# CSCI 241 - Assignment 4 Postage Calculator

**Due: Thursday, March 4, 2021 *at 11:59 p.m.***

**Objective:** Develop a postage calculator for a simple post office.

## Description

Although we rely on electronic means of communication, during this pandemic we've received more deliveries through the U.S. Postal Service than ever before. The Post Office has numerous ways of calculating postage. The amount of postage required depends on the type of item being sent, e.g., postcards generally cost less than letters, which in turn cost less than parcels (packages), but within each category, there are some more calculations.

The cost of sending a ***letter*** depends on its weight and if hand-sorting is needed. Your instructor still gets irritated that credit card applications seem to be cheaper to send than personal letters, but that type of mail is presorted by the sender, requiring less hand sorting. For first class mail that isn't presorted, the cost is $0.55 for anything weighing up to 1 ounce. Each additional ounce (or fraction of an ounce) costs $0.20. For purposes of this project, we will assume that there is no limit for the number of extra ounces in this calculation.

A ***postcard*** normally costs $0.36. If they are larger than 6 inches in length or 4.25 inches in height they cost $0.55 to send (the same as a letter).

The price one pays to ship a ***parcel*** depends on the weight of the parcel, the distance the parcel is to be shipped, and how fast the sender wants to get it there. Our system will model Parcel Post packages. Distances for parcels are calculated by zones. The zones are:

1. The local zone (we can use 0 for local) is the delivery area of the post office where the parcel was mailed.
2. Zone 1 includes all units of area outside the local zone lying in whole or in part within a radius of less than 50 miles from the center of the area.
3. Zone 2 includes all units of area outside zone 1 lying in whole or in part within a radius of less than 150 miles from the center of a given unit of area.
4. Zone 3 includes all units of area outside zone 2 lying in whole or in part within a radius of less than 300 miles from the center of a given unit of area.
5. Zone 4 includes all units of area outside zone 3 lying in whole or in part within a radius of less than 600 miles from the center of a given unit of area.
6. Zone 5 includes all units of area outside zone 4 lying in whole or in part within a radius of less than 1000 miles from the center of a given unit of area.
7. Zone 6 includes all units of area outside zone 5 lying in whole or in part within a radius of less than 1400 miles from the center of a given unit of area.
8. Zone 7 includes all units of area outside zone 6 lying in whole or in part within radius of less than 1800 miles from the center of a given unit of area.
9. Zones 8 and 9 include all units at least 1800 miles from the sender.

Weight also influences the cost of shipping a parcel. For purposes of this assignment, we will assume no one wants to ship any parcel weighing over two pounds. The chart on the next page shows the prices for packages up to and including 2 pounds.

| Zone | Cost for 1 pound or less | Cost for more than 1 pound and up to 2 pounds |
|---|---|---|
| Local, 1, 2 | $7.70 | $8.55 |
| 3 | $8.10 | $8.85 |
| 4 | $8.25 | $10.10 |
| 5 | $8.40 | $10.95 |
| 6 | $8.70 | $11.75 |
| 7 | $8.95 | $12.75 |
| 8 & 9 | $9.55 | $13.80 |

## Your Assignment

The overall goal is to develop a program to calculate postage for 3 types of items. To make testing a bit easier, I have written a shell of the class named **`PostageCalc`** for you in a BlueJ project named **`Assign4Postage`**.

Copy the BlueJ project (a zip file) from Canvas.

It contains a loop which will run 5 times. You need to add the code inside the loop body. Look for the special comment lines that border the area in which you can write your code. Because of the loop, your code will repeat 5 times, but the welcome message will only appear once.

The first thing your code needs to do is ask what type of item the customer wishes to mail. But – as you will see in a future chapter - you can't use the == operator to compare `String`s like you can with primitives. Instead, use the `String` class method named `.equals()`. For example, if your input String is named `input`, here is how to use it:

```
if (input.equals("postcard"))
      ...
```

If the user enters `postcard`, `letter` or `parcel`, the program should take the corresponding actions to read in any extra information needed. The `cost` variable is already declared and initialized to zero, and its value will be printed at the end of the program (after the code you write). Your code will calculate the correct number to save in the `cost` variable.

