Skills for Success Curriculum Resource Cover Page

Organization

College Sector Committee for Adult Upgrading (CSC)

Curriculum Resource

***Food Services Preparation Module 2* - Recipe Scaling and Yield Factors** This module is the second in a five-part series. It can be used to support learners in LBS and/or pre-apprenticeship who are interested in food service/cooking. In this module, participants will learn how to scale recipes with a calculator, and then they will learn how to scale using Microsoft Excel. In addition, this module will teach students about yield factors, how to conduct a yield test on a product, and how to calculate a yield factor. Also, an activity is included where the student must attach a recipe (scaled in Excel) to an email, and send it to their "chef" (instructor). A simple kitchen scale is required for the final activity (the "Yield Test"). Familiarity with Excel at an introductory level is recommended. Answer keys for practice activities are provided in the document.

OALCF Alignment

Competency	Task Group	Level
Competency A -Find and Use Information	A1. Read continuous text	3
Competency B - Communicate Ideas and Information	B1. Interact with others	1
Competency B - Communicate Ideas and Information	B2. Write continuous text	2
Competency B - Communicate Ideas and Information	B3. Complete and create documents	2
Competency C - Understand and Use Numbers	C3. Use measures	3
Competency D - Use Digital Technology	N/A	2

Goal Paths (check all that apply)

☒ Employment
☒ Apprenticeship
☐ Secondary School Credit
☒ Postsecondary
☒ Independence

Embedded Skills for Success (check all that apply)

☐ Adaptability
☐ Collaboration
☐ Communication
☐ Creativity and innovation
☒ Digital
☒ Numeracy
☒ Problem Solving
☒ Reading
☐ Writing

Notes:
This resource can be used in a teacher-led or self-directed format.
Note that fonts used in the equation editor differ from the rest of the text.
The opinions expressed in this document are the opinions of the College Sector Committee for Adult Upgrading. The Government of Ontario and its agencies are in no way bound by any recommendations contained in this document

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Introduction

This resource is the second module of a five-part series pertaining to the basic theory and calculations used in the kitchens of food service establishments, such as restaurants, cafeterias, and food trucks. For cooks, managers and owners alike, a thorough understanding and the proficient application of these fundamental principles is essential to one's job description as well as to the proper functioning and economic survival of any food service establishment.

In this module, learners will be introduced to the concepts of recipe scaling, yield factors, and yield tests. Learners will utilize their new knowledge to practice scaling recipes using a calculator and Excel; students should have at least a basic understanding of Excel before challenging the module. As well, students will learn about yield factors and conduct a basic yield test to calculate the yield factor of a food item. Please note, students will require access to a digital kitchen scale, so they can conduct the yield test.

The content of this module is covered in the following order: recipe scaling using a calculator, recipe scaling using Excel, yield factors, yield test, conclusion, and Appendix. The first two chapters provide learners with theory and examples for scaling recipes by converting either yield or portion size, followed by problem sets with answers. Learners are expected to apply their knowledge from the first module on measurement conversion to ensure recipes are in metric units before proceeding with recipe scaling.

The second chapter also includes an email assignment that involves attaching a scaled recipe in Excel and then sending the email to the learner's educator. In the third chapter, the learner will be introduced to the concept of a yield factor. A yield test will be conducted on a unit of fruit, and from this yield test, a yield factor will be calculated.

Appendix A is intended for use as a quick reference sheet; it contains conversion factors and formulas required to complete the module. Appendix B contains the necessary unit of measurement abbreviations to use with Excel's convert function.

If at any time a learner encounters difficulties with the content of this resource, the instructor can provide assistance.

Acknowledgement

The *College Sector Committee for Adult Upgrading* would like to thank Professor Christopher Prechotko (Cambrian College) for researching and authoring this resource for use by Literacy and Basic Skills/Academic Upgrading programs across Ontario.

Chapter 1 – Scaling Recipes with a Calculator

When working in the kitchen, you may be required to increase or decrease the quantity of product required from a recipe. The quantity of product made from a recipe is also known as yield (Labensky et al., 2006). For example, following a recipe for cream of tomato soup may provide two litres of soup, but you may want four litres of soup instead. As another example, you have a recipe for ten burgers that weigh 227 grams each, but perhaps a catering contract requires you to prepare 20 burgers that weigh 170 grams.

In the first example, you would scale the recipe using the technique of converting by yield (Labensky et al., 2006) because you're only concerned with a larger quantity of product, from 2 L to 4 L; in this example, portion size is not a consideration. In the second example, you must consider a different number of portions (12) and portion size (170 grams) from those the original recipe was intended for, 10 burgers that weigh 227 grams. In this case, you would scale the recipe by converting portion size (Labensky et al., 2006).

