3.1

The `cin` Object

The `cin` Object

- Standard input object
- Like cout, requires iostream file
- Used to read input from keyboard
- Information retrieved from cin with >>
- Input is stored in one or more variables

Introducing Programming with an example

- Computing the Area of a Circle
- This program computes the area of the circle.

Writing a Program

Step 1: Designing An Algorithm

- The algorithm for calculating the area of a circle:

1. Read in the circle's radius using keyboard input.
2. Compute the area using the following formula:

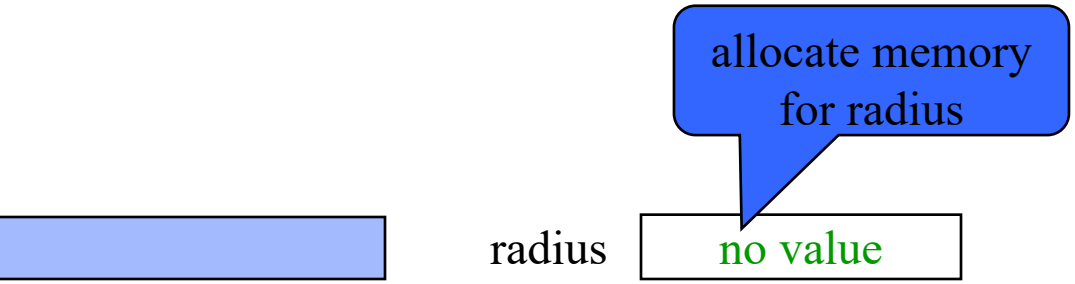
area= radius * radius * π

π = 3.14159

3. Display the result.

Trace a Program Execution

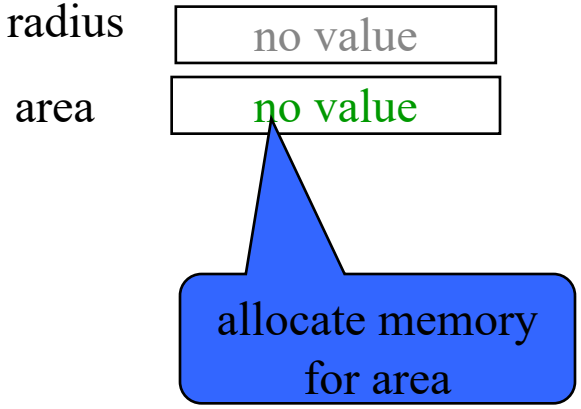
```
#include <iostream>
using namespace std;

int main() {
  double radius;
  double area;

  // Step 1: Read in radius
  radius = 20;

  // Step 2: Compute area
  area = radius * radius * 3.14159;

  // Step 3: Display the area
  cout << "The area is ";
  cout << area << endl;
}
```



Trace a Program Execution

```
#include <iostream>
using namespace std;

int main() {
  double radius;
  double area;

  // Step 1: Read in radius
  cout <<  “Enter in a radius” ;
  cin >> radius ;

  // Step 2: Compute area
  area = radius * radius * 3.14159;

  // Step 3: Display the area
  cout << "The area is ";
  cout << area << std::endl;
```

memory



Trace a Program Execution

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#include <iostream>
using namespace std;

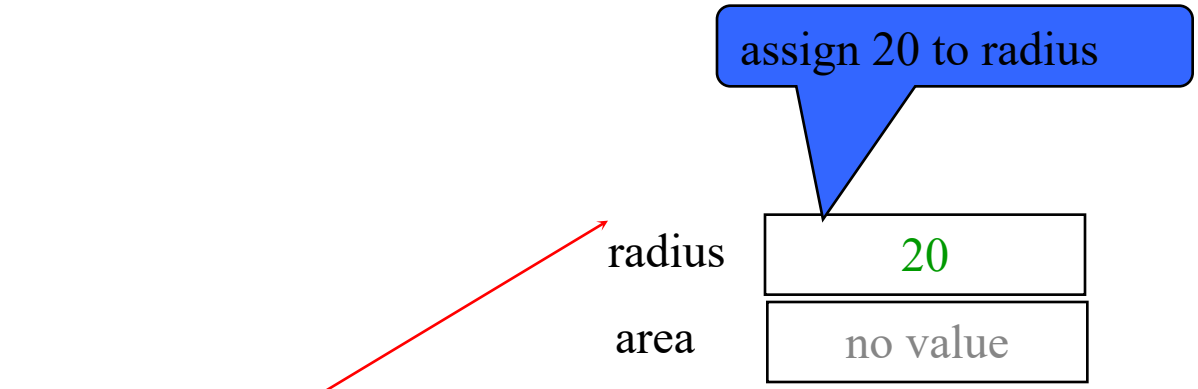
int main() {
  double radius;
  double area;

  // Step 1: Read in radius
  cout <<  "Enter in a radius" ;
  cin >> radius ;

  //radius = 20;

  // Step 2: Compute area
  area = radius * radius * 3.14159;

