1 1 Consider the C++ code segment below What value will newval have after this code has been executed? (2)

```
int var1 = 4,
int var2 = 10,
int newval = 0;
if (var1 * 2 >= var2)
    newval = 5 + 2 * var2;
else if (var1 < var2)
       newval = var2 - var1 * 2,
    else
       newval = var1;
```

newval == 2

1 2 Suppose the input value for a is 5 What is the value of a after the following C++ code has been executed? (2)

```
int a,
cin >> a,
switch (a)
{
     case 1: a += 3,
     case 3: a =  a * 3; break,
     case 5  a = ++a + 10;
     case 6  a /= 2;
     default: a = a + 1,
}
```

a == 9

1 3 Consider the following C++ code segment (2)

```
int findValue(int numberP)
{
     int count = 0;
     int value = 20,
     while (count < numberP)
     {
          value += count,
          count ++,
     }
     return value,
}
```

What will be the output of the following statement executed in the main function?

```
cout << findValue(3),
```

cout << findValue(3); // 23

In Questions 2 1 and 2 2 you have to write down what the purpose of the segment of code is Look at the following example before answering the questions.

```
int a,b,c,
cin >> a >> b >> c;
cout << c + b + a,
```

The purpose of the above code segment is to input three integer values and display their sum

Now answer questions 2 1 and 2 2 below

2 1 Assume that s and n have been declared as integers Explain in words what the purpose of the following segment of code is (2)

```
int s = 0,
int n = 0,
while (n <= 5)
{
  s = s + n;
  n++,
}
```

The purpose : Continue to add (s) to (n) per loop until n is greater than 5

2 2 Explain the purpose of the following segment of code (2)

```
int numbers[ ] = {11, 0, 15, 0, 16, 23},
int c = 0;
for (int i = 0; i <= 5; i++)
     if (numbers[i] != 0)
        c += 1,
```

The purpose : Continue to increment (c) per loop when the a specific element in the "numbers" array specified by the index variable (i) is not equal to zero

Question 3 (8marks)

Consider the following C++ code segment below

```
1 int result(int valueP)
2 {
3      int a = 2;
4      int count = 0,
5      while (count < valueP)
6      {
7           a += count + a / 2,
8           count += 2,
9      }
10     return a,
11 }
```

Demonstrate the execution and output of the program by drawing a variable diagram that traces each line of code if the value of `valueP` is 6 You are required to draw a variable diagram to illustrate what the code does

	a	count
Line 3	2	
	a	count
Line 4	2	0
	a	count
Line5	2	0
	a	count
Line7	3	0
	a	count
Line 8	3	2
	a	count
Line 7 > 5	3	2
	a	count
Line 7	6	2
	a	count
Line 8	6	4
	a	count
Line 7 > 5	6	4
	a	count
Line 7	13	4
	a	count
Line 8	13	6
	a	count
Line 7 > 5	13	6
	a	count
Line 10	13	6

Karlton Learning wants a program that displays the amount of money a company owes for a seminar The fee per person is based on the number of people the company registers For example, if the company registers 7 people then the amount owed is R 560 00 If the user enters a number that is less than or equal to 0, the program should display an appropriate error message

Number of registrants	Fee per person
1 through 4	R100 00
5 through 10	R 80 00
11 or more	R 60 00

Complete the program below

```
#include <iostream>
using namespace std,
int main()
{
      // Question 4.1                                                    (2)
      // Declare a variable to hold the number of registrants and a
      // variable to hold the amount a company owes for a seminar

int num_registrants;
int amount;

      // Question 4.2                                                    (2)
      // Write statements to input the number of registrants  If the
      // user enters a number that is less than or equal to 0, the
      // program should display an appropriate error message

cout << "Input the number of registrants : "; cin >> num_registrants;
while(num_registrants <= 0)
{
        cout << "Number of registrants cannot be zero or less than zero!\n";
        cout << "Please re-enter the number of registrants : "; cin >>
num_registrants;
}
```

```
        // Question 4.3                                                    (4)
        // Write statements to calculate and display the amount of money
        // a company owes for a seminar

        return 0,
    }
```

```
if(num_registrants <= 4) amount = 100.00;
else if(num_registrants <= 10) amount = 80.00;
else amount = 60.00;

cout << "The amount of money a company owes for a seminar : " << amount <<
endl;
```