*Note: you will also need to modify the code at the bottom of the loop that prints the cost so that it uses a System.out.printf() statement. You also don't want to print the cost when there is an error in the type of item entered.*

You have a lot of `if` statements to write ;-)

If the user enters any other `String` that does not match one of the things that can be mailed, or if the package is too heavy, your program should print an error message (see sample output).

Here are the details for each type of mailed item:

## Postcard

To determine the cost for a postcard, you'll need to collect both width and height values in inches (should these be `int`s or `double`s?). Refer to page 1 of this document to see how to calculate postage for a postcard.

## Letter

To determine the cost for a letter you'll need to collect the weight (in ounces). (Again, should that be an `int` or `double`?) Refer to page 1 of this document to see how to calculate postage for a postcard. One tricky part: any fraction of an ounce over an integer number of ounces needs to be charge extra postage. Think about how you can figure this out …

## Parcel

To determine the cost for a parcel you'll need to collect the weight (in pounds - `int` or `double`?). You will also need to collect the zone number where the package will be delivered. See the table above to find the postage for the different zone areas. *Ask the user to enter a zone number, not a number of miles.*

## Submission Requirements

1. **From your Computer Science Lab account:** Use BlueJ's submit command to submit your project electronically.
2. **Canvas Copy:** Upload a copy of your **`PostageCalc.java`** class to this assignment in Canvas.

## Grading Criteria

*Your class must compile without errors to be accepted. If your class does not compile, you will receive a grade of 0*. I will test your programs by executing them as many times as necessary to test all features.

The following criteria will be used to evaluate your program:

| | |
|---|---|
| Correct submission of project | 2 pts |
| Appropriate and complete comments | 7 pts |
| Adherence to style/design/naming conventions and standards | 4 pts |
| Efficiency of logic | 2 pts |
| Correct program behavior | 15 pts |
| **Total points:** | **30 pts** |

The next page contains 2 sample runs of the program (again, note that the Welcome message prints only at the beginning, but the user enters 5 items to mail. As usual, keyboard input is written in **`bold and underscored text`** to distinguish it from what the program prints.

```
Welcome to the Postage Calculator Program
This program will calculate postage for items up to 2 pounds.
------------------------------------------------------------

You can choose postcard, letter, or parcel.
Type the kind of item you wish to send: postcard
Enter the width of the postcard: 6
Enter the height of the postcard: 9
Cost of mailing your postcard is $0.55

You can choose postcard, letter, or parcel.
Type the kind of item you wish to send: postcard
Enter the width of the postcard: 3
Enter the height of the postcard: 5
Cost of mailing your postcard is $0.55

You can choose postcard, letter, or parcel.
Type the kind of item you wish to send: letter
Enter the weight in ounces: 2
Cost of mailing your letter is $0.75

You can choose postcard, letter, or parcel.
Type the kind of item you wish to send: letter
Enter the weight in ounces: 1
Cost of mailing your letter is $0.55

You can choose postcard, letter, or parcel.
Type the kind of item you wish to send: letter
Enter the weight in ounces: 4
Cost of mailing your letter is $1.15
```

```
Welcome to the Postage Calculator Program
This program will calculate postage for items up to 2 pounds.
------------------------------------------------------------

You can choose postcard, letter, or parcel.
Type the kind of item you wish to send: parcel
Enter the weight in pounds: 2
Enter the zone (0 for Local): 4
Cost of mailing your parcel is $10.10

You can choose postcard, letter, or parcel.
Type the kind of item you wish to send: parcel
Enter the weight in pounds: 5
Enter the zone (0 for Local): 1
Package too heavy - try another program.

You can choose postcard, letter, or parcel.
Type the kind of item you wish to send: parcel
Enter the weight in pounds: 1
Enter the zone (0 for Local): 8
Cost of mailing your parcel is $9.55

You can choose postcard, letter, or parcel.
Type the kind of item you wish to send: parcel
Enter the weight in pounds: .5
Enter the zone (0 for Local): 0
Cost of mailing your parcel is $7.70

You can choose postcard, letter, or parcel.
Type the kind of item you wish to send: box
Can't mail this type of item.
```