Programming Algorithm

Take input from user for school name, address, length of stay and number of students and teachers attending

Add the number of students and teachers to calculate how many flights are required

Multiply flights by 213.67 to work out how much the flights will cost

Multiply the amount of students by 37.5 to work out how much the student's accommodation will cost

Multiply the amount of teachers by 58.5 to work out how much the teacher's accommodation will cost

Add the flight cost and the teacher and student accommodation cost to get the subtotal

Use an if statement for every 20 students up to 100 to work out how many free flights will be given for the teachers – Declare two variables for flights as one will be used if there are free flights due.

Use modulus with an if statement to work out if there is any empty beds in both the teachers and students rooms

Use modulus 2 for teachers and modulus for students. If there is a remainder multiply the remainder by 8.42 for the students and 15.43 for the teachers. This calculates the surcharge

Take away the second flight variable from the first to calculate if there are free flights due

Add the subtotal, the amount of empty teacher and student beds (if there are any) and take away the amount of free flights to calculate the total cost

Data Dictionary

addressLine1	String	1st address line
addressLine2	String	2nd address line
addressLine3	String	3rd address line
emptySBeds	Float	Number of empty student beds
emptyTBeds	Float	Number of empty teacher beds
flightCost	Float	Cost of flights
Flights	Byte	Number of flights
Flights1	Byte	Duplicate variable for flights used to calculate if there are any free flights
freeFlights	Byte	Number of free flights if any
InvoiceNo	Int	Invoice Number
nights	Byte	Number of nights
schoolName	String	Name of school
studentAccom	Float	Cost of student accommodation
students	Byte	Number of students
Subtotal	Float	Subtotal of invoice before deductions and surcharges
teacherAccom	Float	Cost of teacher accommodation
teachers	Byte	Number of teachers
total	Float	Total after surcharges and free flight deductions

Test Data

String Values will be kept the same for testing

School Name:

Cork College of Commerce

Address Line 1

Morrisons Island

Address Line 2

Cork City

Address Line 3

Cork

Test 1

Testing if the surcharge section appears if there are no empty beds and also testing if there is a free flight deducted if there are 20 students.

Specifications:

10 nights

20 students

10 teachers

Expected Results:

Student Accommodation cost: 7,500

Teacher Accommodation cost: 5,850

Flight Cost: 6,410.10

No surcharge as there is no empty beds

1 free teacher flight

Total: 19,546.43

```
Enter the name of the school
Cork College of Commerce
Enter the first line of the schools address
Morrisons Island
Enter the second line of the schools address
Cork City
Enter the third line of the schools address
Cork
Enter the number of nights you will be staying
10
Enter the number of students that will be going on this trip
20
Enter the number of teachers that will be going on this trip
10
```

	Rebel Tours LTD.		
		Invoice No:	112923
		Date:	10/Feb/2023
School Name:	Cork College of Commerce		
Address:	Morrisons Island		
	Cork City		
	Cork		
No. of Nights: 10			
Flights:	30		€6,410.10
Student Accommodation:	20		€7,500.00
Teacher Accomodation:	10		€5,850.00
			————————
Subtotal:			€19,760.10
Discount:			
Free teacher flights	1		€213.67
	Total:		€19,546.43

Test 2

Testing if surcharge does appear with 1 empty teacher bed and 1 empty student bed and also ensuring that only 1 free flight is taken away with 39 students.

Specifications:

10 nights

39 students

9 teachers

Expected Results:

Student Accommodation cost: 14,625

Teacher Accommodation cost: 5,265

Flight Cost: 10,256.16

Surcharge of 8.42 for 1 empty student bed and 15.43 for 1 empty teacher bed

1 free teacher flight

Total: 29,956.34

```
Enter the name of the school
Cork College of Commerce
Enter the first line of the schools address
Morrisons Island
Enter the second line of the schools address
Cork City
Enter the third line of the schools address
Cork
Enter the number of nights you will be staying
10
Enter the number of students that will be going on this trip
39
Enter the number of teachers that will be going on this trip
9
┌──────────────────────────────────────────────────────────────────────────────┐
|                                Rebel Tours LTD.
|                                       Invoice No:     370120
|                                       Date:   10/Feb/2023
|School Name:    Cork College of Commerce
|Address:        Morrisons Island
|                Cork City
|                Cork
|
|No. of Nights: 10
|Flights:                        48              €10,256.16
|Student Accommodation:          39              €14,625.00
|Teacher Accomodation:           9               €5,265.00
|                                                ──────────
|Subtotal:                                       €30,146.16
|Surcharge:
|Student Accommodation:          1               €8.42
|Teacher Accommodation:          1               €15.43
|Discount:
|Free teacher flights            1               €213.67
|                                Total:          €29,956.34
└──────────────────────────────────────────────────────────────────────────────┘
```

