PROGRAM ONE
SOLAR PANELS

CSC 2100-001 / SPRING 2017

ASSIGNMENT DATE

Friday, September 10, 2010

DUE DATE

Friday, September 24, 2010 by midnight

HOW TO TURN IN YOUR PROGRAM:

Upload your program to the ilearn dropbox named **Program 1** by **10pm** on **Monday, February 13, 2017**. The dropbox will CLOSE at 11:59pm.

ACADEMIC MISCONDUCT POLICY

Please review the academic misconduct policy on the syllabus. Basically, if you share **any part** of your program 1 code with another student, then I am **REQUIRED** by TTU policy 217 to file a charge of Academic Misconduct for **BOTH** students. This means that I will send a Charging Document (via email) to both students, the Department Chair, Dean, the Provost's Office, and the Office of the Registrar detailing the evidence of cheating (sharing code) and recommending a zero for either the programming assignment or the entire course. Please, please do not put you, your peers, or me in this situation!!

DESCRIPTION OF PROGRAM:

You want to produce less greenhouse gases (help the environment) by helping people figure out how they can replace their current electricity usage from the power grid to solar panels that they can have installed on their house. Your program will ask the user for information on their house and current electric bill. Then, your program will calculate how many solar panels would be needed in order to completely replace all the electricity used from their electric company. Also, your program should calculate how much the solar panels would cost to install, taking in to account any financial incentives the electric company and federal government may give to install solar panels. Last, your program will figure out if the user paid the same amount toward the solar panels each month instead of the electric company, how long it would take to pay off the panels.

PROGRAM SPECIFICATIONS:

GENERAL DIRECTIONS

1. Name your source file for your program solarPanels.cpp
2. At the top of your program, write a comment block that says the title of the program, the author of the program, the date the program was started, and a short sentence or two explaining the purpose of the program.
3. Make sure you include all files necessary using #include preprocessor directive.
4. Make sure to include comments in your program to explain any variables that may not be obvious what they are used for in the program.
5. Make sure to include comments throughout your program explaining calculations your program is making.

VARIABLES

You will have several variables as well as some constant variables. You name the variables what you want in your program. Make sure you use legal variable names and follow good programming practice. You need a variable to hold…

1. The number of square feet in the user's house.
2. The total amount paid on the user's latest (current) electric bill.
3. The number if Kilowatts per Hour that the user used on the last electric bill for that entire month.
4. The number of days in the month on the latest electric bill.
5. The number of Kilowatts per Day
6. The number of solar panels needed in square inches
7. The number of solar panels needed in square feet
8. The cost of the solar panels
9. The amount of cash incentive the user will receive from their electric company if they install solar panels.
10. The total cash incentive received if the user installs solar panels
11. The total cost of the solar panels after subtracting the cash incentives
12. The number of months it will take to pay off the solar panels
13. The number of years it will take to pay off the solar panels

The constant variables that you will need are described below:

1. You will need a variable that holds the amount of federal incentive money the user will receive if he/she installs solar panels. This amount is $1000.00.
2. You will need a variable to hold the cost of a solar panel, which is $56.00 per square foot.
3. You will need a variable to hold the number of Kilowatts per Hour produced in one 24-hour period assuming that the solar panel will be able to operate at maximum power for 5 hours. This number is .00035 kWh.
4. You will need to convert from square inches to square feet during the program. In order to do this, you have to multiply the number of square inches by .0069444. Make this number a constant variable, too.

INPUT FROM THE USER

You will need to ask the user for the following information (data):

1. How many square feet is their house?
2. How much was their total bill from their latest electricity bill?
3. How many KWH (kilowatts per hour) did they consume on their latest electricity bill?
4. How many days were serviced on the last bill (this is usually 30 to 31 days)?

CALCULATIONS (PROCESSING)

You will make several calculations to figure out how many solar panels will be needed, the cost of the solar panels, the cash incentives, and the payment.

1. Calculate the number of KWH per day by dividing the number of KWH per month by the number of days per month. (Both of these values should have already been obtained from the user before you make this calculation).
2. Calculate the number of panels needed in square inches by dividing the number of KWH per day by the constant variable that holds .00035.
3. Calculate the number of panels needed in square feet by converting the number you received in step 2.
4. Calculate the cost by multiplying the number of panels needed in feet by the cost of each square foot of panel (constant variable - $56.00 per square foot)
5. Calculate the incentive given by the Upper Cumberland Electric Membership Corporation (UCEMC) in the following way:
    a. If the square footage of the house is less than 1500 square foot, the incentive is $200.
    b. If the square footage of the house is greater than or equal to 1500 square foot, then the incentive is $500
6. Calculate the total cash incentive amount by adding the number you get in #5 to the federal incentive cash amount (constant variable - $1000).
7. Calculate the total cost by subtracting the total cash incentive amount from the cost calculated in #4.
8. Calculate how many months it will take to pay for solar panels if the the user pays the same amount they used to pay for their electricity bill. To do this, divide their total cost (#7) by their electric bill.
9. Convert the amount you get in #8 to number of years. To do this, take the amount you get for #8 and divide by 12.0 (12 months in a year).

SAMPLE OUTPUT

Part of this assignment is to learn how to neatly format your output. I want your output to look EXACTLY like mine (except your numbers will be different if the user inputs different values). HINT: you will have to use setw(), setprecision() and fixed to make the columns & numbers formatted correctly. Format your output for an 80-character-width command prompt/terminal screen.

```
How many square feet is your house? 1497
How much money was your current month's electric bill? $164.34
How many kWh (KiloWatts per Hour) did you consume on your current bill? 1532
How many days were serviced on your current bill? 30

 HOUSE INFORMATION                          SOLAR PANEL INFORMATION
 ------------------------------------       ------------------------------------
 Square Feet:                  1497.00      Panels Needed:              1013.22
 Current Electric Bill: $       164.34      Cost of Panels: $          56740.38
 KWH Used Current Month:       1532.00      Total Incentives: $         1200.00
 Days in Current Month:          30.00
If you pay $164.34 each month toward solar panels instead of your electric bill,
 it will take 28.16 years to pay off your panels.
```

ANOTHER EXAMPLE of OUTPUT (so you can check your numbers):

```
How many square feet is your house? 2100
How much money was your current month's electric bill? $218
How many kWh (KiloWatts per Hour) did you consume on your current bill? 2068
How many days were serviced on your current bill? 31

 HOUSE INFORMATION                          SOLAR PANEL INFORMATION
 ____________________________________       ____________________________________
 Square Feet:                  2100.00      Panels Needed:                1323.60
 Current Electric Bill: $       218.00      Cost of Panels: $           74121.39
 KWH Used Current Month:       2068.00      Total Incentives: $           1500.00
 Days in Current Month:          31.00
If you pay $218.00 each month toward solar panels instead of your electric bill,
 it will take 27.76 years to pay off your panels.
```

ONE MORE EXAMPLE:

```
How many square feet is your house? 1248
How much money was your current month's electric bill? $72.69
How many kWh (KiloWatts per Hour) did you consume on your current bill? 820
How many days were serviced on your current bill? 31

 HOUSE INFORMATION                          SOLAR PANEL INFORMATION
 ____________________________________       ____________________________________
 Square Feet:                  1248.00      Panels Needed:                 524.83
 Current Electric Bill: $        72.69      Cost of Panels: $           29390.49
 KWH Used Current Month:        820.00      Total Incentives: $           1200.00
 Days in Current Month:          31.00
If you pay $72.69 each month toward solar panels instead of your electric bill,
it will take 32.32 years to pay off your panels.
```