero

★ Complement operator

~

If 1 then 0
If 0 then 1

$a = 1010$
$\sim a = 0101$

★ Special operator (,)

$a=1, \; b=2, \; c=3$

$= a+b+c$

$= 1+2+3$

$= 6$

★ Bitwise operator << (left), >>, |(or), &(and)

① $a << n$

$a=5$

0000 0000 0000 0101 = (5)

ans :-

$a<<1 \longrightarrow 1010 \quad \therefore 0100$

$a<<2 \longrightarrow 0100 \quad \therefore 0100$

$a<<3 \longrightarrow 0100 \quad \therefore 1000$

② $a>>n$ (right)

$\longrightarrow$ $a=5$

ans.

$a>>1 \longrightarrow 0101 \quad \therefore 0010$

$a>>2 \longrightarrow 0010 \quad \therefore 0001$

$a>>3 \longrightarrow 0001 \quad \therefore 0000$

★ Precedence :-

In any operation solve from left to right

& solve bracket first :

1234 (n)
4321 (Rev)

Practice Question:- To find the reverse of a 4 d

```
#include <stdio.h>
#include <conio.h>
void main()
{
int d1, d2, d3, d4, n, rev;
clrscr();
printf("Enter a 4 digit integer: ");
scanf("%d", &n);
d1 = n % 10;
n = n/10;
d2 = n % 10;
n = n/10;
d3 = n % 10;
d4 = n/10;
rev = d1*1000 + d2*100 + d3*10 + d4;
printf("Reverse is %d", rev);
getch();
}
```

variable

to get reverse variable

coz the no. is 4 digit number

n = 1234

d1 = n % 10 = 1234 % 10 = 4

n = n/10 = 1234/10 = 123

d2 = n % 10 = 123 % 10 = 3

n = n/10 = 123/10 = 12

d3 = n % 10 = 12 % 10 = 2

d4 = n/10 = 2/10 = 1

a = 2 , b = 3
After swapping
a = 3 , b = 2

★ Swapping

Q To swap 2 nos.

```
void main()
{
int a, b, temp;
clrscr();
printf("Enter 2 nos: ");
scanf("%d %d", &a, &b);
printf("Nos. bf swapping a = %d, b = %d \n", a, b);
temp = a;
a = b;
b = temp;
printf("Nos. after swapping: a = %d,
b = %d, a, b);
getch();
}
```

Imp

★ Swapping without using third variable :-

a = a+b
b = a-b
a = a-b

i.e.: a = 2 , b = 3
∴ a = 5
∴ b = 5-3 = 2
a = 5-2 = 3
∴ b = 2 , a = 3

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

um

PAGE No.
DATE / /

1) ★ Write a Program to find roots of quadratic eqn.

• NOTE: Use <math.h> in header tag.

```
# include <stdio.h>
# include <conio.h>
# include <math.h>
int main()
{
float a, b, c, x1, x2;
clrscr();
printf("Enter coefficient \n");
scanf("%f %f %f", &a, &b, &c);
x1 = (-b + sqrt(b*b - 4*a*c)) / (2*a);
x2 = (-b - sqrt(b*b - 4*a*c)) / (2*a);

printf("Roots are %f %f", x1, x2);
```

★ Constants

① Numeric constants.

ex:- 5, -100, 12.5

② Non-numeric constants

ex:- 'a'

ⓐ Character constants : 'A' 'B' '\n' '\t'

ⓑ String constants : "Hello", "Mary"

ASCII :- American standard Code for Information Interchange

10|

Q Write a programm to read a character from the keyboard and diplay the same by it's (ascii) ASCII value

```
#include <stdio.h>
#include <conio.h>
void main()
{
char x;
clrscr();
printf("Enter a character\n");
scanf("%c", &x);
printf("Given character = %c and ASCII code
        = %d, x, x);
getch();
}
```

Q Write a programm to convert a given English lower case letter into uppercase letter

```
#include <stdio.h>
#include <conio.h>
#include <ctype.h>
void main()
{
char x, y;
clrscr();
printf("Enter lowercase letter\n");
x = getchar();
y = toupper(x);
printf("Given character =");
```

```
        putchar(x);
printf("Upper case character = ");
    putchar(y);
    getch();
}
```

★ Operators in C

① Arithmetic

②

NEW CHAPTER

:- control (structure) statements & looping

★ Loops

① for loop

for (initialization ; condition ; increment / decrement)

ex:-

```
for (i=1 ; i<=5 ; i++)
{
    statement;
}
```

(1) (2) (4)

a+b

Program ①

Q Write a programme to print the natural numbers from 1 to 100.
(1 line 1 no.)