1a. Scaling Recipes by Converting Yield

To scale recipes by converting yield, we must calculate a *Conversion Factor* specific to the recipe we are scaling. In this case, the yield of a recipe can be the volume, weight, number of portions/servings, or number of batches produced. To find the conversion factor, we can use the following formula:

$$Conversion\ Factor = \frac{New\ Yield}{Old\ Yield}$$

It is necessary that both yields have the same units before dividing, which means you may have to convert one of the yields, so it has the same units as the other. After we know the conversion factor, we can then multiply the metric quantity of each item in the recipe by the conversion factor to determine the new ingredient quantities required to scale the recipe to our newly desired yield.

Example 1a: Scaling by Converting Yield

For the recipe below, scale the recipe to make a **new yield of 4L**.

Recipe - Cream of Tomato Soup (Yield = 2L)

Ingredients	Quantity of Each Ingredient
Canned Tomatoes	1.5 L
Onion	5 oz
Unsalted Butter	3 oz
Garlic	2 cloves
Heavy Cream	1 c
Salt	10 g
Basil	1 Bunch

Step 1: The first step is to determine the conversion factor. **If required, ensure both yields are in the same units before dividing.*

New Yield = 4 L

Old Yield = 2 L

$$Conversion\ Factor = \frac{New\ Yield}{Old\ Yield}$$

$$Conversion\ Factor = \frac{4L}{2L} = 2$$

Therefore, the conversion factor required to scale the recipe is 2. In this case, we're scaling-up the recipe because our new yield has a greater volume than our old yield.

Step 2: Create a new table with the column headings seen below. You'll see that four new columns were added to the above recipe to create the new table.

Ingredients	Old Quantity of Each Ingredient	Metric Conversion Factor	OLD Quantity of Each Ingredient in Metric	Conversion Factor	New Quantity of Each Ingredient

Step 3: Fill in the row headings for each ingredient in the recipe along with the Old Quantity of Each Ingredient. Don't forget the units for each quantity!

Ingredients	Old Quantity of Each Ingredient	Metric Conversion Factor	OLD Quantity of Each Ingredient in Metric	Conversion Factor	New Quantity of Each Ingredient
Canned Tomatoes	1.5 L				
Onion	5 oz				
Butter	3 oz				
Garlic	2 cloves				
Heavy Cream	1 c				
Salt	10 g				
Basil	1 bunch				

Step 4: To ensure consistency in product quality and cost, you must ensure all non-metric units are converted to metric. Use the Quick Reference Sheet in Appendix A to fill in all the necessary conversion factors under Metric Conversion Factor or write n/a

(not applicable) in any row that does not require a conversion and then convert any non-metric units to metric. Fill in the column Old Quantity of Each Ingredient in Metric with the ingredient quantities in metric units as you calculate them.

Ingredients	Old Quantity of Each Ingredient	Metric Conversion Factor	OLD Quantity of Each Ingredient in Metric	Conversion Factor	New Quantity of Each Ingredient
Canned Tomatoes	1.5 L	n/a	1.5 L		
Onion	5 oz	28.4 g / 1 oz	142 g		
Butter	3 oz	28.4 g / 1 oz	85.2 g		
Garlic	2 cloves	n/a	2 cloves		
Heavy Cream	1 c	240 mL / 1 c	240 mL		
Salt	10 g	n/a	10 g		
Basil	1 bunch	n/a	1 bunch		

Step 5: In each row of the Conversion Factor column, write the conversion factor that you calculated in the first step.

Ingredients	Old Quantity of Each Ingredient	Metric Conversion Factor	OLD Quantity of Each Ingredient in Metric	Conversion Factor	New Quantity of Each Ingredient
Canned Tomatoes	1.5 L	n/a	1.5 L	2	
Onion	5 oz	28.4 g / 1 oz	142 g	2	
Butter	3 oz	28.4 g / 1 oz	85.2 g	2	
Garlic	2 cloves	n/a	2 cloves	2	
Heavy Cream	1 c	240 mL / 1 c	240 mL	2	
Salt	10 g	n/a	10 g	2	
Basil	1 bunch	n/a	1 bunch	2	

Step 6: The last step is to multiply the Old Quantity of Each Ingredient in Metric by the Conversion Factor (CF) to find the New Quantity of Each Ingredient required for the new recipe yield.

$$New\ Quantity\ of\ Each\ Ingredient = Old\ Quantity\ of\ Each\ Ingredient\ in\ Metric\ x\ CF$$

Recipe - Cream of Tomato Soup (Yield = 4L)

Ingredients	Old Quantity of Each Ingredient	Metric Conversion Factor	OLD Quantity of Each Ingredient in Metric	Conversion Factor	New Quantity of Each Ingredient
Canned Tomatoes	1.5 L	n/a	1.5 L	2	3 L
Onion	5 oz	28.4 g / 1 oz	142 g	2	284 g
Butter	3 oz	28.4 g / 1 oz	85.2 g	2	170.4 g
Garlic	2 cloves	n/a	2 cloves	2	4 cloves
Heavy Cream	1 c	240 mL / 1 c	240 mL	2	480 mL
Salt	10 g	n/a	10 g	2	20 g
Basil	1 bunch	n/a	1 bunch	2	2 bunches

On the next page, you can practice by scaling a different recipe.

