AP Computer Science

**BatteryCharger Free Response**

An electric car that runs on batteries must be periodically recharged for a certain number of hours. The battery technology in the car requires that the charge time not be interrupted.

The cost for charging is based on the hour(s) during which the charging occurs. A rate table lists the 24 one-hour periods, numbered from 0 to 23, and the corresponding hourly cost for each period. The same rate table is used for each day. Each hourly cost is a positive integer. A sample rate table is given below.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Hour** | **Cost** |  | **Hour** | **Cost** |  | **Hour** | **Cost** |
| **0** | **50** |  | **8** | **150** |  | **16** | **200** |
| **1** | **60** | **9** | **150** | **17** | **200** |
| **2** | **160** | **10** | **150** | **18** | **180** |
| **3** | **60** | **11** | **200** | **19** | **180** |
| **4** | **80** | **12** | **40** | **20** | **140** |
| **5** | **100** | **13** | **240** | **21** | **100** |
| **6** | **100** | **14** | **220** | **22** | **80** |
| **7** | **120** | **15** | **220** | **23** | **60** |

The BatteryCharger class uses this table to determine the most economic time to charge the battery. You will write two methods for this class:

public class BatteryCharger

int [] rateTable; // Data field holds the values from the table above. It has 24 elements.

Method # 1 – Determine the total cost to charge the battery starting at startHour and charging it for chargeTime hours.

private int getChargingCost(int startHour, int chargeTime){

}

Method # 2 – This will calculate the start time that will create the lowest cost for a specific charge time.

private int getChargeStartTime(int chargeTime){

}

|  |  |  |  |
| --- | --- | --- | --- |
| **Hours of Charge Time** | **Minimum Cost** | **Start Hour of Charge** | **Last Hour of Charge** |
| **1** | **40** | **12** | **12** |
| **2** | **110** | **0 1 or**  **23 0 (the next day)** | |
| **7** | **550** | **22** | **4 (the next day)** |
| **30** | **3,710** | **22** | **3 (two days later)** |