Tutorial 1 – C++ Basics, I/O and Operators

Q1. Write a program **display.cpp** that displays the sentence "This is Tutorial 1" on the screen. You may copy the code below and fill in the missing parts to complete the program.

```
_____ <iostream>
using _____ std;

int _____
{
    // code to display sentence
    _____;

    // code indicates the end of program
    _____;
}
```

Sample result:
```
This is Tutorial 1
```

Q2. Write a program **unit.cpp** that converts the user input value from meter (m) to centimeter (cm). Given that 1m = 100cm. Your program should display the messages as shown in the sample result.

Sample result:
```
Input meter: 1.234
1.234m = 123.4cm
```

Input value is highlighted in **bold and italic** for easy reference. Not a format in your code.

Think about the following first:
  (1) What header files/library are required?
  (2) How many variables are needed?
  (3) What is/are the data type(s) of variable(s)?
  (4) What are the steps and calculations involved?

Follow the steps below to write the program:
1. Include necessary header files/library similar to Q1.

```
_____ <iostream>
using _____ std;
```

2. Write the main program block similar to Q1.

```
int _____
{
    // code for step 4 and onwards
    // code indicates the end of program
    _____;
}
```

3. Declare necessary variables.

```
double m, cm;
```

Use **double** type because the values contain decimal point.

4. Prompt for user input of a value in meter.

```
cout << "Input meter: ";
cin >> m;
```

Prompt message is displayed using cout. Input value is accepted using cin.

5. Calculate the answer in terms of centimeter (1m = 100cm).

```
cm = m * 100;
```

Right-hand-side is calculated first. The result is then stored into cm.

6. Display the result in the required format.

```
cout << m << "m = " << cm << "cm";
```

Use << to concatenate different components in a display message.

Q3. Write a program **Cone.cpp** that calculates and displays the volume of a cone, where the radius (*r*) and height (*h*) are input by the user. Use data type **double** for all data values, and include the constant variable *PI* in your program: `const double PI = 3.14159265;`
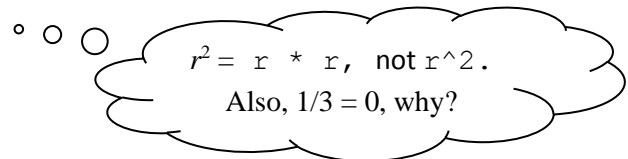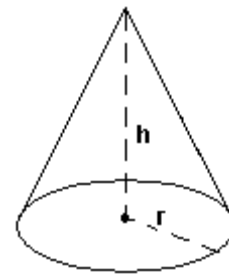
Sample result:
```
Enter the radius (in cm): 3
Enter the height (in cm): 5
The volume of the cone is 47.1239 cm^3
```

Follow similar steps in Q2 with the underlined program logic below:

```
Start
    1.  Declare PI and other necessary variables
    2.  Ask user to input radius and height
    3.  Calculate the cone volume ( 1/3 πr²h )
    4.  Display result
End
```

$r^2 = r * r$, not `r^2`.
Also, $1/3 = 0$, why?

Q4. Write a program **calculate.cpp** that calculates and displays the answer of the following equation, where *x* is an integer variable with value input by user.

$$\left[\frac{3 + 4x}{10} - \frac{10(x - 2)^2}{x - 3} \right]^2$$

Sample result (suppose *x* = 5):
```
Input the value of x: 5
The answer is 1823.29
```

Consider: If user input 3, what will the program output?

Q5. Write a program **Digit.cpp** that asks the user to input a two-digit integer (00 – 99) and display the two digits separately. Use data type **integer** for all data values.

Sample result:
```
Enter a two-digit integer (00 - 99): 48
The two digits are 4 and 8
```

Hint: You may use the remainder operator (modulus, %) in your calculation.