→

```
#include <stdio.h>
#include <conio.h>
void main()
{
int i;
for (i=1; i<=100; i++)
{
printf("%d\n", i);
}
getch();
}
```

Q② To find sum of 'n' given no.s

→

```
#intlude <stdio.h>
#include <conio.h>
void main()
{
int i,n number, sum;
printf("Enter value of n\n");
scanf ("%d", &n);
sum=0;
for (i=1, i<=n; i++)
{
```

which has more capacity than int.

PAGE No.
DATE / /

```
printf(" Enter a number\n");
scanf("%d", &number);
sum = sum + number;
printf("Sum of n given numbers %d",
getch();                          sum);
}
```

Q③ To find factorial of the given integer:-

→

```
#include <stdio.h>
#include <conio.h>
void main()
{
int i, n;
long fact=1;
printf("Enter a number\n");
scanf("%d", &n);
for (i=1, i<=n, i++)
{
fact= fact * i;  }
printf(" factorial of n given numbers
%ld", fact);
getch();
}
```

Q Write aprogram to generate fibonacci numbers 1, 1, 2, 3, 5, 8, 13 - - - -

```
#include <stdio.h>
#include <conio.h>
void main()
{
int i, n;
```

for loop condition end. ...

i = loop

```
long a=1, b=1, c;
printf("Enter a number\n");
scanf("%d", &n);
for (i=1, i<=n-2, i++)
{
    c=a+b;
printf("\n %d, c);
    a=b;
    b=c;
    getch();
}
```

Q. write a program to generate pattern

(1) :-

```
*
* *
* * *
* * * *
```

```
int i, j;
for (i=1; i<=4; i++)
{
 for (j=1, j<=1; j++)
    {
      printf("*");
    }
    printf("\n");
    getch();
}
```

PAGE No.
DATE / /

② Write a program to generate the following pattern

```
   *
*   *
*   *   *
*   *   *   *
```

```
for (i=1, i<=4; i++)
{
for (j=1; j<=4; j++)
  {
   printf("  ");
  }
for (j=1; j<=i; j++)
  {
   printf("*");
  }
  printf("\n");
  }
  getch();
  }
```

space

③ Write a programme to generate following pattern.

```
    1
  2   2
3   3   3
4   4   4   4
```

```
int i,j;
for (i=1; i<=4; i++)
  {
```

```
for (j=1 ; j<=4 ; j++)
  {
    printf ("  ");
  }

for (j=1 ; j<=i ; j++)
  {
  printf ("%d", i);
  }
printf ("\n");
}
getch();
}
```

★ **While loop** (syntax)

continues loop till condition is true

```
while ( condition)
  {
  statement
  }
```

Q Program to find factorial of a number.

```
int i, n;
long fact = 1;
printf ("Enter a number: ");
scanf ("%d, &n\n");
i=1;
while (i<=n)
```

PAGE No.
DATE / /

★ If else

Program to find even or odd.

```
#include <stdio.h>
#include <conio.h>
void main () {
~~If else~~
~~[illegible]~~
if (a% 2==0)
{
printf ("even");
}
else
{
printf ("odd");
}

getch();
}
```

Q Write a program to find a larger of two given numbers:-

```
#include <stdio.h>
#include <conio.h>
void main()
{
~~If else~~ if (a>b)
{
printf ("largest is %d,"a);
}
else
{
```

```
printf ("largest is %d", b);
}
getch();
}
```

HW Q. Programme to find largest of three numbers using conditional operator:-

Q. Program to generate pattern

```
1
1 1
1 1 1
1 1 1 1
:
1 1 1 1 1 n times
```

→

```
int i, j, n;
clrscrc ;
printf ("Enter no. of rows\n");
scanf ("%d \n", n);
for (i=1 ; i <= n ; i++)
{
for (j=1 ; j <= i ; j++)
```

```
{
printf("1");
}
printf("\n");
}
getch();
}
```

Q. To find the factorial of a number using while or do-while loop

→

while:-

```
void main()
{
int i, n;
long fact=1
printf("Enter a number: \n");
scanf("%d", &n);
i=1;
while (i<=n)
{
fact = fact*i; i++;
}
printf("%d! = %ld \n", n, fact);
getch();
}
```

Do while :-

```
void main()
{
int i, n;
```

PAGE No.
DATE / /

```
printf("Enter a number :\n");
scanf("%d", &n);
i=1;
do
{
fact = fact *i; i++;
}
while (i<=n);
printf("                    );
getch();
}
```

Q To check whether the given year is leap year or not.

