

CPW 142 Object-Oriented Programming I, Summer 2016

Programming Assignment #3

Background

For this assignment, we will use methods with parameters and return values to decompose a complex problem into simpler parts. The object is to calculate the cost of a paint job

A painting company has determined that for every 112 square feet of wall space, one gallon of paint and eight hours of labor will be required. The company charges \$35.00 per hour for labor.

Complete the program named **PaintJobEstimator.java** so that it will display the following data:

- The number of gallons of paint required (This is an integer value. You can't buy a partial gallon.)
- The hours of labor required. (This is a floating-point value. You can have a fraction of an hour of work.)
- The cost of the paint. (This should be in dollars and cents, i.e., 2 decimal places.)
- The labor charges. (This should be in dollars and cents, i.e., 2 decimal places.)
- The total cost of the paint job. (This should be in dollars and cents, i.e., 2 decimal places.)

The provided starter code, **PaintJobEstimator.java**, has class constants for labor rate (35.0), labor hours per 112 sq ft, and paint coverage (112). Those constants are named **LABOR_COST_PER_HOUR**, **HOURS_PER_UNIT_AREA**, and **AREA_PER_GALLON**. Your code should use the constants where appropriate instead of hard coding the numbers. The starter code has a complete **main** and a method, **getInput**, for getting user input. Your job is to write the other methods that are called from **main**.

Write these methods:

- **calculateGallons** This method takes a **double, sqft**, as a parameter and returns an **int, numberOfGallons**, the number of gallons of paint required to cover **sqft** square feet of wall. For example, if **sqft** was 224.0, **numberOfGallons** would be 2. To round up and convert to **int**, do this: **int numberOfGallons = (int) Math.ceil(your calculation here);**
- **calculateHours** This method takes a **double, sqft**, as a parameter and returns an **double, numberOfHours**, the number of hours of labor required to cover **sqft** square feet of wall. For example, if **sqft** was 224.0, **numberOfHours** would be 16.
- **calculatePaintCost** This method takes an **int, numGallons**, and a **double, gallonCost**, as parameters and returns an **double, paintCost**, the cost of **numGallons** gallons of paint when each gallon costs **gallonCost**. For example, if **numGallons** was 4 and **gallonCost** was 20.0, **paintCost** would be 80.0.
- **calculateLaborCost** This method takes a **double, hoursOfLabor**, as a parameter and returns an **double, laborCost**, the cost of **hoursOfLabor** hours of labor when each hour is charged at **LABOR_COST_PER_HOUR**. For example, if **hoursOfLabor** was 4 and **LABOR_COST_PER_HOUR** was 35.0, **laborCost** would be 140.0.
- **calculateTotalCost** This method takes a **double, laborCost**, and a **double, paintCost** as parameters and returns an **double, totalCost**, the sum **laborCost** of and **paintCost**. For example, if **laborCost** was 140.0 and **paintCost** was 80.0, **totalCost** would be 220.0.
- **generateReport** This method takes all the results of the previous calculations as parameters and prints a report on the paint job. See sample output listed below.

As a first step in developing your code, write method stubs and get them to compile. Then figure out how to do the right calculations. Here's an example of a stub:

```
public static double calculateHours( double sqft ) {  
    return 0.0;  
}
```

Expected Output:

Three sample runs of the program: (The user's input has been underlined to show you what the computer prints and what the user types.)

First run:

```
Enter the number of square feet: 224
Enter the price of a gallon of paint: 20
To paint 224.00 square feet, with
paint that costs 20.00 per gallon,
you will need 2 gallons of paint
and 16.00 hours of labor.
The cost of the paint is: 40.00
The cost of the labor is: 560.00
The total cost of the job is: 600.00
```

Second run:

```
Enter the number of square feet: 100
Enter the price of a gallon of paint: 30
To paint 100.00 square feet, with
paint that costs 30.00 per gallon,
you will need 1 gallons of paint
and 7.14 hours of labor.
The cost of the paint is: 30.00
The cost of the labor is: 250.00
The total cost of the job is: 280.00
```

Third run:

```
Enter the number of square feet: 1000
Enter the price of a gallon of paint: 35
To paint 1000.00 square feet, with
paint that costs 35.00 per gallon,
you will need 9 gallons of paint
and 71.43 hours of labor.
The cost of the paint is: 315.00
The cost of the labor is: 2500.00
The total cost of the job is: 2815.00
```

Extra Credit (10 extra points):

Modify your program so that it prints all values of money as numbers with exactly 2 decimal places.

To generate report values for money that have exactly two decimal places, use **System.out.printf** as explained on page 268 of your textbook.

For example, **System.out.printf("This %.2f is the value.\n", 1.2367);** will produce:
This 1.24 is the value.

For example,

System.out.printf("This is %f with %d digits: %.2f.\n", 1.2367, 2, 1.2367);
will produce:

This is 1.236700 with 2 digits: 1.24.