

Question 1

Create a complete program based on the following criteria:

A) Create class ***Triangle***.

(i) protected data members : a (int), b (int), c (int)

(ii) public member functions

- **Default constructor**

To output "----- Triangle Class -----".

- **void setData(.....)**

To set the data member **a** and **b** with the value of its arguments.

B) Create class ***PythagorasTriangle*** which inherits **publicly** from class ***Triangle***.

(i) private data members : none

(ii) public member functions

- **Default constructor**

To output "-----Pythagoras Triangle -----".

- **void calcHypotenuse()**

To calculate the hypotenuse which is c using the formula given below

$$c = \sqrt{a^2 + b^2}$$

(Hint: Use the functions in the math library (`#include <cmath>`)

Square root function: `sqrt(<a number>)`

Power function: `pow(<a number>, 2)`)

- **void displaySides()**

Display values of a , b and c .

C) In **main()**

- Create an object of class *PythagorasTriangle* using the *new* operator.

- Get user input in the main function for 2 sides (side a and side b) of a Pythagoras Triangle and pass it to the ***setData(..)*** function as arguments. Invoke the ***setData(..)*** function through the dynamic object.

- Using the same object, call ***calcHypotenuse()*** and ***displaySides()***.

- Deallocate the memory for the object.

[Note: refer to sample output screen below]

Sample Output Screen

```
----- Triangle class -----
```

```
-----Pythagoras Triangle-----
```

```
Enter a : 5
```

```
Enter b : 12
```

```
::The sides of a Pythagoras triangle::
```

```
a : 5
```

```
b : 12
```

```
c : 13 (also known as the Hypotenuse)
```

Question 2

Modify main function of **Question 1** solution so that the program will repeat as long as user wants to. Use a *do-while* loop.

[Note: refer to sample output screen below]

Sample Output Screen

```
----- Triangle class -----
-----Pythagoras Triangle-----
Enter a : 5
Enter b : 12

::The sides of a Pythagoras triangle::
a : 5
b : 12
c : 13 (also known as the Hypotenuse)

Do you want to continue [Y/N] : Y

----- Triangle class -----
-----Pythagoras Triangle-----
Enter a : 3
Enter b : 4

::The sides of a pythagoras triangle::
a : 3
b : 4
c : 5 (also known as the Hypotenuse)

Do you want to continue [Y/N]: N
```

Question 3

Create a complete program based on the following criteria:

A) Create class **Product**

- (i) private data member : *prodID*(int)
- (ii) protected data member: *total_price* (float)
- (iii) public member functions :
 - **constructor** to initialize *total_price* to **0.0**
 - **int getProd_ID()**
Returns *prodID*
 - **void input_ProdID()**
Get user input for *prodID* (representing product ID)

B) Create class **CanFood** which inherits **protectedly** from class **Product**.

- (i) private data members : `unit_price(float)`, `order_unit(int)`
- (ii) public member functions
 - **void get_Product()** Call **input_prodID()**.
Get user input for *unit_price* and *order_unit*.
 - **void calculate_Total()**
Calculate *total_price*
 - **void display_product()**
Display *prodID* by calling accessor function. Display *total_price*.

C) In *main()*:

- (i) Prompt the user to enter the number of types of canned food.
- (ii) Create pointer **tp** of class *canFood*
- (iii) Use the pointer **tp** to create a dynamic array of *canFood* using *new* operator. (the size of the array will be the number of types of canned food entered by the user earlier)
- (iv) In a *for*-loop that loop through the array, using pointer *tp*:
 - Call *get_Product()*
 - Call *calculate_Total()*
- (v) In another *for*-loop that loop through the array, using pointer *tp*:
 - Call *display_product()*
- (vi) Deallocate the memory of the dynamic array.

Sample Output Screen

How many types of canned food? **2**

Enter product ID : **1001**
Enter price : **RM30**
Enter order unit : **5**

Enter product ID : **1002**
Enter price : **RM45**
Enter order unit : **3**

Product ID : 1001
Total price : RM150

Product ID : 1002
Total price : RM135