→

```
#include <stadio.h>
#include <conio.h>
void main()
{
int y;
printf("Enter a year\n");
scanf("%d", &n);
if (y%4 ==0 && y%100 != 0||
    y%400 ==0)
{
printf("%d is a leap year");
}
else
{
printf("%d is not a leap year", y);
}
getch();
}
```

PAGE No.
DATE / /

Switch statement

```
switch (exp)
{
case 1 : statement 1
    break;
case 2 : statement 2
    break;
case n : statement n
    break;
default break;
}
```

Q To print a given three digit number in words.

ex:- 125
one two five

→

```
void main()
{
int n, d, i, k;
printf("Enter a three digit no:\n");
scanf("%d %d %d", &n, &d, &k);
k = 100;
for (i=1 ; i <= 3 ; i++)
{
d = n/k;
switch (d)
{
case 0 : printf ("zero");
```

```
            break;
case 1 : printf("one");
            break;
case 2 : printf("two");
            break;
case 3 : printf("three");
            break;
case 4 : printf("four");
            break;
case 5 : printf("five");
            break;
case 6 : printf("six");
            break;
case 7 : printf("seven");
            break;
case 8 : printf("eight");
            break;
case 9 : printf("nine");
            break;
}
    n = n%.k;
    k = k|10;
}
    getch();
}
```

Q/. Mini calculator :-

```
void main()
{
char choice;
```

PAGE No.
DATE / /

```
int a,b, result;
printf ("Enter your choice");
scanf ("%c", &choice);
printf (" Enter a & b");
scanf ("%d %d", &a, &b);
switch (choice)
case '+' : result = a+b;
printf ("sum= %d", result);
break;
case '-' : result = a-b;
printf ("Difference %d", result);
break;
default:
printf (" Invalid choice");
}
getch();
}
```

Q To find the grade of a student in one subject. marks in the subject will be given

NOTE:-

Marks ≥ 70 Grade is Distinction
Marks < 70 & Marks ≥ 60 Grade is 1st.
Marks < 60 & Marks ≥ 50 Grade is 2nd.
Marks < 50 & Marks ≥ 40 Grade is Pass
Marks < 40 FAIL

```
# include <stdio.h>
# include <conio.h>
void main()
{
```

```
int m ;
printf ("Enter marks \n");
scanf ("%d", &m);
switch (m/10)
{
case 0: printf("      ");
case break;
case 1: printf("      ");
break;
case 2: printf("      ");
break;
case 3 : printf(" FAIL");
break;
case4 : printf(" PASS");
break;
case 5: printf ("2nd");
break;
case 6 : printf (" 1st");
break;
case 7: printf ("      ");
break;
Case8 : printf("      ");
break;
case9: printf("      ");
break;

case 10: printf ("DIST");
default : printf ("Invalid marks");
}
getch();
}
```

PAGE No.
DATE / /

Q. Write this program using if else.
previous
(Lorde wala)

Q. To check whether a given integer is a prime number or not.

```
#include <stdio.h>
#include <conio.h>
void main()
{
int n, i, prime = 1;
printf ("Enter a positive integer");
scanf ("%d", &n);
if (n==1)
{
prime = 0;
}
for(i=2; i<= n/2; i++)
{
if (n%i ==0)
{
prime = 0;
break;
}
if prime
{
printf ("%d is a prime no:\n", n);
}
else {
printf ("%d is not a prime number:\n", n);
}
getch();
```