  // Step 3: Display the area
```



Trace a Program Execution

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using namespace std;

int main() {
  double radius;
  double area;

  // Step 1: Read in radius
   cout <<  “Enter in a radius” ;
  cin >> radius ;

  // Step 2: Compute area
  area = radius * radius * 3.14159;

  // Step 3: Display the area
  cout << "The area is ";
  cout << area << std::endl;
```
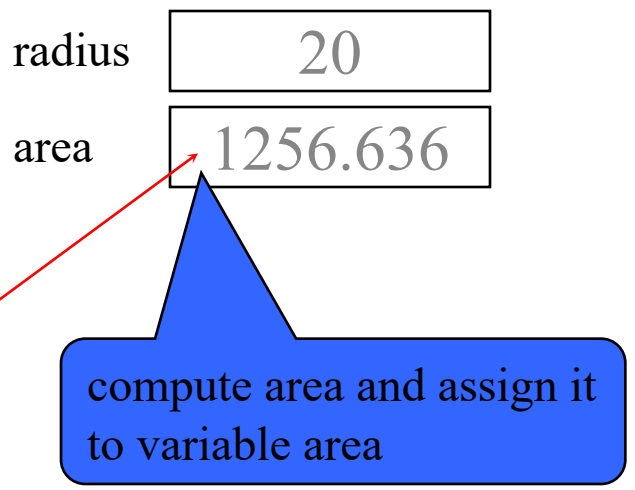



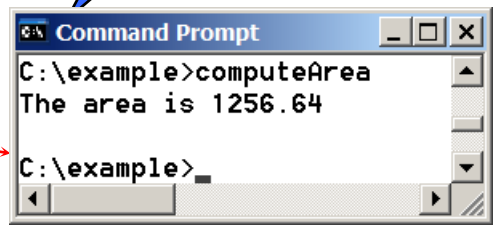
Trace a Program Execution

```
#include <iostream>
using namespace std;

int main() {
  double radius;
  double area;

  // Step 1: Read in radius
  cout <<  “Enter in a radius” ;
  cin >> radius ;

  // Step 2: Compute area
  area = radius * radius * 3.14159;

  // Step 3: Display the area
  cout << "The area is ";
  cout << area << std::endl;
}
```

memory

radius	20
area	1256.636

print a message to the console



The `cin` Object in Program 3-1

Program 3-1

```
1  // This program asks the user to enter the length and width of
2  // a rectangle. It calculates the rectangle's area and displays
3  // the value on the screen.
4  #include <iostream>
5  using namespace std;
6
7  int main()
8  {
9       int length, width, area;
10
11      cout << "This program calculates the area of a ";
12      cout << "rectangle.\n";
13      cout << "What is the length of the rectangle? ";
14      cin >> length;
15      cout << "What is the width of the rectangle? ";
16      cin >> width;
17      area = length * width;
18      cout << "The area of the rectangle is " << area << ".\n";
19      return 0;
20 }
```

Program Output with Example Input Shown in Bold

```
This program calculates the area of a rectangle.
What is the length of the rectangle? 10 Enter
What is the width of the rectangle? 20 Enter
The area of the rectangle is 200.
```

The `cin` Object

- **`cin`** converts data to the type that matches the variable:

```
int height;
cout << "How tall is the room? ";
cin >> height;
```

Displaying a Prompt

- A prompt is a message that instructs the user to enter data.

- You should always use **`cout`** to display a prompt before each **`cin`** statement.

```
cout << "How tall is the room? ";
cin >> height;
```

The `cin` Object

- Can be used to input more than one value:

```
cin >> height >> width;
```

- Multiple values from keyboard must be separated by spaces

- Order is important: first value entered goes to first variable, etc.

The `cin` Object Gathers Multiple Values in Program 3-2

Program 3-2

```
1  // This program asks the user to enter the length and width of
2  // a rectangle. It calculates the rectangle's area and displays
3  // the value on the screen.
4  #include <iostream>
5  using namespace std;
6
7  int main()
8  {
9     int length, width, area;
10
11    cout << "This program calculates the area of a ";
12    cout << "rectangle.\n";
13    cout << "Enter the length and width of the rectangle ";
14    cout << "separated by a space.\n";
15    cin >> length >> width;
16    area = length * width;
17    cout << "The area of the rectangle is " << area << endl;
18    return 0;
19 }
```

Program Output with Example Input Shown in Bold

```
This program calculates the area of a rectangle.
Enter the length and width of the rectangle separated by a space.
10 20 [Enter]
The area of the rectangle is 200
```

The `cin` Object Reads Different Data Types in Program 3-3

Program 3-3

```
1  // This program demonstrates how cin can read multiple values
2  // of different data types.
3  #include <iostream>
4  using namespace std;
5
6  int main()
7  {
8     int whole;
9     double fractional;
10    char letter;
11
12    cout << "Enter an integer, a double, and a character: ";
13    cin >> whole >> fractional >> letter;
14    cout << "Whole: " << whole << endl;
15    cout << "Fractional: " << fractional << endl;
16    cout << "Letter: " << letter << endl;
17    return 0;
18 }
```

Program Output with Example Input Shown in Bold

```
Enter an integer, a double, and a character: 4 5.7 b [Enter]
Whole: 4
Fractional: 5.7
Letter: b
```

Volume of a cuboid

- Calculate volume of a cuboid by taking in length, breadth and width from the user.