Question 5 : (5marks)

In order to plan road maintenance, the department of Road Works request that road usage must be determined This is done by counting the number of vehicles using the road with two wheels, four wheels and more than four wheels respectively Write down ONLY the necessary `switch` statement to count the number of vehicles with two wheels, four wheels and more than four wheels Do NOT write a complete program

Use the following variables

```
    int nrWheels,          // number of wheels of a vehicle using the road

    int countTwo, countFour, countMore,    // the counters for the
                                           // number of vehicles with
                                           // two, four and more than
                                           // four wheels respectively
```

Assume that `countTwo`, `countFour` and `countMore` have been initialised already and that a value has been input and validated for `nrWheels`

```
switch(nrWheels)
{
        case 2 : countTwo++; break;
        case 4 : countFour++; break;
        default : if(nrWheels > 4)countMore++; break;

}
```

6 1 Write a `for`-statement to display the numbers 1 through 10 on the screen (2)

```
for (int i = 1;i <= 10; i++)
cout << i << endl;
```

6 2 Write a `while`-statement to display the numbers 1 through 10 on the screen (3)

```
int i = 0;
while(i <= 10);
i++
cout << i << endl;
```

6 3 The code below should display the numbers 1, 2, 3 and 4 on the screen However, the code is not working correctly Correct the errors in the code (2)

```
1    int num = 1,
2    while (num < 4)
3         cout << num << endl,
4    // endwhile
```

```
int num = 1;
while(num < 4)
{
        cout << num << endl;
}
```

The error :
+ The programmer forgot to increment (i) during the while loop
+ while(num < 4) should be while(num <= 4)

Correction :

```
int num = 1;
while(num <= 4)
{
        cout << num << endl; num++;
}
```

6 4 The code below should display each salesperson's commission. The commission is calculated by multiplying the salesperson's sales by 10% The code is not working correctly Correct the errors in the code (2)

```
1    float sales = 0 0,
2    float commission = 0 0,
3    cout << "Enter a sales amount  ",
4    cin >> sales,
5    while (sales > 0 0)
6    {
7         Commission = sales * 0.1,
8         cout << commission << endl;
9    }
10   // endwhile
```

The error :
+ While loop should be if loop
+ Missing error message when i < 0.0
+ "Commission" should be "commision"

Correction :

```
if(sales > 0.0)
{
        commision = sales * 0.1;
        cout << commision;
}
else if(sales < 0.0) cout << "Invalid sales. Please try again.\n";
```

Question 7 : (6marks)
In this question you have to write a complete function

The Fruit Packers keep record of the number of crates of fruit that are packed for each day for a whole year (365 days) These 365 values are stored in an `int` array called `crates` You have to write a function, called `calcAverage` to determine the average number of crates packed per day for the year

Assume the following

- a declaration of a global constant
- `const int NUM_DAYS = 365;  // number of days per year`
- two declaration statements in the main function

```
int crates[NUM_DAYS],    // array of days
int average;             // the average number of crates
```

- values have been assigned already to all the elements of the array
- the function is called in the main function as follows

```
average = calcAverage(crates);
```

Write down ONLY the complete function `calcAverage`

```
float calcAverage(int crates[NUM_DAYS])
 {
  int total = 0;
  for(int i = 0; i < NUM_DAYS; i++)
  total += crates[i];
  return (float) total / (float) NUM_DAYS;
}
```

8 1 Write a function header for the function `check` that has two parameters The first parameter should be an integer value and the second parameter a floating point value The function returns no value (1)

```
void check (int num1, float num2);
```

8 2 Write a function header for the function `mult` that has two floating point numbers as parameters and returns the result of multiplying them (1)

```
double mult(double num1, double num2);
```

8 3 Write a function header for the function `time` that inputs seconds, minutes and hours and returns them as parameters to its calling function (1)

```
void time(int &seconds, int &minutes, int &hours);
```

8 4 Write a function header for the function `countLets` that returns the number of occurrences of a character in a string, both provided as parameters (1)

```
int countLets(string senP, char letter);
```

8 5 Suppose the following declarations appear in the main function of a C++ program

```
int number,
float cost, markup, discount,
```

Also, suppose the following calling statement appears in the main function:

```
amount = calcFinal(67 50, markup, discount, 5);
```

