

PRE-RELEASE MATERIAL 2210/22 MJ-2020

Your preparation for the examination should include attempting the following practical tasks by **writing and testing a program or programs**.

A car park payment system allows customers to select the number of hours to leave their car in the car park. The customer will get a discount if they enter their frequent parking number correctly. The system calculates and displays the amount the customer must pay. The price of parking, the number of hours the customer can enter, and any discount depend upon the day of the week and the arrival time. The number of hours entered is a whole number. The price per hour is calculated using the price in force at the arrival time. No parking is allowed between Midnight and 08:00.

Day of the week	Arrival time			
	From 08:00 to 15:59		From 16:00 to Midnight	
	Max stay in hours	Price per hour	Hours	Price
Sunday	8	2.00	Up to Midnight	2.00
Monday	2	10.00	Up to Midnight	2.00
Tuesday	2	10.00	Up to Midnight	2.00
Wednesday	2	10.00	Up to Midnight	2.00
Thursday	2	10.00	Up to Midnight	2.00
Friday	2	10.00	Up to Midnight	2.00
Saturday	4	3.00	Up to Midnight	2.00

A frequent parking number can be entered for discounted parking. This number consists of **4 digits and a check digit that is calculated using a modulo 11 check digit calculation**. A discount of 50% is available for arrival times from 16:00 to Midnight; the discount is 10% at all other arrival times.

Write and test a program or programs to simulate the car park payment system.



Your program or programs must include appropriate prompts for the entry of data; data must be validated on entry.



Error messages and other output need to be set out clearly and understandably.



All variables, constants and other identifiers must have meaningful names.

You will need to complete these **three** tasks. Each task must be fully tested.

Task 1 – Calculating the price to park.

A customer inputs the day, the hour of arrival excluding minutes (for example 15:45 would be 15), the number of hours to leave their car, and a frequent parking number if available. If the frequent parking number has an incorrect check digit, then no discount can be applied. The price to park, based on the day, the hour of arrival, the number of hours of parking required and any discount available, is calculated and displayed.

Task 2 – Keeping a total of the payments.

Extend **Task 1** to keep a daily total of payments made for parking. The daily total is zeroed at the start of the day. For the simulation, each customer inputs the amount paid, this must be greater than or equal to the amount displayed. There is no change given so the amount input may exceed the amount displayed. Each customer payment is added to the daily total, and this total is displayed at the end of the day.

Task 3 – Making payments fairer.

Customers have complained that sometimes they are being charged too much if they arrive before 16:00 and depart after 16:00. Extend **Task 1** to calculate the price before 16:00, then add the evening charge. For example, a customer arriving at 14:45 on a Sunday and parking for five hours was previously charged 10.00 and would now be charged 6.00

