

Functions As Program Building Blocks

- ◆ Programmers use functions like building blocks to construct large programs.
- ◆ To be able to construct interesting programs, we must provide functions that can be easily interconnected.

```
cube = pow( num, 3.0 ) ;
```

This function call statement has three parts:

1. The name of the function being called (`pow`)
2. An argument list enclosed in parentheses (`num and 3.0`)
3. An assignment statement (`=`) and variable (`cube`) to store the return value.

- ◆ The arguments of a function are used to carry information into the function subprogram from the `main` function (or from another function subprogram).

- ◆ The arguments of a function can also be used to return computed results back to the calling function, in addition to the return value.

- ◆ Arguments that carry information from the `main` function into the function subprogram are called **input arguments**.

- ◆ Arguments that return results to the main function are called **output arguments**.

Functions and Code Reuse

- ◆ A C++ function can return a single "result" value to the calling program. This is called the **return value**.
- ◆ Since this single result is considered the value of the function call, the call does not have to be a separate assignment statement, but can appear anywhere that we can use that value. For example,

```
cout << "The cube of " << num << " is "  
      << pow( num, 3.0 )  
      << endl ;
```

- ◆ A function can be thought of as a "black box" that is passed one or more input values and then automatically returns a single output value.
- ◆ Functions which return values are called into execution by writing a function call into an expression:



```
// calculate cube root of num
double cuberoot( double num ) ;

. . .

double z ;           // cube root
double w = 27.0;     // number

z = 5.7 + cuberoot( w ) ;
```

Predefined Functions and Code Reuse

- ◆ A primary goal of software engineering is to write error-free code.
- ◆ One way to approach this goal is through **code reuse**, reusing program fragments that have been already written and tested.

"Why reinvent the wheel?"

- ◆ C++ promotes reuse by providing numerous library functions that do things like perform complex mathematical computations.

Example, **sqrt**

```
#include <cmath>
double sqrt( double x );
```

Description: ANSI

The sqrt function calculates the square root of x.

The x argument must be greater than or equal to 0.

Returns: square root of x
 0 if x is less than 0