Test 3

Testing to see if surcharge appears with only empty teacher beds and no empty student beds and that there is 5 flights taken away with 100 students

Specifications:

10 nights

100 students

9 teachers

Expected Results:

Student Accommodation cost: 37,500

Teacher Accommodation cost: 5,265

Flight Cost: 23,290.03

Surcharge of 15.43 for 1 empty teacher bed

5 free teacher flights

Total: 65,002.11

```
<terminated> SkillDemo1 [Java Application] C:\Users\dylan\.p2\pool\plugins\org.eclipse.justj.openjc
Enter the name of the school
Cork College of Commerce
Enter the first line of the schools address
Morrisons Island
Enter the second line of the schools address
Cork City
Enter the third line of the schools address
Cork
Enter the number of nights you will be staying
10
Enter the number of students that will be going on this trip
100
Enter the number of teachers that will be going on this trip
9
┌──────────────────────────────────────────────────────────────────────────────┐
|                                Rebel Tours LTD.
|                                       Invoice No:     983966
|                                       Date:   10/Feb/2023
|School Name:    Cork College of Commerce
|Address:        Morrisons Island
|                Cork City
|                Cork
|
|No. of Nights: 10
|Flights:                        109             €23,290.03
|Student Accommodation:          100             €37,500.00
|Teacher Accomodation:           9               €5,265.00
|                                                ________________
|Subtotal:                                       €66,055.03
|Surcharge:
|Student Accommodation:          0               €0.00
|Teacher Accommodation:          1               €15.43
|Discount:
|Free teacher flights            5               €1,068.35
|                                Total:          €65,002.11
└──────────────────────────────────────────────────────────────────────────────┘
```

Test 4

Testing if the free flight section appears with no free flights given and that with empty student beds and no empty teacher beds that the free flight section still appears.

Specifications:

10 nights

15 students

10 teachers

Expected Results:

Student Accommodation cost: 5,625

Teacher Accommodation cost: 5,850

Flight Cost: 5341.75

Surcharge of 8.42 for 1 empty student bed

0 free teacher flights

Total: 16,825.17

```
Enter the name of the school
Cork College of Commerce
Enter the first line of the schools address
Morrisons Island
Enter the second line of the schools address
Cork City
Enter the third line of the schools address
Cork
Enter the number of nights you will be staying
10
Enter the number of students that will be going on this trip
15
Enter the number of teachers that will be going on this trip
10
┌──────────────────────────────────────────────────────────────────────────┐
|                                Rebel Tours LTD.
|                                       Invoice No:     869190
|                                       Date:   10/Feb/2023
|School Name:    Cork College of Commerce
|Address:        Morrisons Island
|                Cork City
|                Cork
|
|No. of Nights: 10
|Flights:                        25              €5,341.75
|Student Accommodation:          15              €5,625.00
|Teacher Accomodation:           10              €5,850.00
|                                                ──────────────
|Subtotal:                                       €16,816.75
|Surcharge:
|Student Accommodation:          1               €8.42
|Teacher Accommodation:          0               €0.00
|                                Total:          €16,825.17
└──────────────────────────────────────────────────────────────────────────┘
```