Problem Set 1a. Scaling by Converting Yield

I. For the recipe below, scale it to the following yields:

a) 280 mL

b) 1.68 L

Recipe – Mayonnaise (Yield = 560 mL)

Ingredients	Quantity of Each Ingredient
Canola Oil	480 mL
Large Egg Yolk	2
Dijon Mustard	2 t
White Vinegar	2 T
Salt	6 g

*Remember to make a new table with the necessary row and column headings.

II. For the recipe below, scale it to the following yields:

a) 2 L

b) 2 c

Recipe – Red Wine Gravy (Yield = 1.5 L)

Ingredients	Quantity of Each Ingredient
Unsalted Beef Stock	1 L
Red Wine	1 c
Unsalted Butter	4 oz
Flour	64 g
Tomato Paste	6 g
Onion	55 g
Thyme	4 sprigs
Bay Laurel	1 leaf
Black Peppercorn	4 g
Salt	7 g

*Remember to make a new table with the necessary row and column headings.

Solutions to Problem Set 1a. Scaling by Converting Yield

**When required, round conversion factors to two decimal places and new quantities of each ingredient, such as weights to two decimal places, items without units to one decimal place, and volumes to two decimal places and one decimal place for litre and millilitre, respectively.*

I. Mayonnaise

a) Convert Yield to 280 mL

New Yield = 280 mL

Old Yield = 560 mL

$$Conversion\ Factor = \frac{New\ Yield}{Old\ Yield}$$

$$Conversion\ Factor = \frac{280\ mL}{560\ mL} = 0.5$$

Recipe – Mayonnaise (Yield = 280 mL)

Ingredients	Old Quantity of Each Ingredient	Metric Conversion Factor	OLD Quantity of Each Ingredient in Metric	Conversion Factor	New Quantity of Each Ingredient
Canola Oil	480 mL	n/a	480 mL	0.5	240 mL
Large Egg Yolk	2	n/a	2	0.5	1
Dijon Mustard	2 t	5 ml / 1 t	10 mL	0.5	5 mL
White Vinegar	2 T	15 mL / 1 T	30 mL	0.5	15 mL
Salt	6 g	n/a	6 g	0.5	3 g

b) Convert Yield to 1.68 L

New Yield = 1.68 L

= 1680 mL (We convert to mL because both yields must have the same units.)

Old Yield = 560 mL

$$Conversion\ Factor = \frac{New\ Yield}{Old\ Yield}$$

$$Conversion\ Factor = \frac{1680\ mL}{560\ mL} = 3$$

Recipe – Mayonnaise (Yield = 1.68 L)

Ingredients	Old Quantity of Each Ingredient	Metric Conversion Factor	OLD Quantity of Each Ingredient in Metric	Conversion Factor	New Quantity of Each Ingredient
Canola Oil	480 mL	n/a	480 mL	3	1440 mL
Large Egg Yolk	2	n/a	2	3	6
Dijon Mustard	2 t	5 ml / 1 t	10 mL	3	30 mL
White Vinegar	2 T	15 mL / 1 T	30 mL	3	90 mL
Salt	6 g	n/a	6 g	3	18 g

II. Red Wine Gravy

a) Convert yield to 2 L

New Yield = 2 L

Old Yield = 1.5 L

$$Conversion\ Factor = \frac{New\ Yield}{Old\ Yield}$$

$$Conversion\ Factor = \frac{2\ L}{1.5\ L} = 1.33\ (rounded)$$

Recipe – Red Wine Gravy (Yield = 2 L)

Ingredients	Old Quantity of Each Ingredient	Metric Conversion Factor	OLD Quantity of Each Ingredient in Metric	Conversion Factor	New Quantity of Each Ingredient
Unsalted Beef Stock	1 L	n/a	1 L	1.33	1.33 L
Red Wine	1 cup	240 mL / 1 c	240 mL	1.33	319.2 mL (rounded)
Unsalted Butter	4 oz	28.4 g / 1 oz	113.6 g	1.33	151.09 (rounded)
Flour	64 g	n/a	64 g	1.33	85.12 g
Tomato Paste	6 g	n/a	6 g	1.33	7.98 g
Onion	55 g	n/a	55 g	1.33	73.15 g
Thyme	4 sprigs	n/a	4	1.33	5.3 sprigs (rounded)
Bay Laurel	1 leaf	n/a	1	1.33	1.3 leaves (rounded)
Black Peppercorn	4 g	n/a	4 g	1.33	5.32 g
Salt	7 g	n/a	7 g	1.33	9.31 g

b) Convert yield to 2 c

New Yield = 2 c

= 0.480 L (We convert to L because both yields must have the same units.)

