

Project 1

Best Ever Chocolate Chip Cookies: cookies.cpp

Due: **Friday, 24-January-2014 6:00 pm**

Grading: **50 points runnability**

10 points "code quality"

Note: **We grade your LAST submit only**
This project must be done individually

Hint: **Start with the code given**

Note: Beware the autograder-cheat-detector magic machine see next section for further information



This assignment requires you to design and write a C++ program on your own for the first time this semester.

Learning Objectives

- To understand the use of existing operators to perform interactive I/O using C++
- To implement conversions correctly
- To write selection statements in C++
- To use constants and variables appropriately

Autograder-Cheat-Detector Magic Machine

We run every submission against every other submission and determine similarities. All projects that are "too similar" are forwarded to the Engineering Honor Council. This happened to numerous students last semester. Also know that it takes months to get a resolution from the Honor Council. Discussion of the project will NOT be an issue. Sharing code between students will likely



cause the cheating detector to identify both programs as "too similar". We also search the web for solutions that may be posted online and add these into the mix of those checked for

similarities. Searching the web, by the way, is something that we are very good at.



Also note that on all cases forwarded to the Engineering Honor Council the LSA Dean of Academic Affairs is also notified. Furthermore, the LSA rule is students involved in honor violations cannot withdraw from nor drop the course.

Problem Statement

You are starting your own company that sells cookies using an old family recipe passed down through the generations -- the "Best Ever Chocolate Chip Cookies". Since you expect both small and large orders, you need assistance in figuring out how much to buy for the ingredients for each order. Since this is a start-up, you will be working out of your own small kitchen with limited space to store ingredients.

Input

Your program must accept input data for the following questions:

- How many cookies is a serving size?
- How many people do you need to serve?

These are also the exact prompts to be used in requesting input. They must be in the order specified.

Output

The output from your program should be:

- How many batches need to be made
- A shopping list containing:
 - how many dozen of eggs
 - how many bags of granulated sugar
 - how many bags of brown sugar
 - how many bags of flour
 - how many pounds of butter
 - how many bags of chocolate chips
- Expected cost of the ingredients



Note: the order and verbiage connected with the shopping list is critical to passing the autograder. Make sure they are exact. Check the sample runs and the "prompts.txt" file attached to the assignment for the exact prompts. To avoid spelling errors, simply copy/paste the appropriate prompt into your code.

Of course if any of the expected output is '1', then the noun following it should be singular. If any of the expected output is larger than 1, then the noun following it should be plural.

Examples:

You need to make: 1 batch of cookies

You need to make: 2 batches of cookies

1 dozen eggs

2 dozen eggs

1 bag of granulated sugar

2 bags of granulated sugar

etc

Cost of Ingredients

Use the following prices for the ingredients you need to purchase:

Ingredient	Cost
dozen Eggs	\$2.68
1 lb Butter	\$2.50
5 lb bag Granulated Sugar	\$2.98
2 lb bag of Brown Sugar	\$1.78
5 lb bag of Flour	\$3.09
12 oz bag of Chocolate Chips	\$2.64
Vanilla, baking soda, salt	infinite supply available for no \$\$\$

Note: "lb" is an abbreviation for "pound" due to the Roman weight system. A "pound" of weight in Latin (the language of the Romans) is called a libra pondo. This abbreviation of the Latin term translates into "lb." for "pound".



Recipe for one batch of "Best Ever" Chocolate Chip Cookies: makes 4 dozen

2 1/4 cups all-purpose flour
1 teaspoon baking soda
1/2 teaspoon salt
1 cup (2 sticks) butter
3/4 cup granulated sugar
3/4 cup packed brown sugar
2 eggs
1 teaspoon vanilla extract
2 cups (12 oz pkg) chocolate chips

Conversions

Since the recipe is in "cups", and the ingredients are in "pounds", we need to be able to convert between the two. Since "cups" is a measure of volume and "pounds" is a measure of weight, a definitive conversion is not possible. Therefore, we are going to use the following "close enough" conversions:

1 lb granulated sugar = 2 cups
1 lb brown sugar = 2 1/2 cups
1 lb all-purpose flour = 4 cups
1 lb butter = 2 cups

Additionally, there are: 12 eggs per dozen

Further Rules

You cannot make a partial batch of cookies.

You must buy the ingredients only in the amounts listed above in the Ingredients Table.