Write the correct function header of the function calcFinal? (2)

```
float calcFinal(float, float, float, int)
```

8 6 Suppose the following declarations appear in the main function of a C++ program

```
string dayOfWeek;
int productCode, number;
float discount,
```

If the following function header is given

```
void calcDiscount(float & discountP , int productCodeP,
                  int numberP, string dayOfWeekP),
```

give the correct calling statement of the function calcDiscount in the main function (2)

```
calcDiscount(discount, productCode, number, dayOfWeek);
```

Bookworm bookstores announced a competition running over four weeks for their three branches The branch with the highest sales per week will receive a surprise for that week You as a programmer are requested to write a program to keep record of the number of books sold per week in each of the three branches over this period of four weeks The (incomplete) program below inputs the respective number of books sold and stores it in a two-dimensional array called `sales`, with four rows and three columns The program then displays for each week, the highest number of book sold

Here is an example of the input data for the program

	Bookworm South	Bookworm West	Bookworm North
Week 1	100	120	103
Week 2	96	122	111
Week 3	110	101	119
Week 4	106	99	102

And the corresponding output

```
The highest sales in week 1 were 120 books.
The highest sales in week 2 were 122 books.
The highest sales in week 3 were 119 books.
The highest sales in week 4 were 106 books.
```

Use the declarations in the (incomplete) program below and do the following

9 1 Declare the two- dimensional array `sales` (2)

```
int sales[NUM_WEEKS][NAME];
```

9 2 Assume array `sales` have been initialised Write a program fragment to determine and display the highest sales per week. (6)

```
#include <iostream>
using namespace std,
const int NUM_WEEKS = 4,
const int NAME = 3;
int main()
{
      int highest;

      // array sales should be declared here (part 9.1)

      // Assume statements to input the array here
      // Do not write these statements

      // Your statements to determine and display the highest
      // number of sales per week (part 9.2 of the question)

      return 0,
}
```

```
int highest_sales_per_week = 0;
for(int i = 0; i < NUM_WEEKS; i++)
{
        highest_sales_per_week = sales[i][0];
        for(int j = 1; j < NAME; j++)
        {
        if(highest_sales_per_week < sales[i][j]) highest_sales_per_week =
sales[i][j];
        }
        cout << "The highest sales for week " << i + 1 << " : " <<
highest_sales_per_week << endl;
}
```

Consider the following struct definition

```
struct Product
{
      String name,
      float weight;
      float price,
}
```

10 1 Given this structure type definition above, suppose the following declaration appear in the main function of a C++ program

```
Product p1,
```

Write a cout statement that will display all the fields of the Product p1 (2)

```
cout << "name : " << p1.name << endl;
cout << "weight : " << p1.weight << endl;
cout << "price : " << p1.price << endl;
```

10 2 Write a function read_Product_Record which accepts a reference parameter new_Product of type Product read_Product_Record fills new_Product with values entered from the keyboard (4)

```
void read_Product_Record(Product &new_Product)
{
        cout << "Enter name : " << new_Product.name << endl;
        cout << "Enter weight : " << new_Product.weight << endl;
        cout << "Enter price : " << new_Product.price << endl;
}
```

Question 11 : (7marks)

In this question you have to write a function that receives as input a person's first names and surname, and then display just the initials For example, if the input is John Peter Doe, the initials JPD must be displayed

```
     void displayInitials()
     {
      string firstname;
      string secondname;
      string surname;

      cout << "Please enter your first name: ";
      getline(cin, firstname);

      cout << "Please enter your second name: ";
      getline(cin, secondname);

     cout << "please enter your surname name: ";
     getline(cin, surname);

     cout << "\nYour initials: " << firstname[0] << secondname[0] <<
surname[0] << "\n";
  }
```

OR

```
void displayInitials()
```

```
{
   string namesAndsurname, initials;
   int space;

   cout << "Please enter full names and surname , all seperated by
   spaces: " <<endl;
   getline(cin, namesAndsurname, '\n');
   initials = namesAndsurname[0];
   space = namesAndsurname.find (" ") ;//position of next space

   while (space > 0)
   {
       initials = initials + namesAndsurname[space + 1];
       space = namesAndsurname.find (" ", space + 1); //next blank space
   }
   cout << " Initials are : " << initials << endl;
 }
```