Old Yield = 1.5 L

$$Conversion\ Factor = \frac{New\ Yield}{Old\ Yield}$$

$$Conversion\ Factor = \frac{0.480\ L}{1.5\ L} = 0.32$$

Recipe – Red Wine Gravy (Yield = 2 c)

Ingredients	Old Quantity of Each Ingredient	Metric Conversion Factor	OLD Quantity of Each Ingredient in Metric	Conversion Factor	New Quantity of Each Ingredient
Unsalted Beef Stock	1 L	n/a	1 L	0.32	.32 L
Red Wine	1 cup	240 mL / 1 c	240 mL	0.32	76.8 mL
Unsalted Butter	4 oz	28.4 g / 1 oz	113.6 g	0.32	36.35 g (rounded)
Flour	64 g	n/a	64 g	0.32	20.48 g
Tomato Paste	6 g	n/a	6 g	0.32	1.92 g
Onion	55 g	n/a	55 g	0.32	17.6 g
Thyme	4 sprigs	n/a	4	0.32	1.3 sprigs (rounded)
Bay Laurel	1 leaf	n/a	1	0.32	0.3 leaf (rounded)
Black Peppercorn	4 g	n/a	4 g	0.32	1.28 g
Salt	7 g	n/a	7 g	0.32	2.24 g

1b. Scaling Recipes by Converting Portion Size

To scale recipes by converting portion size, we must use two additional formulas, so we can calculate our *Old Total Yield* and *New Total Yield* before calculating the *Conversion Factor* specific to the recipe we are scaling. In this case, the number of portions of a recipe may change along with the quantity of each portion, where quantity can be in volume or weight.

To calculate *Old Total Yield***,** we use the following formula:

$$Old\ Total\ Yield = \ Original\ Number\ of\ Portions\ x\ Original\ Portion\ Size$$

To calculate *New Total Yield***,** we use the following formula:

$$New\ Total\ Yield = Desired\ Number\ of\ Portions\ x\ Desired\ Portion\ Size$$

Lastly, to find the *Conversion Factor* we can use the same formula as the previous scaling technique (Converting by Yield), except the New Yield and Old Yield are now represented by New Total Yield and Old Total Yield:

$$Conversion\ Factor = \frac{New\ Total\ Yield}{Old\ Total\ Yield}$$

Note: it is necessary that both yields have the same units before dividing, which means you may have to convert one of the yields, so it has the same units as the other. After we know the conversion factor, we can then multiply the metric quantity of each item in the recipe by the conversion factor to determine the new quantities required to scale the recipe to our desired number of portions and portion size.

Example 1b: Scaling by Converting Portion Size

For the recipe below, scale the recipe to make **12 portions** with a **portion size of 170 grams**.

Recipe - Eye of Round Burger Patties (Portions = 10, Portion Size = 227 grams)

Ingredients	Quantity of Each Ingredient
Eye of Round	1800 g
Fatback	450 g
Salt	14 g
Pepper	6 g

Step 1: The first step is to determine the Old Total Yield.

Original Number of Portions = 10

Original Portion Size = 227 g

$$Old\ Total\ Yield = \ Original\ Number\ of\ Portions\ x\ Original\ Portion\ Size$$

$$Old\ Total\ Yield = \ 10\ x\ 227\ g = 2270\ g$$

Therefore, the old total yield is 2270 g.

Step 2: The second step is to calculate the New Total Yield.

Desired Number of Portions = 12

Desired Portion Size = 170 g

$$New\ Total\ Yield = Desired\ Number\ of\ Portions\ x\ Desired\ Portion\ Size$$

$$New\ Total\ Yield = 12\ x\ 170\ g = 2040\ g$$

Therefore, the new total yield is 2040 g.

Step 3: The next step is to determine the Conversion Factor. ** If required, ensure both total yields are in the same units before dividing.*

New Total Yield = 2040 g

Old Total Yield = 2270 g

$$Conversion\ Factor = \frac{New\ Yield}{Old\ Yield}$$

$$Conversion\ Factor = \frac{2040\ g}{2270\ g} = 0.90 \text{ (rounded)}$$

Therefore, the conversion factor required to scale the recipe is 0.90, which means we're scaling-down the recipe because the new total yield has a lighter weight than the old total yield.

Step 4: Create a new table with the column headings seen below. Four new columns were added to the above recipe to create the new table.

Ingredients	Old Quantity of Each Ingredient	Metric Conversion Factor	OLD Quantity of Each Ingredient in Metric	Conversion Factor	New Quantity of Each Ingredient

Step 5: Fill in the row headings for each ingredient in the recipe along with the Old Quantity of Each Ingredient. Don't forget the units for each quantity!