Q To print name of a month, number will be given.

```
#incude <stdio.h>  #incude <conio.h>
void main()
{
    int m;
printf ("Enter month number 1 to 12\n");
  scanf ("%d", & m);
  switch (m)
  {
   case 1 : printf ("January");
        break;
   case 2: printf ("February");
        break;
   case 3: printf ("march");
        break;
   Case 4: printf ("April");
        break;
   case 5: printf ("may");
        break;
   case 6: printf ("June");
        break;
   case 7: printf ("July");
        break;
   case 8: printf ("August");
        break;
   case 9: printf ("September");
        break;
   case 10: printf ("October");
        break;
   Case 11: printf ("November");
        break;
   Case 12: printf ("December");
```

```
        break;
default : printf("Invalid month number");
    }
    getch();
    }
```

3. FUNCTIONS

Q. To find area of triangle using its side, use a function to find the area.

```
#include <stdio.h>
#include <conio.h>
#include <math.h>
void main()
{
float area (int a, int b, int c);
void main ()
{
int x, y, z;
float ar;
clrscr();
printf("Enter sides:\n");
scanf("%d %d %d", &x, &y, &z);
ar = area(x,y,z); // f^n call
printf("Area = %f", ar);
getch();
}
```

fuction prototype

half code on

if means if you write here int then you cannot enter decimal number

your datatypes should be match

```
float area(int a,int b, int c)
{                                  //fn definition
  float s;
s=(a+b+c)/2;
return sqrt(s*(s-a)*(s-b)*(s-c));
```

Output :-

Enter the sides
3
4
5

Area = 6

Q To find the average of 3 numbers using function

```
#include<stdio.h>
#include<conio.h>
#include<math.h>
float average(int a, int b, int c);
void main()
{
  int x,y,z;
float avg;  clrscr();
printf("Enter 3 numbers:\n");
scanf("%d %d %d",&x,&y,&z);
avg = average (x,y,z);
```

```
printf ("Average = %f", avg);
getch();
}
float average(int a, int b, int c)
{
return (a+b+c)/3.0;
}
```

Armstrong.

Q To check whether a given 3 digit integer is an Armstrong number or not using a function

→

```
#include <stdio>
#include <conio.h>
#include <math.h>
~~void main()~~
{
void armstrong (int n)
void main ()
{
int x;
clrscr();
printf ("Enter a no. \n");
scanf ("%d", &x);
armstrong (x);
getch();
}
```

153
$= 1^3 + 5^3 + 3^3$
$= 1 + 125 + 27$
$= 126 + 27$
$= 153$

```
Void armstrong (int n)
int sum, t, d;
sum = 0;
```

```
t=n;
while (n!=0)
{
d=n%10;
sum= sum+d*d*d;
n=n/10;
}
if(sum==t)
printf("%d is armstrong no",t);
else
printf("%d is not armstrong no",t);
}
```

Palindrome (no. whose reverse is also same).

121 ⟶ 121

151 ⟶ 151

Q. To find reverse of an integer, write a program to check whether the given number is palindrome or not.

```
#include <stdio.h>
#include <conio.h>
int reverse (int n);
void main ()
{
int m;
clrscr();
printf("Enter no.\n");
scanf("%d",&m);
```

Alt+space:
Turbo+CC.

PAGE No.
DATE / /

```
if (m==reverse (m))
printf("palindrome");
else
printf("not a palindrome");
    getch();
}
int reverse (int n)
{
    int d, rev;
  rev=0;
while (n!=0)
{
    d=n%10;
rev = rev*10+d;
    n=n/10;
}
  return rev;
}
```

Function

1) return ⟶ used when you call out area
2) continue

Pointers : those variable which stores address of other variable.

```
int *a;  ⟶ p = &a
int *b;
float *f;
```

Q To find area and perimeter of a triangle using a function.

DATE / /

```
#include <stdio.h>
#include <conio.h>
#include <math.h>
void calculate (int a, int b, int c, float *
    ar, int *pr);
void main()
{
  int x, y, z;
  float area;
  int perimeter;
    clrscr();
printf("Enter sides\n");
  scanf("%d %d %d", &x, &y, &z);
calculate (x, y, z, &area, &perimeter);
printf("Area = %.2f\n", area);
printf("Perimeter = %d", perimeter);
    getch();
}
//fn defn
void calculate(int a, int b, int c, float *ar,
        int *pr);
{
  float s;
s = (a+b+c)/2.0;
*ar = sqrt (s*(s-a)*(s-b)*(s-c));
*pr = a+b+c;
}
```

