Program Development Process

Step 1: Requirements specification

The purpose of the program is to calculate the monthly payment on a home mortgage given the loan amount, rate, and years.

Step 2: Analyze

Inputs	Outputs	Constants
Loan Amount	Monthly Payment	
Interest Rate	Total Payment	
Number of years		

Step 3: Program design

Step 4: Implementation in C++

```
// Include Section
#include <iostream>
#include <cstdlib>
using namespace std;
```

```cpp
class Mortgage
{
public:
    // Constructors
Mortgage(double l, double r, double y);
Mortgage();

    // Mutators
void setLoan(double l);
void setRate(double r);
void setYear(double y);

    // Accessors
double getPayment();
double getLoan();
double getRate();
double getYear();
double getTerm();
double getTotal();

private:
    double loan;    // Dollar amount of the loan
    double rate;    // Annual interest rate
    double year;    // Number of years of the loan
};

// Main Program
Mortgage Input(Mortgage mort) //Reads inputs
{
double loan, rate, year;
cout << "Enter the loan amount($): ";
cin >> loan;
cout << "Enter the annual interest rate(%): ";
cin >> rate;
cout << "Enter the number of years: ";
cin >> year;
mort.setLoan(loan);
mort.setRate(rate);
mort.setYear(year);
return mort;
}

void Output(Mortgage mort) //Outputs solution
{
cout << "\nLoan: $" << mort.getLoan() << endl;
cout << "Rate: " << mort.getRate()*100 << "%" << endl;
cout << "Years: " << mort.getYear() << endl;
cout << "Monthly Payment: $" << mort.getPayment() << endl;
cout << "Total Payment: $" << mort.getTotal() << endl;
}

int main()
{

// Variable Declarations
double loan = 0, rate = 0, year = 0;
Mortgage mort;

// Output Identification
system("CLS");
cout << "Assignment 5 Exercise #2 by Aidan Sullivan - "
<< "House Mortgage\n\n";

mort = Input(mort);
Output(mort);

cout << "\nEnd Program.\n";

return 0;
}

Mortgage::Mortgage(double l, double r, double y)
{
loan = l;
rate = r;
year = y;
```

```cpp
}

Mortgage::Mortgage()
{
loan = 0.0;
rate = 0.0;
year = 0.0;
}

void Mortgage::setLoan(double l)
{
if (l >= 0)
loan = l;
else
{
cout << "Invalid Loan\n";
exit(EXIT_FAILURE);
}
}

void Mortgage::setRate(double r)
{
if (r >= 0)
rate = r/100;
else
{
cout << "Invalid Rate\n";
exit(EXIT_FAILURE);
}
}

void Mortgage::setYear(double y)
{
if (y >= 0)
year = y;
else
{
cout << "Invalid Year\n";
exit(EXIT_FAILURE);
}
}

double Mortgage::getPayment()
{
return (loan * (rate/12) * getTerm())/(getTerm()-1); //Payment Equation
}

double Mortgage::getLoan()
{
return loan;
}

double Mortgage::getRate()
{
return rate;
}

double Mortgage::getYear()
{
return year;
}

double Mortgage::getTerm() //For getPayment
{
return pow((1+(rate/12)),12*year);
}

double Mortgage::getTotal()
{
return year*12*getPayment();
}
```

Step 5: Testing
Test your program with sample data set to make sure the output is correct.

Should test multiple data sets including the boundary cases.
Summary and analyze your result.
Show the output screen shots here.

CN Microsoft Visual Studio Debug Console

```
Assignment 5 Exercise #2 by Aidan Sullivan - House Mortgage

Enter the loan amount($): 240000
Enter the annual interest rate(%): 3.534
Enter the number of years: 30

Loan: $240000
Rate: 3.534%
Years: 30
Monthly Payment: $1082.27
Total Payment: $389616

End Program.

C:\CIS121\ASN5\Debug\ASN5.exe (process 18636) exited with code 0.
Press any key to close this window . . .
```

CN Microsoft Visual Studio Debug Console

```
Assignment 5 Exercise #2 by Aidan Sullivan - House Mortgage

Enter the loan amount($): 100000
Enter the annual interest rate(%): 6
Enter the number of years: 10

Loan: $100000
Rate: 6%
Years: 10
Monthly Payment: $1110.21
Total Payment: $133225

End Program.

C:\CIS121\ASN5\Debug\ASN5.exe (process 17344) exited with code 0.
Press any key to close this window . . .
```