Question 1

Based on the program given below, answer the questions from **(1)** to **(11).**

```
#include <iostream>
#include <cmath>
using namespace std;
class Geometry
{
        private:
              float pi, height, radius;
        public:
              //-----(1)-----

              //-----(2)-----

              //-----(3)-----

              //-----(4)-----
};

class Cylinder
{
        private:
            float vol;
        public:
            //-----(5)-----
};

class Cone
{
        private:
            float vol;
        public:
            //-----(6)-----
};

int main()
{
        float hg, rd;
        cout << "Enter height: ";
        cin  >> hg;
        cout << "Enter radius: ";
        cin  >> rd;
        //-----(7)-----
        //-----(8)-----
        //-----(9)-----
        //-----(10)-----
        //-----(11)-----
}
```

Sample Output Screen

```
Enter height: 3.5
Enter radius: 4.0

Volume of cylinder with radius 4 and height 3.5 is : 175.929

Volume of cone with radius 4 and height 3.5 is : 58.6431

= END OF PROGRAM =
```

1. Define a parameterized constructor that takes in two float parameters, *hg* and *rd*. Assign values *M_PI*, *hg* and *rd* to *pi*, *height* and *radius* respectively.

2. Define a destructor that displays on the output screen **"= END OF PROGRAM ="**. **[Note: refer to sample output screen above]**

3. Declare class *Cylinder* as a friend.

4. Declare class *Cone* as a friend.

5. Define function *calc_vol(…)* for class *cylinder*.
   - Parameter : **pointer** *g* of class *Geometry*
   - Use the pointer *g* (use the -> operator) to calculate the volume of a cylinder and display the output.
     - Formula: $vol = pi \times radius^2 \times height$

       [Note: refer to sample output screen above]

6. Define function *calc_vol(…)* for class *cone*.
   - Parameter : **reference** argument *g* of class *Geometry*
   - Use reference argument *g*, calculate the volume of a cone and display the output.
     - Formula: $vol = \frac{1}{3} \times pi \times radius^2 \times height$

       [Note: refer to sample output screen above]

7. Declare object *gmt* of class *Geometry*, passing in *hg* and *rd* as parameter values.

8. Declare object *cyc* of class *Cylinder*.

9. Call object *cyc*'s *calc_vol(…)* method, passing in address of object *gmt*.

10. Declare object *cn* of class *Cone*.

11. Call object *cn*'s *calc_vol(…)* method, passing in object *gmt*.

Question 2

Modify the code created in **Question 1** by adding a few items below in order to calculate volume of cube.
Hint: Need changes a bit at class *geometry* and get length input.

Sample Output Screen
Enter height: ***3.5*** Enter radius: ***4.0*** Enter length: ***3.0*** Volume of cylinder with radius 4 and height 3.5 is: 175.929 Volume of cone with radius 4 and height 3.5 is: 58.6431 Volume of cube with length 3 is: 27 = END OF PROGRAM =

1. Declare class *Cube* as friends.

2. Define function *cal_vol(…)* for class *cube*.
   - Parameter : reference argument *g* of class *geometry*
   - Use reference argument *g*, calculate the volume of a cube and display the output.
     - Formula: $length^3$
       [Note: refer to sample output screen above]

3. Declare object *cb* of class *Cube*.

4. Call object *cb's calc_vol(…)* method, passing in object *gm*t

Question 3

A. **Create class Ticket** with the following:
   i. Data members (**private**):
      - *no* : int
      - *price* : float
   ii. Declare class **Student** as a *friend* of class **Ticket.**
   iii. Public member functions:
      - A **default constructor** to set *price* to 10.00
      - void **setTickets()**
        Prompt and get user input for *no* (number of tickets to purchase).

B. **Create class Student** with the following:
   i. Data members (**private**):
      - *id* : string
      - *name* : string
      - *purchase* : string
      - *p* : Ticket

ii. Public member functions:

- **void setStudent( )**
  Prompt and get user input for *name* and *id.*
- **void ticket_entry( )**
  Prompt user whether to purchase tickets.
  - If user enters 'Y', set *purchase* to *"Yes",* and call function *setTickets()* using object *p*.
  - If user choose not to purchase ticket, display "--------No ticket purchase--------"
- **void display( )**
  To display the student's details (*name*, *id)* and additional details. If *purchase* equals *"Yes"*, display the details using object *p* (*no*, total price of tickets purchased (*no* multiply *price*). Otherwise, display *"You've not purchased any tickets". **[Refer to sample output screen]***

C. In **main( ):**

i. Declare an array of 3 object elements of class **Student.**

ii. Using a for-loop that loops on every array element:

- Call **setStudent( )**, **ticket_entry( )**, and **display( )**

Sample Output Screen

```
Enter ID: 1011
Enter Name: Julia
Do you want to purchase charity tickets? [Enter Y or N]: Y
Please enter number of tickets to purchase: 2

----------------------------
STUDENT DETAILS
----------------------------
ID      : 1011
Name    : Julia

----------------------------
ADDITIONAL DETAILS
----------------------------
You've purchased 2 Tickets
Total amount  : RM 20


Enter ID: 1013
Enter Name: Andy
Do you want to purchase charity tickets? [Enter Y or N]: N
--------No ticket purchased-------

----------------------------
STUDENT DETAILS
----------------------------
ID      : 1013
Name    : Andy
```

```
----------------------------
ADDITIONAL DETAILS
----------------------------
You've not purchased any tickets

Enter ID: 1055
Enter Name: Peter
Do you want to purchase charity tickets? [Enter Y or N]: Y
Please enter number of tickets to purchase: 20

----------------------------
STUDENT DETAILS
----------------------------
ID        : 1055
Name    : Peter

----------------------------
ADDITIONAL DETAILS
----------------------------
You've purchased 20 Tickets
Total amount: RM 200
```