Assignment 2 - Rosie's Road Co.

CSE 110 Principles of Programming with Java
Spring 2021
Due February 21st 2021, 11:59PM Arizona Time

1 Assignment Objectives & Requirements

1.1 Assignment Objectives

After completing this assignment the student should be able to:

- Write, compile, and run a small Java program
- Use System.out to display prompts and other information to the user
- Collect input using a Scanner object
- Declare and use variables
- Use math operators and expressions to compute desired values

1.2 Assignment Requirements

For this assignment you are given the following file -

Assignment2.java (you must complete this file).

2 Problem Description and Given Information

Within the **main()** method in the **Assignment2.java** file, you must write a program to compute the materials and costs required for a specified road construction project.

Your program must prompt the user to enter the 4 input values described below. It must collect the user's input and store these values in 4 different variables. It must collect the inputs in the order shown below.

Inputs

1. Length of road (miles) - datatype **double**
2. Number of lanes - datatype **int**
3. Depth of asphalt (inches) - datatype **int**
4. Days to complete project - datatype **int**

Outputs

1. Truckloads of Asphalt (rounded up)
2. Stoplights
3. Conduit Pipes (rounded up)
4. Crew members (rounded up)
5. Cost of Asphalt
6. Cost of Stoplights
7. Cost of Conduit Pipes
8. Cost of Labor
9. Total Cost

Other Details Rosie's Road Co. is a new construction company. They are interested in bidding on new highway construction projects around the city. They've hired you to develop a software tool that they will use to help determine material needs and costs.

Road development is not only the asphalt you see - water and power conduits must be installed at the same time, and we have to account for things like labor costs and how long it will take to complete a particular project.

The city is very regular grid, with one 4-way intersection at each mile of road. When asking for a quote, the city sends out the number of linear miles of road, and how many total lanes (1 to 8).

Here's some information that you might find useful as you complete this challenge.

1. The trucks hauling asphalt have a maximum capacity of 5 US tons (10,000 lbs)
2. The standard road lane is 12 feet wide.

3. Asphalt weighs 150 lbs per cubic foot
4. Asphalt costs $200 per ton
5. Power and water utilities are run in a conduit pipe under the road as part of all road projects
6. Conduit pipe is available only in 24 ft. lengths - each length costs $500
7. There is one intersection for every mile of road
   (a) a 1 mile road has 1 intersection
   (b) a 2 mile road has 2 intersections
   (c) a 2.99 mile road has 2 intersections
8. Stoplights cost $25,000 per light
9. Each intersection has two stoplights, plus one additional stoplight for each lane
   (a) a 1 lane road has three stop lights at each intersection
   (b) 2 lane road has four stop lights at each intersection
   (c) 3 lane road has five stop lights at each intersection
10. Work days are 8-hour days
11. All workers are paid $25 per hour.
12. Crew members can complete an amount of work in a specified time according to the equation below:

$$crewMember = \frac{50 * miles * lanes}{days}$$

2.1 Test Data

Use the following test cases to check if your program is correct.

Test Case 1:

Given Input

```
Length of road project (miles)  :  2.75
Number of lanes                 :  3
Depth of asphalt (inches)       :  12
Days to complete project        :  30
```

Expected Output

```
=== Amount of materials needed ===
Truckloads of asphalt   :  7841
Stoplights              :  10
Conduit pipes           :  605
Crew members needed     :  14
=== Cost of Materials =============
Cost of asphalt         :  $7841000.00
Cost of stoplights      :  $250000.00
Cost of conduit pipes   :  $302500.00
Cost of labor           :  $84000.00
=== Total Cost of Project =========
Total cost of project   :  $8477500.00
```

Test Case 2:

Given Input

```
Length of road project (miles)  :  3
Number of lanes                 :  2
Depth of asphalt (inches)       :  18
Days to complete project        :  50
```

Expected Output

```
=== Amount of materials needed ===
Truckloads of asphalt   :  8554
Stoplights              :  12
Conduit pipes           :  660
Crew members needed     :  6
=== Cost of Materials =============
Cost of asphalt         :  $8554000.00
Cost of stoplights      :  $300000.00
Cost of conduit pipes   :  $330000.00
Cost of labor           :  $60000.00
=== Total Cost of Project =========
Total cost of project   :  $9244000.00
```

Test Case 3:

Given Input

```
Length of road project (miles)  :  1
Number of lanes                 :  1
Depth of asphalt (inches)       :  1
Days to complete project        :  1
```

Expected Output

```
=== Amount of materials needed ===
Truckloads of asphalt   :  80
Stoplights              :  3
Conduit pipes           :  220
Crew members needed     :  50
=== Cost of Materials =============
Cost of asphalt         :  $80000.00
Cost of stoplights      :  $75000.00
Cost of conduit pipes   :  $110000.00
Cost of labor           :  $10000.00
=== Total Cost of Project =========
Total cost of project   :  $275000.00
```

3 To Do

After reading the problem description, you may follow the given steps to starting your assignment -

1. Create a new project in your IDE called **Assignment2**
2. Create a new source file called **Assignment2.java** inside the project
3. Copy the contents of the source file provided for this assignment into the one created by you
4. Follow the comment sections along with the requirements listed in section 2 to complete your code
5. Compile and run your program to check for errors
6. Use the test case input values given section 2.1 and check if you are getting the same outputs for each test case
7. Make sure you submit your source code file **Assignment2.java** to the submission link by the deadline

4 Submission Guidelines

Please follow the guidelines listed below prior to submitting your source code file **Assignment2.java** on Canvas -

1. Make sure that your source code file is named **Assigment2.java** prior to submitting.
2. Make sure that your input and output matches the format shown in the test cases
3. Make sure that you have completed the comment section at the top of the source code file
4. Submit your **Assignment2.java** file only to the Canvas link for Assignment 2 by **February 21st 2021, 11:59PM Arizona Time**.

5 Grading Rubric

Criteria	Points
All required files are submitted	**10**
Each file includes the comment head section completed.	
Code is neat and well organized	**10**
Good naming conventions for all identifiers Good use of whitespace Descriptive comments Partial credit can be awarded	
Code compiles with no syntax errors	**20**
No Partial credit can be awarded No credit will be awarded for structure or logic if your code does not compile	
Code passes structure tests	**30**
Code collects and stores all 4 required inputs Code computes and stores 9 values Code outputs results	*10* *10* *10*
Code passes logic tests	**30**
Partial credit is awarded based on number of tests passed No credit will be awarded for logic if your code does not pass all structure tests See test examples (#1 - #3) above in these instructions	
TOTAL	**100**