Source Code:

```
/* Name: Dylan Coveney
 * Date: 24/01/2023
* This program reads in the number of students and teachers going on a trip
and calculates how much the cost will be
* depending on various costs, discounts and surcharges.  */


import java.text.DecimalFormat;
import java.util.Scanner;
import java.util.Random;
import java.util.Date;
import java.text.SimpleDateFormat;

public class SkillDemo1 {

            public static void main(String[] args) {
                        DecimalFormat moneyFormat = new DecimalFormat(
"€###,##0.00");
```

```
                        DecimalFormat bedFormat = new DecimalFormat ("0");
                        Scanner sc = new Scanner(System.in);

                        //Declaring variables such as school name, address,
invoice number and date.

                        String schoolName, addressLine1, addressLine2,
addressLine3;
                        byte students, teachers, nights, freeFlights;
                        int invoiceNo = new Random ().nextInt(999999);
                        float studentAccom, teacherAccom, flightCost,
subtotal, emptyTBeds, emptySBeds, total;
                        SimpleDateFormat dateFormat = new SimpleDateFormat
("dd/MMM/yyyy");
                        Date today = new Date ();

                        /* Reads in the details from the person booking */
                        System.out.println("Enter the name of the school");
                        schoolName = sc.nextLine();
                        System.out.println("Enter the first line of the
schools address");
                        addressLine1 = sc.nextLine();
                        System.out.println("Enter the second line of the
schools address");
                        addressLine2 = sc.nextLine();
                        System.out.println("Enter the third line of the
schools address");
                        addressLine3 = sc.nextLine();
                        System.out.println("Enter the number of nights you
will be staying");
                        nights = sc.nextByte();
                        System.out.println("Enter the number of students
that will be going on this trip");
                        students = sc.nextByte();
                        System.out.println("Enter the number of teachers
that will be going on this trip");
                        teachers = sc.nextByte();

                        /*Calculates cost of flights, teacher and student
accommodation and the subtotal
                         * using previous variables that were declared and
input by user. There is two
                         * separate 'flights' variables here, the second of
which is used in the if statement
                         * to calculate if there are any free flights due.
*/

                        byte flights = (byte)(teachers + students);
                        byte flights1 = (byte)(teachers + students);
                        flightCost = (float)(flights*213.67);
                        studentAccom = (float)(students*37.5*nights);
                        teacherAccom = (float)(teachers*58.5*nights);
                        subtotal = flightCost + studentAccom +
teacherAccom;

                        //Calculates if there is any free flights due based
on the number of students in attendance

                        if (students >= 100)
                              {flights1 = ((byte)(flights - 5));}
                        else if (students >= 80)
```

```
			{flights1 = ((byte)(flights - 4));}
		else if (students >= 60)
			{flights1 = ((byte)(flights - 3));}
		else if (students >= 40)
			{flights1 = ((byte)(flights - 2));}
		else if (students >= 20)
			{flights1 = ((byte)(flights - 1));}

		//Calculates extra costs based on whether or not 
there is empty beds in both the teachers and students accommodation

		if (teachers % 2 == 1)
			{emptyTBeds = 1;}
		else
			{emptyTBeds = 0;}

		if (students % 4 == 3)
			{emptySBeds = 1;}
		else if (students % 4 == 2)
			{emptySBeds = 2;}
		else if (students % 4 == 1)
			{emptySBeds = 3;}
		else
			{emptySBeds = 0;}

		//Calculates the number of free flights due and the 
total

		freeFlights = (byte)(flights - flights1);
		total = subtotal + (float)(emptyTBeds*15.43) + 
(float)(emptySBeds*8.42) - (float)(freeFlights*213.67);

		/* Prints all previous data that was inputted.
		 * There is If statements used for the free
		 * flight and surcharge sections so they
		 * won't be printed if these values are 0
		 */


	System.out.println("\u250F\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2513");
		System.out.println("\u2503\t\t\t\t Rebel Tours 
LTD.");
		System.out.println("\u2503\t\t\t\t\tInvoice No: \t" 
+ invoiceNo);
		System.out.println("\u2503\t\t\t\t\tDate: \t" + 
dateFormat.format(today));
		System.out.println("\u2503School Name: \t" + 
schoolName);
		System.out.println("\u2503Address:\t" + 
addressLine1);
		System.out.println("\u2503\t\t" + addressLine2);
		System.out.println("\u2503\t\t" + addressLine3);
		System.out.println("\u2503\n\u2503No. of Nights: " 
+ nights);
```

```
				System.out.println("\u2503Flights: \t\t\t" + 
flights + "\t\t" + moneyFormat.format(flightCost));
				System.out.println("\u2503Student Accommodation: 
\t\t" + students + "\t\t" + moneyFormat.format(studentAccom));
				System.out.println("\u2503Teacher Accomodation: 
\t\t" + teachers + "\t\t" + moneyFormat.format(teacherAccom));

	System.out.println("\u2503\t\t\t\t\t\t\u2500\u2500\u2500\u2500\u2500\
u2500\u2500\u2500\u2500\u2500\u2500\u2500\u2500\u2500\u2500");
				System.out.println("\u2503Subtotal: \t\t\t\t\t" + 
moneyFormat.format(subtotal));
				if (emptySBeds + emptyTBeds > 0)
					{System.out.println("\u2503Surcharge:");
					System.out.println("\u2503Student 
Accommodation:\t\t" + bedFormat.format(emptySBeds) + "\t\t" + 
moneyFormat.format(emptySBeds*8.42));
					System.out.println("\u2503Teacher 
Accommodation:\t\t" + bedFormat.format(emptyTBeds) + "\t\t" + 
moneyFormat.format(emptyTBeds*15.43));}
				if (freeFlights > 0)
					{System.out.println("\u2503Discount:");
				System.out.println("\u2503Free teacher flights\t\t" 
+ freeFlights + "\t\t" + moneyFormat.format(freeFlights*213.67));}
				System.out.println("\u2503\t\t\t\tTotal:\t\t" + 
moneyFormat.format(total));

	System.out.println("\u2517\u2501\u2501\u2501\u2501\u2501\u2501\u2501\
u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u25
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01\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\u2501\
u2501\u2501\u2501");

				sc.close();
			}

		}
```