Output :- Enter sides
3
4
5
Area = 6.00
Perimeter = 12

Call by value

$x = 10$ $y = 20$

After swapping

$x = 20$ $y = 10$

main f^n values

$x = 10$, $y = 20$

$x\ y \rightarrow$ actual parameters

$a, b \rightarrow$ formal parameters

Call by Reference

$x = 10$ $y = 20$

After swapping

$x = 20$ $y = 10$

main f^n values

$x = 20$ $y = 10$

Q. To exchange values of two variables using functions.

→

```
#include <stdio.h>
#include <conio.h>
void swap (int *a, int *b);
void main()
{
int x, y;
printf("Enter 2 nos.\n");
scanf("%d %d", &x, &y);
```

```
    printf ("Before swapping");
    printf ("x = %3d, y = %3d\n", x, y);
    swap (&x, &y);
printf ("After swapping : x = %3d, y = %3d", x, y);
    getch();
    }

// void swap (int *a, int *b)
{
 int temp,
 temp = *a;
*a = *b;
*b = temp;
    }
```

Output :-

```
Enter 2 nos.
10    5
Before swapping : x=10 y=5
After swapping : x = 5  y=10
```

Recursion

Q Write a program to find nCr using functions.

→

```
#include <stdio.h>
int fact (int n);
void main ()
{
```

$0! = 1$

PAGE No.
DATE / /

continous allocations → calloc

```
int n, r, nCr;
nCr = fact (n) / fact (r) * fact (n-r));
    nCr
printf ("%d", nCr);
}
/* fn defn */
int fact ( int n)
{
  if (n = = 0)
  return 1;
else
  return n * fact (n-1);
}
```

recursion process.

nCr = fact (n) % fact(r) * fact (n-r)

calloc

POINTERS

malloc

syntax / writing styles of pointers

⟹ int *p; | int* p; | int * p;

→ adress location

→ pointer is a special variable.

1) Static variable
2) Dynamic variables
   a) calloc () → multiple
   b) malloc () → faster
   c) realloc ()

memory is dividing in multiple box

memory is saved in every box

DATE / /

Program:- To create array of 'n' location & read n numbers into array & display.

```
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>
void main()
{
int * a, n, I,
clrscr();
printf("Enter value of n");
scanf("%d", &n);
a= (int *)malloc(n * size of (int));
if (a! = NULL)
{
printf("Enter array elements\n");
for (i=0; i<n; i++)
{
scanf("%d", &a[I]);
}
printf("Array elements\n",);
for (i=0, i<n, i++)
{
printf("%d\n", a[i]);
}
} getch();
}
```

PAGE No.
DATE / /

variables can be classified into 2 types:-

1) static variables :-
variables that are declared in a program are known as static variables. We cannot make any changes in the size of the memory allocated for such variables.

2) Dynamic variable :- Variables that can be created & destroyed at run time are known as dynamic variables. We can create and destroy dynamic variables using the following functions.

malloc :- to allocate a block of ~~bytes~~ byte of a given size.

calloc :- To allocate a continous block of bytes of a given size.

realloc :- To change the size of a previously created dynamic variable.

free () :- To destroy a dynamic variable.

ARRAYS

Arrays — collection of items/elements of same [data types]

eg:- int or float.

Syntax of array :-

```
int a[10];

int arr[10] = { 3, 5, 8, 0, 1, 2, 5, 13, 9, 10 }
                ↑  ↑  ↑                    ↑
                0  1  2                    9

float b[25];

char c[3] = { 'h', 'i', 'j' }
```

Q To find the sum & average of an array.

→

```
#include <stdio.h>
#include <conio.h>

void main()
{
int a[100], n, i;
float sum, avg;
clrscr();
printf("Enter no. of element \n");
scanf("%d", &n);
printf("Enter element of array \n");
for (i=0; i<n; i++)
{
printf("Enter an element \n");
scanf("%d", &a[i]);
}
```

PAGE No.
DATE / /

```
printf ("Given array \n");
for (i=0 ; i<n , i++)
  {
   printf ("%d", a[i]);
  }
  sum = 0 ;
for (i=0 ; i<n ; i++)
      {

   sum = sum + a[i] ;
      }
   avg = sum/n;
printf ("\n Sum = %.2f, Average = %.2f",
 sum, avg);
    getch();
  }
```

Output :- Enter no. of element
2.

Enter elements of array
Enter an element 2
Enter an element 2.
Given array
2 2
Sum = 4.00 Average = 2.00