Ingredients	Old Quantity of Each Ingredient	Metric Conversion Factor	OLD Quantity of Each Ingredient in Metric	Conversion Factor	New Quantity of Each Ingredient
Eye of Round	1800 g				
Fatback	450 g				
Salt	14 g				
Pepper	6 g				

Step 6: To ensure consistency in product quality and cost, ensure all non-metric units are converted to metric. Use the Quick Reference Sheet in the appendix to fill in all the necessary conversion factors under Metric Conversion Factor or write n/a (not applicable) in any row that does not require a conversion and then convert any non-metric units to metric. Fill in the column Old Quantity of Each Ingredient in Metric with the ingredient quantities in metric units as you calculate them. In this example, all the ingredient quantities are already in metric.

Ingredients	Old Quantity of Each Ingredient	Metric Conversion Factor	OLD Quantity of Each Ingredient in Metric	Conversion Factor	New Quantity of Each Ingredient
Eye of Round	1800 g	n/a	1800 g		
Fatback	450 g	n/a	450 g		
Salt	14 g	n/a	14 g		
Pepper	6 g	n/a	6 g		

Step 7: In each row of the Conversion Factor column, write the conversion factor that you calculated in the third step.

Ingredients	Old Quantity of Each Ingredient	Metric Conversion Factor	OLD Quantity of Each Ingredient in Metric	Conversion Factor	New Quantity of Each Ingredient
Eye of Round	1800 g	n/a	1800 g	0.90	
Fatback	450 g	n/a	450 g	0.90	
Salt	14 g	n/a	14 g	0.90	
Pepper	6 g	n/a	6 g	0.90	

Step 8: The last step is to multiply the Old Quantity of Each Ingredient in Metric by the Conversion Factor (CF) to find the New Quantity of Each Ingredient required for the new recipe yield.

$$New\ Quantity\ of\ Each\ Ingredient = Old\ Quantity\ of\ Each\ Ingredient\ in\ Metric\ x\ CF$$

Recipe - Eye of Round Burger Patties (Portions = 12, Portion Size = 170 grams)

Ingredients	Old Quantity of Each Ingredient	Metric Conversion Factor	OLD Quantity of Each Ingredient in Metric	Conversion Factor	New Quantity of Each Ingredient
Eye of Round	1800 g	n/a	1800 g	0.90	1620 g
Fatback	450 g	n/a	450 g	0.90	405 g
Salt	14 g	n/a	14 g	0.90	12.6 g
Pepper	6 g	n/a	6 g	0.90	5.4 g

Problem Set 1b. Scaling by Converting Portion Size

I. For the recipe below, scale it to the following portions and portion sizes:

a) 8 x 230 g

b) 4 x 115 g

Recipe – Salmon Cakes (Portions = 10, Portion Size = 115 g)

Ingredients	Quantity of Each Ingredient
Salmon	1.3 kg
Garlic	40 g
Shallot	0.55 lb
Dijon Mustard	50 mL
Egg Yolk	5 fl oz
Mayonnaise	1.25 c
Panko	140 g
Fresh Dill Weed	6 g
Salt	30 g

* Remember to make a new table with the necessary row and column headings.

II. For the recipe below, scale it to the following portions and portion sizes:

a) 16 x 30 mL

b) 2 x 900 mL

Recipe – Thin Bechamel (Portions = 8, Portion Size = 90 mL)

Ingredients	Quantity of Each Ingredient
Homogenized Milk	3 c
Unsalted Butter	3 oz
Flour	48 g
Onion	20 g
Bay Laurel	0.5 g
Clove	0.2 g
Nutmeg	0.6 g
Salt	9 g

*Remember to make a new table with the necessary row and column headings.

Solutions to Problem Set 1b. Scaling by Converting Portion Size

**When required, round values as follows:*

- *conversion factors to two decimal places*
- *new quantities of each ingredient, such as weights, to two decimal places*
- *items without units to one decimal place*
- *volumes to two decimal places*
- *one decimal place for litre and millilitre, respectively.*

I. Salmon Cakes

a) Convert portions and portion size to 8 x 230 g

Old Total Yield

Original Number of Portions = 10

Original Portion Size = 115 g

$$Old\ Total\ Yield = \ Original\ Number\ of\ Portions\ x\ Original\ Portion\ Size$$

$$Old\ Total\ Yield = \ 10\ x\ 115\ g = 1150\ g$$

New Total Yield

Desired Number of Portions = 8

Desired Portion Size = 230 g

$$New\ Total\ Yield = Desired\ Number\ of\ Portions\ x\ Desired\ Portion\ Size$$

$$New\ Total\ Yield = 8\ x\ 230\ g = 1840\ g$$

Conversion Factor (* If required, ensure both total yields are in the same units before dividing.)

