



4. At the school in Kenya where the solar suitcases are going, the girls want to use six light bulbs at night time. One light bulb needs 4W of power.
- a. What current is needed to get this amount of power if the voltage from the suitcase is 12V? Show your work: (5 points)

Answer:

Unit:

- b. If the solar suitcase uses a 12 Amp-hour battery and it is fully charged, then for how long would it be able to power the lights? Show your work: (5 points)

Answer:

Unit:

- c. To ensure that the battery lasts as long as possible, the girls should not let it empty to more than 50%, or half full. What advice would you give the girls about the number of lights and / or the time that they have them on for? Include an explanation. (5 points)

5. Follow the steps below to size a solar system

- a. Complete the table below to find the total energy requirements for the day and night (5 points)

| Equipment           | Power Usage     | # of pieces | Hours/day      | Day: w-hrs | Night:<br>watt-hours |
|---------------------|-----------------|-------------|----------------|------------|----------------------|
| <i>LED light</i>    | <i>5 watts</i>  | <i>5</i>    | <i>4 hours</i> |            |                      |
| <i>Cell Phone</i>   | <i>5 watts</i>  | <i>2</i>    | <i>2 hours</i> |            |                      |
| <i>Lap top</i>      | <i>40 watts</i> | <i>1</i>    | <i>3 hours</i> |            |                      |
| <b><i>Total</i></b> |                 |             |                |            |                      |

- b. Calculate the size of battery needed for this system. (5 points)

- c. Calculate the size of solar panel needed for this system. (5 points)

- d. Calculate the size of charge controller needed for this system. (5 points)

- e. Draw a single line diagram for this system. (5 points)