```
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%Bradley University Fall 2007
%Algorithm for determining number of P.V. arrays needed to charge a
%battery.

clear all;
clear workspace;

solar_w=.652;           %solar module width in meters
solar_l=.639;           %solar module length in meters
solar_efficiency=.16;   %solar module
sun_hours_hi=4.475;     %max sun hours  %sun hour=Kilowatt-hrs/m²/day
sun_hours_lo=1.47;      %worst case sun hours
sun_hours_avg=3.76;     %average of high and low
battery_v=12;           %battery to charge voltage
battery_ah=12;          %battery to charge amp hour rating
batt_charge_eff=1.25;   %battery charing inefficiency
                        %= 1+(inefficiency percentage)
                        %(usually around 1.2 for lead acid)

mobile_wh=battery_v*battery_ah;         %capacity of battery in watt hours
mobile_j=mobile_wh*3600;                %capacity of battery in joules
solar_area=solar_w*solar_l;             %calculate area of solar panel
joules_hi=1e3*solar_area*solar_efficiency*3600;
                                        %calculate joules generates/module
if joules_hi>194400                     %check not over 54W rating
    joules_hi=194400;
end
joules_hi=joules_hi*sun_hours_hi;       %calculate no of Joules/module/day
joules_lo=1e3*solar_area*solar_efficiency*3600;
if joules_lo>194400
    joules_lo=194400;
end
joules_lo=joules_lo*sun_hours_lo;
joules_avg=1e3*solar_area*solar_efficiency*3600;
if joules_avg>194400
    joules_avg=194400;
end
joules_avg=joules_avg*sun_hours_avg;

number_solar_hi=(mobile_j*batt_charge_eff)/joules_hi;
number_solar_lo=(mobile_j*batt_charge_eff)/joules_lo;
number_solar_avg=(mobile_j*batt_charge_eff)/joules_avg;
```