New Total Yield = 1840 g

Old Total Yield = 1150 g

$$Conversion\ Factor = \frac{New\ Yield}{Old\ Yield}$$

$$Conversion\ Factor = \frac{1840\ g}{1150\ g} = 1.6$$

Recipe – Salmon Cakes (Portions = 8, Portion Size = 230 g)

Ingredients	Old Quantity of Each Ingredient	Metric Conversion Factor	OLD Quantity of Each Ingredient in Metric	Conversion Factor	New Quantity of Each Ingredient
Salmon	1.3 kg	n/a	1.3 kg	1.6	2.08 kg
Garlic	40 g	n/a	40 g	1.6	64 g
Shallot	0.55 lb	1 kg / 2.2 lb	0.25 kg	1.6	0.4 kg
Dijon Mustard	50 mL	n/a	50 mL	1.6	80 mL
Egg Yolk	5 fl oz	30 mL / 1 fl oz	150 mL	1.6	240 mL
Mayonnaise	1.25 c	240 mL / 1 c	300 mL	1.6	480 mL
Panko	140 g	n/a	140 g	1.6	224 g
Fresh Dill Weed	6 g	n/a	6 g	1.6	9.6 g
Salt	30 g	n/a	30 g	1.6	48 g

b) Convert portions and portion size to 4 x 115 g

Old Total Yield

Original Number of Portions = 10

Original Portion Size = 115 g

$$Old\ Total\ Yield = \ Original\ Number\ of\ Portions\ x\ Original\ Portion\ Size$$

$$Old\ Total\ Yield = \ 10\ x\ 115\ g = 1150\ g$$

New Total Yield

Desired Number of Portions = 4

Desired Portion Size = 115 g

$$New\ Total\ Yield = Desired\ Number\ of\ Portions\ x\ Desired\ Portion\ Size$$

$$New\ Total\ Yield = 4\ x\ 115\ g = 460\ g$$

Conversion Factor (* If required, ensure both total yields are in the same units before dividing.)

New Total Yield = 460 g

Old Total Yield = 1150 g

$$Conversion\ Factor = \frac{New\ Yield}{Old\ Yield}$$

$$Conversion\ Factor = \frac{460\ g}{1150\ g} = 0.4$$

Recipe – Salmon Cakes (Portions = 4, Portion Size = 115 g)

Ingredients	Old Quantity of Each Ingredient	Metric Conversion Factor	OLD Quantity of Each Ingredient in Metric	Conversion Factor	New Quantity of Each Ingredient
Salmon	1.3 kg	n/a	1.3 kg	0.4	0.52 kg
Garlic	40 g	n/a	40 g	0.4	16 g
Shallot	0.55 lb	1 kg / 2.2 lb	0.25 kg	0.4	0.1 kg
Dijon Mustard	50 mL	n/a	50 mL	0.4	20 mL
Egg Yolk	5 fl oz	30 mL / 1 fl oz	150 mL	0.4	60 mL
Mayonnaise	1.25 c	240 mL / 1 c	300 mL	0.4	120 mL
Panko	140 g	n/a	140 g	0.4	56 g
Fresh Dill Weed	6 g	n/a	6 g	0.4	2.4 g
Salt	30 g	n/a	30 g	0.4	12 g

II. Thin Bechamel

a) Convert portions and portion size to 16 x 30 mL

Old Total Yield

Original Number of Portions = 8

Original Portion Size = 90 mL

$$Old\ Total\ Yield = \ Original\ Number\ of\ Portions\ x\ Original\ Portion\ Size$$

$$Old\ Total\ Yield = \ 8\ x\ 90\ mL = 720\ mL$$

New Total Yield

Desired Number of Portions = 16

Desired Portion Size = 30 mL

$$New\ Total\ Yield = Desired\ Number\ of\ Portions\ x\ Desired\ Portion\ Size$$

$$New\ Total\ Yield = 16\ x\ 30\ mL = 480\ mL$$

Conversion Factor (* If required, ensure both total yields are in the same units before dividing.)

New Total Yield = 480 mL

Old Total Yield = 720 mL

$$Conversion\ Factor = \frac{New\ Yield}{Old\ Yield}$$

$$Conversion\ Factor = \frac{480\ mL}{720\ mL} = 0.67\ (rounded)$$

Recipe – Thin Bechamel (Portions = 16, Portion Size = 30 mL)

