

cout

- To display values of the variable as well as strings of text, you use an entity called cout and the `<<` operator (sometimes called the *insertion* operator).

→ • Notice that strings must be included in double quotes.

Ex 1: What will be printed at the output after execution of the following statement, assuming the value of the variable `square_area` is 25?

→

```
int square_area=25; ←  
cout << "The area is:" << square_area;
```

`square_area`
25

OUTPUT.

The area is: 25

Ex 2: What will be printed at the output after execution of the following statement, assuming the value of the variable `square_area` is 25?

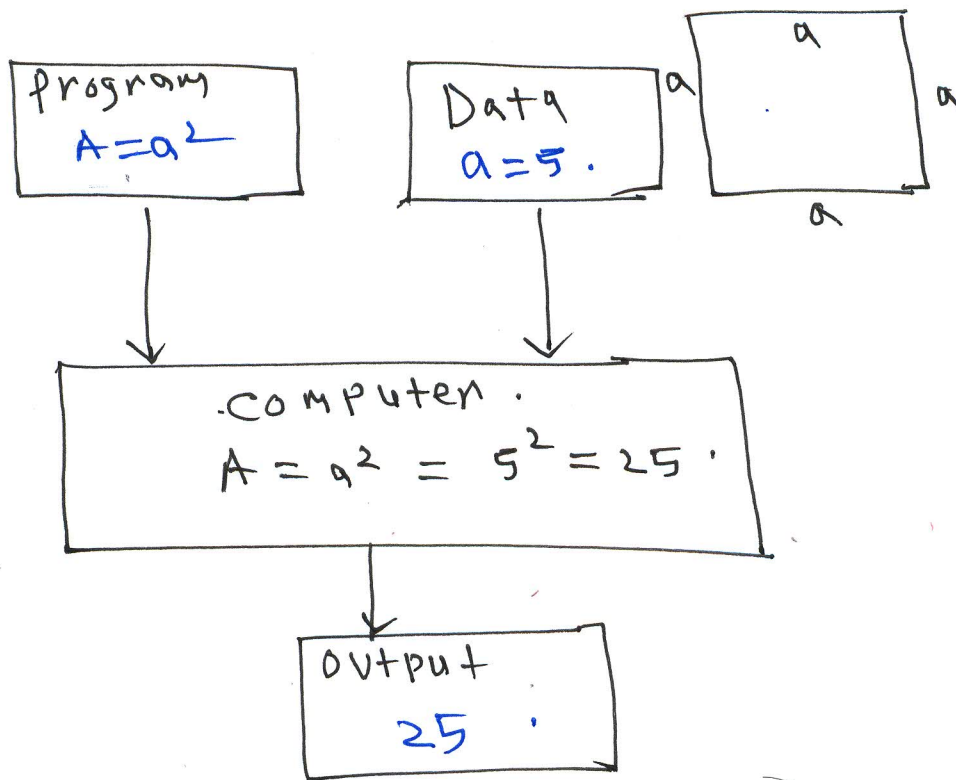
```
int square_area=25;  
cout << "The area is:\n" << square_area;
```

\n → new line character

→ The area is :
25

Output

Write a Program to print the area of a square, where length of each side is 5. The equation for area of the square $A = a^2$, where a is the length of each side



→ `#include <iostream>`
→ `using namespace std;`
→ `int main()`

```
{  
    int a = 5, area;  
    area = a*a; ✓ 5 * 5 = 25  
    cout << "The area is:" << area << endl;
```

→ `return 0;`

The area is: 25

a 5

area

25

\n and endl

* To start a new output line, you can include \n in a quoted string. Alternatively, you can start a new line by outputting endl.

```
cout << "Fall 2020\n";  
cout << "EET 293\n";
```

OUTPUT,

```
Fall 2020  
EET 293
```

```
cout << "Fall 2020"<<endl;  
cout << "EET 293"<<endl;
```

OUTPUT,

```
Fall 2020  
EET 293.
```

cin Statements

- A cin statement sets variable equal to values typed in at the keyboard.
- When a program executes the input statement it waits for user to provide input. The user also needs to hit the Enter key so that the program accepts the input.

```
cin >> Variable_1 >> Variable_2 >>.....;
```

syntax

Example 1 :

```
cin >> price ;
```

Example 2 :

```
cin >> number >> size ;  
price ;
```

```
int price ;
```

```
cout<<"Please enter the values:";
```

```
cin>>price;
```

85 .

OUTPUT

```
please enter the values: 85 .
```

Write a Program to ask user to enter the length of the side and print the area of a square. The equation for area of the square $A = a^2$, where a is the length of each side

a = length of the side,
area = Area of the square.

