**Solar Home System**

You work to design a Solar Home System (SHS) business model, a solution to overcome some of the challenges of traditional, grid-based electrification efforts, while still providing life-changing energy service for citizens in peri-urban, rural and remoted areas.

The SHS must provide enough electric energy to fulfil power requirements of a home such as AC power to operate lighting systems, gadgets, appliances and equipment like computers, refrigerators, mixers, fans, air conditioners, TVs and music systems.

SHS are stand-alone photovoltaic systems that offer a cost-effective model of supplying amenity power for lighting and appliances to remote off-grid households. In rural areas, SHS can be used to meet a household's energy demand fulfilling basic electric needs. Whereas in urban areas, they can serve the community by providing electricity for health stations to operate lamps during night, refrigerator for vaccines/medicines.

Solar Panel Specifications based on size:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Size** | **Configuration** | **Stock Range in Watts** | **Width** | **Height** | **Depth** |
| LARGE | 96-cell | 275 W | 41.5” | 62.6” | 1.38” |
| MEDIUM | 72-cell | 300 W | 36” | 77” | 1.3-1.6” |
| SMALL | 60-cell | 350 W | 39” | 66” | 1.-1.6” |

Your program should take as input:

1. Community Type

2. System Type

3. Solar Panel Size

4. Average Sunlight Duration Per Day

Input Format:

*First Line*:

**<<COMMUNITY\_NAME>> <<COMMUNITY\_TYPE>> <<SYSTEM\_TYPE>> <<SOLAR\_PANEL\_SIZE>> <<AVERAGE\_SUNLIGHT\_DURATION\_PER\_DAY>>**

*Subsequent Lines containing sub community details*:

**<<SUB\_COMMUNITY\_NAME>> <<DAILY\_KWH\_ENERGY\_REQUIREMENT>> <<NUMBER\_OF\_HOUSES>>**

For eg:

COMM\_1 URBAN HOME\_SYSTEM LARGE 6.1

AREA1 33KWH 15

AREA2 20KWH 30

**SYSTEM TYPE Details are listed below:**

**HOME\_SYSTEM**

Need to provide Household lighting only

Battery Type - Ordinary deep-cycle lead-acid battery

Causes loss of 0.23W/hour

System Efficiency Factor is 1.15

**MINI\_GRID\_SYSTEM**

Provides Household and other productive endues

Battery Type - 2 volt type, tubular gel maintenance-free valve-regulated lead-acid(VRLA)

Causes loss of 0.45W/hour

System Efficiency Factor is 2.25

The output should be:

1. Total Watts Required for the Community (DC)

2. Number of panels required for the Community

Where,

|  |  |
| --- | --- |
| *Total KW Required for the Subcommunity (DC)* | (DAILY\_KWH\_ENERGY\_REQUIREMENT/ AVERAGE\_SUNLIGHT\_DURATION\_PER\_DAY) \* NUMBER\_OF\_HOUSES \* System Efficiency Factor |
| *Total Watts Required for the Community (DC)* | **1000 \* Total KW Required for the Subcommunity (DC)** |
| *Number of Panels for Community* | **Total Watts Required for the Community (DC)/Stock Range of Solar Home System** |
| *Number of Panels Per Home* | Number of Panels for Community/total number of houses in community |

In case of any invalid inputs in the input file, the output should print:

“INVALID\_INPUT”

**Assumptions:**

* All calculations should be floored off to the nearest integer. No decimal values are used.
* All the houses in an area (subcommunity) will have same levels of energy requirement
* Energy produced is measured in DC.
* Climate variations on sunlight duration is ignored. Absolute values for average sunlight duration per day is to be considered.

**Scenarios**:

***Scenario 1:***

*Sample Input*

COMM\_1 URBAN HOME\_SYSTEM LARGE 6.1

AREA1 33 15

AREA2 20 30

*Sample Output*

Total Watts Required for the Community (DC): 206434

Number of Panels Per Home: 17

***Scenario 2:***

*Sample Input*

COMM\_2 URBAN MINI\_GRID\_SYSTEM MEDIUM 5

AREA1 33 15

AREA2 25 25

*Sample Output*

Total Watts Required for the Community (DC): 504000

Number of Panels Per Home: 42

***Scenario 3:***

*Sample Input*

COMM\_3 URBAN FLAT\_SYSTEM SMALL 3

AREA1 10 11

AREA2 25 25

*Sample Output*

INVALID\_INPUT