Ingredients	Old Quantity of Each Ingredient	Metric Conversion Factor	OLD Quantity of Each Ingredient in Metric	Conversion Factor	New Quantity of Each Ingredient
Homogenized Milk	3 c	240 mL / 1 c	720 mL	0.67	482.4 mL
Unsalted Butter	3 oz	28.4 g / oz	85.2 g	0.67	57.08 g (rounded)
Flour	48 g	n/a	48 g	0.67	32.16 g
Onion	20 g	n/a	20 g	0.67	13.4 g
Bay Laurel	0.5 g	n/a	0.5 g	0.67	0.34 g (rounded)
Clove	0.2 g	n/a	0.2 g	0.67	0.13 g (rounded)
Nutmeg	0.6 g	n/a	0.6 g	0.67	0.40 g (rounded)
Salt	9 g	n/a	9 g	0.67	6.03 g

b) Convert portions and portion size to 2 x 900 mL

Old Total Yield

Original Number of Portions = 8

Original Portion Size = 90 mL

$$Old\ Total\ Yield = \ Original\ Number\ of\ Portions\ x\ Original\ Portion\ Size$$

$$Old\ Total\ Yield = \ 8\ x\ 90\ mL = 720\ mL$$

New Total Yield

Desired Number of Portions = 2

Desired Portion Size = 900 mL

$$New\ Total\ Yield = Desired\ Number\ of\ Portions\ x\ Desired\ Portion\ Size$$

$$New\ Total\ Yield = 2\ x\ 900\ mL = 1800\ mL$$

Conversion Factor (* If required, ensure both total yields are in the same units before dividing.)

New Total Yield = 1800 mL

Old Total Yield = 720 mL

$$Conversion\ Factor = \frac{New\ Yield}{Old\ Yield}$$

$$Conversion\ Factor = \frac{1800\ mL}{720\ mL} = 2.5$$

Recipe – Thin Bechamel (Portions = 2, Portion Size = 900 mL)

Ingredients	Old Quantity of Each Ingredient	Metric Conversion Factor	OLD Quantity of Each Ingredient in Metric	Conversion Factor	New Quantity of Each Ingredient
Homogenized Milk	3 c	240 mL / 1 c	720 mL	2.5	1800 mL
Unsalted Butter	3 oz	28.4 g / oz	85.2 g	2.5	213 g
Flour	48 g	n/a	48 g	2.5	120 g
Onion	20 g	n/a	20 g	2.5	50 g
Bay Laurel	0.5 g	n/a	0.5 g	2.5	1.25 g
Clove	0.2 g	n/a	0.2 g	2.5	0.5 g
Nutmeg	0.6 g	n/a	0.6 g	2.5	1.5 g
Salt	9 g	n/a	9 g	2.5	22.5 g

In the next chapter, you will be able to use Microsoft Excel to scale recipes. Although it's fine to do the scaling by hand, as we have been in the examples and practice problems, using Excel is usually a faster way to scale recipes.

Chapter 2 – Scaling Recipes with Excel

Once you know how to use Excel, scaling recipes is easier and quicker to do than scaling with a calculator. For example, you can change all the input numbers for your calculations, and Excel will automatically change the output numbers in the spreadsheet of the recipe you're scaling. This means that once you've created a spreadsheet for a particular recipe, you can scale the recipe quickly by simply changing the required yield or number of portions and portion size.

When scaling recipes using Excel, you'll apply the same theory and formulas that you learned in Chapter 1, but you will need to learn how to use basic features in Excel to develop the spreadsheet for your recipe.

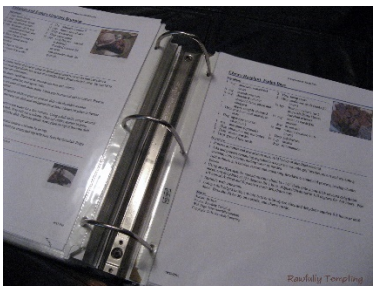
In this chapter, you'll first learn how to create an Excel spreadsheet to scale by converting yield, and then you'll learn how to create an Excel spreadsheet to scale by converting portion size.

2a. Scaling Recipes by Converting Yield in Excel

To scale recipes by converting yield in Excel, we use the same formula to calculate a Conversion Factor as we did in Chapter 1:

$$Conversion\ Factor = \frac{New\ Yield}{Old\ Yield}$$

This formula will be inputted into Excel, so it can calculate the conversion factor. Remember, it is necessary that both yields have the same units before dividing. After we calculate the conversion factor, create our recipe table with the relevant column titles, and convert all non-metric units to metric, we can then program Excel to multiply the metric quantity of each item in the recipe by the conversion factor to determine the new amounts required to scale the recipe to our newly desired yield.



Example 2a: Scaling by Converting Yield

For the recipe below, scale the recipe using Excel to make a **new yield of 4L**.

Recipe – Vegetable Stock (Yield = 2 L)

Ingredients	Quantity of Each Ingredient
Water	12 c
Vegetable Oil	1 T
Carrot	2.2 oz
Leek	160 g
Celery	4 oz
Black Peppercorn	2 g
Fresh Thyme	0.1 oz
Bay Laurel	0.07 oz

Step 1: Open Excel and create a new spreadsheet. Name and save the spreadsheet to the desktop, portable storage device, or Cloud.