Bad Data Checking

You do not need to be concerned with bad input on this project. You may assume that:

- The number of cookies per serving size is an integer greater than 0
- The number of people you need to serve is an integer greater than 0

Overview of Files Given

cookies.cpp	Holds the #includes needed and the basic structure. Also has a "pluralize" function given such that it is easy to get the plural of a word
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What should you do first

Think about it. Plan it. Design it. Start on paper. The worse thing you can do is to start typing code. If you do, plan on it taking about 6 times longer than if you just thought about it first.

Start by laying out the logic.

Start with the inputs: what inputs are needed? What are the exact prompts that are needed? What do you want to call the variables?

Next figure out how many batches are needed. How do you do this? What data is needed? What computation is needed to determine how many batches?

Next the outputs: what outputs are needed? How do you print out how many batches are needed?

Where do you print the "Shopping List ..."

Figure out how many eggs are needed. How do you do this conversion? What data is needed? Now how do you print this out in your shopping list?

Now work on how much granulated sugar you will need. How do you do this conversion? What data is needed? How do you print this out? And continue with the other ingredients and their conversions.

Double check your logic. Are the conversions correct? Do you have the ordering correct?

Once you have this laid out, now is the time to create that project and begin typing code.

Create either an Xcode or Visual project.

For directions on how to do this, see

for Mac: [ctools/assignments/project 1/How_to_create_an_Xcode_project](#) or

for PC: [ctools/assignments/project1/How_to_create_a_Visual_project](#).

Add cookies.cpp into the project. Delete main.cpp out of the project.

These documents also are in

[ctools/Resources/Mac Compiler Info](#) and

[ctools/Resources/PC Compiler Info](#)

How to create a project is covered in your 1st Discussion Section. You should have Xcode or Visual installed before you attend your Discussion Section.

Writing the Code

The best approach is always to start small and build it up -- one piece at a time. NEVER try and do the entire thing at once. Start with your logic you laid out in the previous section.

```
// get the inputs needed
// calculate how many batches you will need
// print out the number of batches --
//     use the exact output expected for batches
// make sure it is correct -- test on a few test sets
// fix the singular/plural
//     "batch" if you have 1
//     "batches" if 2 or more
// test again to make sure it worked

// now add the print needed for "Shopping List ..."
//     and don't forget about all the "-----"

// calculate how many eggs are needed -- I would put this code above
//     the print for the "Shopping List ..."
//     store the number needed into a variable
// now print how many eggs are needed
// test to make sure it is correct

// calculate how much granulated sugar is needed -- put this in same
//     location along with that for eggs
// print how much granulated sugar
// fix singular/plural
// test it out

// etc -- one piece at a time
// test as you go
```

When you start small, add in one small piece at a time, and test as you go, it seems very manageable.

Testing

Remember, a computer does NOT interpret. If you miss-spell a word, you will fail all test cases with the autograder. If you miss a punctuation mark, you will fail all test cases with the autograder. We STRONGLY suggest you test your code. An easy way is to use "quickdiff.com" or your favorite "diff" program. SampleRun1.txt, SampleRun2.txt, SampleRun3.txt are available in ctools for an easy check. Run the "diff" program of the sample runs against your code using the same input. A couple of easy to use "diff" programs are:

quickdiff.com
diffnow.com

You will soon develop a "love/hate" relationship with the autograder. You will "love" that you can check your code to see your score. You will "love" that it gives you feedback. You will "hate" that it tells you that you are not totally correct on the first submit.

You have 2 submits per day with feedback. We strongly suggest you use these submits. You will know within seconds how well your code performs and what your score is. You will know when you get a perfect score. Basically, **USE YOUR 2 SUBMITS PER DAY WITH FEEDBACK.** We use your LAST submit for final grading.

Note: you really have an infinite number of submits per day. You get feedback for the first 2 submits per day. Additionally, once per project, you get feedback on a 3rd submit.

Autograder: What must be Handed In - - cookies.cpp

Submission Requirements

You may check your Project1 by using

vienna.eecs.umich.edu
Project 1 - cookies

There is a link to the autograder in the left-hand-menu of ctools. The file you submit to the autograder MUST be called: cookies.cpp. In the feedback you receive, the messages given for what is being tested are somewhat descriptive, but are cryptic. The messages are meant to be only a hint -- NOT a specific concerning what is being tested. Real life does NOT come with an autograder. Therefore, you should test your program with your own full test suite. We will pull your last submit for "final testing".