→ #include <iostream>

→ using namespace std;

→ int main()

{

→ int a, area;

→ cout<<"Enter the value of the side:";

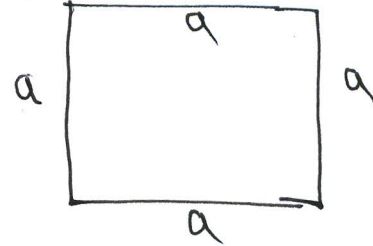
→ cin>>a;

area = a*a; area = 15 * 15 = 225

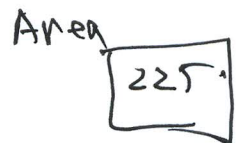
cout<<"The area is:"<<area;

→ return 0;

}



$$A = a^2$$



OUTPUT

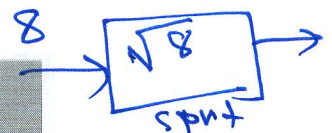
Enter the value of the side: 15.
The area is : 225.

a, b.

Arithmetic Operators

Operation	C++ Symbol	Example (C++ Symbol)	Mathematics Symbol	Example (Mathematics Symbol)
Addition	+	a + b ✓	+	a + b ✓
Subtraction	-	a - b ✓	-	a - b ✓
→ Multiplication	*	<u>a * b</u>	. or x	<u>a . b</u> or <u>a x b</u> ✓
→ Division	/	<u>a / b</u>	fraction bar or ÷	$\frac{a}{b}$ or $a \div b$

Mathematical Expression	C++ Functions	Comments
✓ \sqrt{x}	sqrt (x)	Square root of x
✓ x^n	pow (x, n)	Power of x
e^x	exp (x)	Exponent of x
x	<u>abs</u> (x)	Absolute value x
<u>sin</u> x	sin (x)	Sine of x
<u>cos</u> x	cos (x)	Cosine of x



Example: Convert the following Math expression to C++ expression: $\frac{xy}{2}$

$$(x * y) / 2$$

Example: Convert the following Math expression to C++ expression: $(1 + \frac{r}{100})^n$

$$\left(1 + \frac{r}{100}\right)^n$$
$$= \text{pow}\left(1 + \frac{r}{100}, n\right)$$

$$x^n \rightarrow \text{pow}(x, n)$$
$$x = 1 + \frac{r}{100}$$

Example: Convert the following Math expression to C++ expression: $\sqrt{a^2 + b^2}$

$$\sqrt{a^2 + b^2}$$

$$\sqrt{x} = \text{sqrt}(x)$$

$$= \text{sqrt}(a^2 + b^2)$$

$$= \text{sqrt}(\text{pow}(a, 2) + \text{pow}(b, 2))$$

$$a^2 \rightarrow \text{pow}(a, 2)$$

$$b^2 \rightarrow \text{pow}(b, 2)$$

$$\text{sqrt}(a * a + b * b)$$

Write a program to print the value of y , where $y = \sqrt{a^2 + b^2}$. The value of a and b are 10 and 5, respectively.

→ `#include <iostream>`
→ `#include <cmath>` → Added library.
→ `using namespace std;`

```
int main()
```

```
{
```

```
    // Variable Declaration
```

```
    int a = 10, b = 5; ←
```

```
    double y; ←
```

```
    // Calculation of y
```

```
    y = sqrt(a*a+b*b);
```

```
    // printing the result
```

```
    cout << "The value of y is:" << y << endl;
```

```
    return 0;
```

```
}
```

OUTPUT

The value of y is: 11.18.

Math

$$y = \sqrt{a^2 + b^2}$$

$$= \sqrt{10^2 + 5^2}$$

$$= \sqrt{100 + 25}$$

$$= 11.18$$

a
10

b
5

y
11.18

y = 11.18

a = 10
b = 5

Comments

- You should add comment which explains your code. This helps programmers who read your code understand your intent.
- You use the // delimiter for short comments. If you have a longer comment, enclose it between /* and */ delimiters. The compiler ignores these delimiters and everything in between.

→ `int r = 5;` ✓ // radius of the circle is 5 inch.

```
/* EET 340
   Spring 2022
  */ ED-116
```

$$\pi = 3.1416$$

$$g = 9.8 \text{ ms}^{-2}$$

Naming Constants

- When a variable is defined with the reserved word const, its value can never change.
- Constants are generally written in capital letters to distinguish them visually from regular variables.

Syntax.

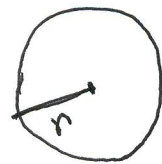
`const Type_Name Variable_Name = Constant ;`

const

double

PI = 3.14 ;

$$A = \pi r^2$$



Write a program to print the area of a circle, where the radius of the circle is 3.
The equation of the circle is $A = \pi r^2$, where r is the radius.

```
#include <iostream>
```

```
using namespace std;
```

```
int main()
{
```

```
    // variable declaration
```

```
    int r=3;
```

```
    → const double PI=3.14;
       double area;
```

```
    //calculate the area
```

```
    → area = PI*r*r; = 3.14 * 3 * 3 = 28.26
```

```
    //printing the area
```

```
    → cout<<"The area is: "<<area;
```

```
    return 0;
```

```
}
```

OUTPUT

The area is : 28.26 ,

r

3

PI

3.14

area .

28.26

Math

$$A = \pi r^2$$

c++

$$A = \pi * r * r = \pi * \text{pow}(r, 2)$$