Pre Release solution Complete Pseudocode

TASK:1 Parking System

```

BEGIN
CONSTANT morninghour = 8, eveninghour = 16, midnighthour = 24
DECLARE maxparking() As INTEGER = {8, 2, 2, 2, 2, 2, 4}
DECLARE hourprice() As INTEGER = {2, 10, 10, 10, 10, 10, 3}
DECLARE parkingday As INTEGER
DECLARE arrivaltime, parkinghours, parkingprice, frequentparknum As INTEGER
DECLARE discount, totalpayable As REAL
DECLARE choice As BOOLEAN
DECLARE checkdigit, digit1, digit2, digit3, digit4, digit5 As INTEGER // for check digit
DECLARE dailytotals As INTEGER = 0 'Daily total is zero at the start of the day
1: //Line1:Actual program code returns to Task1 from Task2 for next customer.See VB code
OUTPUT("Welcome to Parking System")
REPEAT
    OUTPUT ("sunday=0, Monday =1,Tuesday=2, Wednesday=3,Thursday=4,Friday=5,Saturday=6")
    OUTPUT ("INPUT DAY NUMBER")
    INPUT parkingday
UNTIL parkingday >= 0 And parkingday <= 6

REPEAT
    OUTPUT ("Parking Hours= 8:00 till 24:00, No Parking from 24:00 till 7 the morning")
    INPUT arrivaltime
UNTIL arrivaltime >= morninghour And arrivaltime <= midnighthour

REPEAT
    OUTPUT ("Sunday Max: 8 hours, Saturday Max 4 Hours, Weekdays Max 2hours")
    OUTPUT ("input Parking hours")
    INPUT parkinghours
UNTIL parkinghours >= 0 And parkinghours <= maxparking(parkingday)
    If arrivaltime < eveninghour Then // eveninghour = 16 and is a CONSTANT
        parkingprice = parkinghours * hourprice(parkingday)
    ElseIf arrivaltime >= eveninghour Then // eveninghour = 16 and is a CONSTANT
        parkingprice = 2 // Flat 2$ rate is charged all timings after 16 as per Table
    End If

OUTPUT("Do you have frequent parking number? True for yes, False for No")
INPUT choice
    If choice = True Then
        OUTPUT("enter your 5 digit frequent Parking number, one digit at a time")
        INPUT digit1, digit2, digit3, digit4, digit5
        frequentparknum = (5 * digit1) + (4 * digit2) + (3 * digit3) + (2 * digit4)
        checkdigit = 11 - (frequentparknum Mod 11)

        If checkdigit = digit5 Then //if checkdigit mathes digit5 entered
            If arrivaltime >= afternoonhour Then
                discount = parkingprice / 2 //50% discount applied
            Else
                discount = (parkingprice / 100) * 10 //10% discount applied
            End If
        Else
            discount = 0 //if checkdigit <> digit5 then no discount
        End If
    Else
        discount = 0 //if user does not have FPN then no discount
    End If

```

```

totalpayable = parkingprice - discount

OUTPUT("Parking day selected is : " , parkingday)
OUTPUT ("Arrival time in Parking : " , arrivalttime)
OUTPUT ("total number of hours to leave car in parking : " , parkinghours)
OUTPUT (" Total Price of Parking is: = " , parkingprice)
OUTPUT ("Discount : " & discount)
OUTPUT ("Total amount to be paid = " , totalpayable)

```

Task 2: Task2 is continuation of Task1 and is a simulation only as given in Pre-Release. It will keep on inputting customer price till parking is closed

```

DECLARE parkingclosed As Boolean
DECLARE customeramount As Integer
REPEAT
    parkingclosed = False
    OUTPUT("Please Enter the amount you want to pay")
    INPUT customeramount
    While customeramount < totalpayable
        OUTPUT ("Amount you paid is less than parking fee, Enter again")
        INPUT customeramount
    End While
    daillytotal = daillytotal + customeramount
    OUTPUT ("Total Sale till now is : " , daillytotal)
    OUTPUT("PARKING CLOSED ? TRUE for Yes, FALSE to Input Next Customer")
    INPUT parkingclosed
    If parkingclosed = False Then
        GoTo 1: //Line1: returns program to Task1 from Task2 for next customer.
    End If
Until parkingclosed = True
OUTPUT ("Total Daily Amount = " , daillytotal)

```

Task 3: Task3 (MAKING PARKING SYSTEM FAIR)

```

DECLARE departurertime, newprice As Integer
DECLARE pricebefore16, priceafter16 As Integer
departurertime = arrivalttime + parkinghours
If departurertime <= 16 Then
    pricebefore16 = parkinghours * hourprice(parkingday)
    priceafter16 = 0
Else
    pricebefore16 = (16 - arrivalttime) * hourprice(parkingday)
    priceafter16 = 2
End If
newprice = pricebefore16 + priceafter16
If checkdigit = digit5 Then //IF frequent parking number, discount applied
    newprice = newprice - discount
End If
OUTPUT("Your arrival time is : " , arrivalttime)
OUTPUT("Your departure time is : " , departurertime)
OUTPUT ("fair Payment Price: " , newprice)

END

```