Remember this is where we pull code from for final testing. We take the LAST submit to Project 1 for final testing. This is the ONLY place we will pull from.

Note: Differences in white space will NOT fail the autograder.

Note: You have an infinite number of submits per day but feedback for only the first two per day; all others are what we call "blind submits". These "blind submits" do not have feedback -- not even a score. We urge to use them cautiously especially if they are your last submit -- since that last submit is the one you will be graded on. You could get an unpleasant surprise if you are not really really careful.

Sample Run Output

Here are a few examples of the way your program output should look.

Sample run 1:

```
How many cookies is a serving size? 3
How many people do you need to serve? 40
```

You need to make: 3 batches of cookies

Shopping List for "Best Ever" Chocolate Chip Cookies

```
1 dozen eggs
1 bag of granulated sugar
1 bag of brown sugar
1 bag of flour
2 pounds of butter
3 bags of chocolate chips
```

Total expected cost of ingredients: \$ 23.45
Have a great party!

Sample run 2:

```
How many cookies is a serving size? 9
How many people do you need to serve? 40
```

You need to make: 8 batches of cookies

Shopping List for "Best Ever" Chocolate Chip Cookies

```
2 dozen eggs
1 bag of granulated sugar
2 bags of brown sugar
1 bag of flour
4 pounds of butter
8 bags of chocolate chips
```

Total expected cost of ingredients: \$ 46.11

Have a great party!

Sample run 3: -- just under the cutoff on people/batch

How many cookies is a serving size? 5
How many people do you need to serve? 9

You need to make: 1 batch of cookies

Shopping List for "Best Ever" Chocolate Chip Cookies

1 dozen eggs
1 bag of granulated sugar
1 bag of brown sugar
1 bag of flour
1 pound of butter
1 bag of chocolate chips

Total expected cost of ingredients: \$ 15.67

Have a great party!

Sample run 4: -- just over the cutoff on people/batch

How many cookies is a serving size? 5
How many people do you need to serve? 10

You need to make: 2 batches of cookies

Shopping List for "Best Ever" Chocolate Chip Cookies

1 dozen eggs
1 bag of granulated sugar
1 bag of brown sugar
1 bag of flour
1 pound of butter
2 bags of chocolate chips

Total expected cost of ingredients: \$ 18.31

Have a great party!

For a really good test suite

With a serving size of 5, the number of servings per batch is $48 / 5$ or 9.6 servings per batch

Serving Size	Number of People	Expected Output	What it tests
First check cutoffs on how many batches			
5	9	1 batch	ck for singular on "batch"
5	10	2 batches	
5	19	2 batches	just under cutoff on how many batches also check for plural on "batches"
5	20	3 batches	just over cutoff for how many batches
5	48	5 batches	
6	8	1 batch	ck for just enough cookies

Now check batches and when items change count

Note: the items that are just "1" are not always listed in this chart

Make sure you check computations on all

5	19	2 batches 1 pound of butter 1 bag of flour 2 bags of chocolate chips	ck plural on "batches" ck singulars on with a "1 bag" ck plural on choc. chips
5	20	3 batches 2 pounds of butter 3 bags of chocolate chips	ck plural on butter
5	38	4 batches 2 pounds of butter 4 bags of chocolate chips	
		5 batches 3 pounds of butter 5 bags of chocolate chips	
		6 batches 1 dozen eggs 3 pounds of butter 6 bags of chocolate chips	6 batches which would be 12 eggs
		7 batches 2 dozen eggs 2 bags of brown sugar 4 pounds butter	ck plural on eggs ck plural on brown sugar

		7 bags chocolate chips	
		9 batches 2 dozen eggs 2 bags of brown sugar 2 bags of flour 5 pounds of butter 9 bags of chocolate chips	cl plural on flour
		13 batches 3 dozen eggs 1 bag of granulated sugar 2 bags of brown sugar 2 bags of flour 7 pounds of butter 13 bags of chocolate chips	ck computation and singular
		14 batches 3 dozen eggs 2 bags of granulated sugar 3 bags of brown sugar 2 bags of flour 7 pounds of butter 14 bags of chocolate chips	ck plural on granulated sugar