Step 2: Create a title for your spreadsheet. The title can be the name of the recipe that you're scaling. Enter the recipe title in cell A1, and bold it if you like. Also, enter the variables New Yield, Old Yield, and Conversion Factor into cells A3, A4, and A5, respectively. Enter the units of each yield in parentheses beside the variable titles. Resize column A by double clicking on the border between column A and B to ensure the title and three variables all fit into column A. Enter the yield amounts into cells B3 and B4.

See Figure 1 (next page) for an illustration of what the spreadsheet should look like up to this point.

Figure 1.

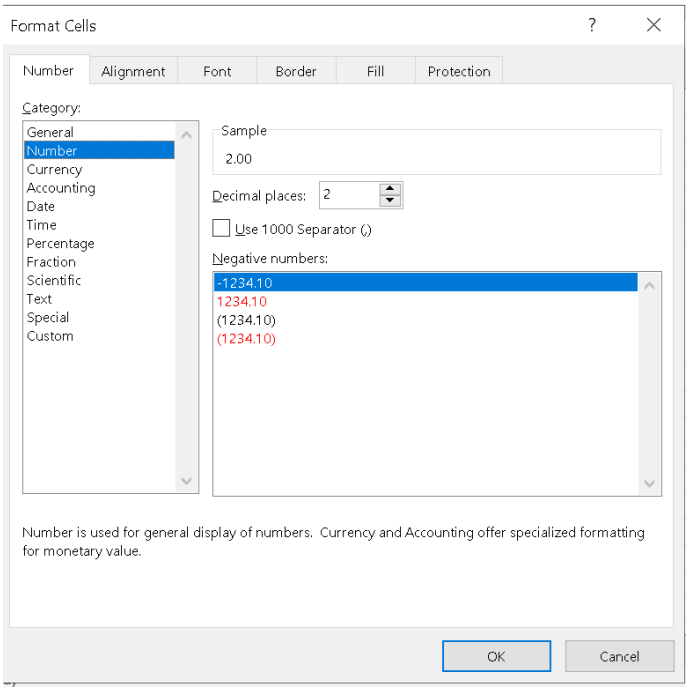
Step 2_Recipe Title, Variable Titles, and Yield Quantities

	A	B
1	**Vegetable Stock**	
2		
3	New Yield (L)	4
4	Old Yield (L)	2
5	Conversion Factor	

Step 3 – *Format and Calculate the Conversion Factor:* Right click on Cell B5, then left-click on Format Cells, left-click on Number, ensure 2 decimal places are selected, and left-click on the OK button. This will ensure that the conversion factor has no more than 2 decimal places (see Figure 2).

Figure 2.

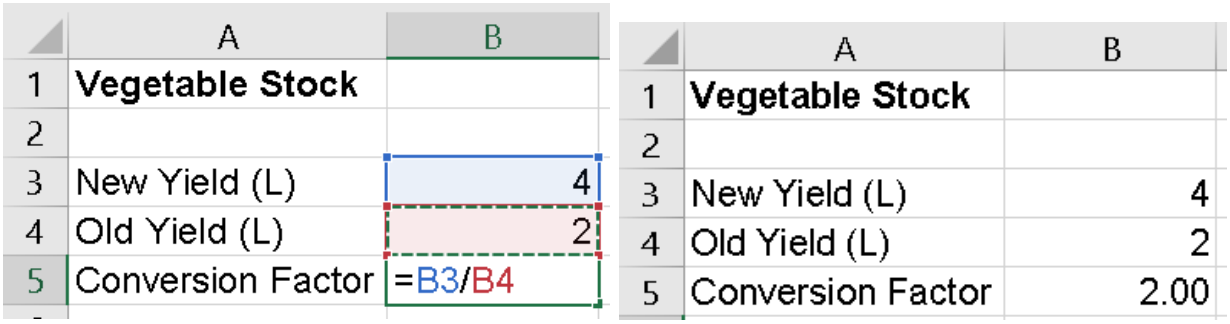
Step 3_Format Conversion Factor to Number and Two Decimal places



To enter our conversion factor formula into the spreadsheet, type an "=" sign into cell B5 then left=click on cell B3, then type "/" (this is the division sign) into the cell, and lastly left-click on cell B4. This formula will calculate the conversion factor to scale the recipe (see Figure 3). If you wanted to, you could now change the yields, and the conversion factor will automatically change when you do so.

Figure 3.

Step 3 Continued…Program Excel to Calculate the Conversion Factor



	A	B
1	**Vegetable Stock**	
2		
3	New Yield (L)	4
4	Old Yield (L)	2
5	Conversion Factor	=B3/B4

	A	B
1	**Vegetable Stock**	
2		
3	New Yield (L)	4
4	Old Yield (L)	2
5	Conversion Factor	2.00

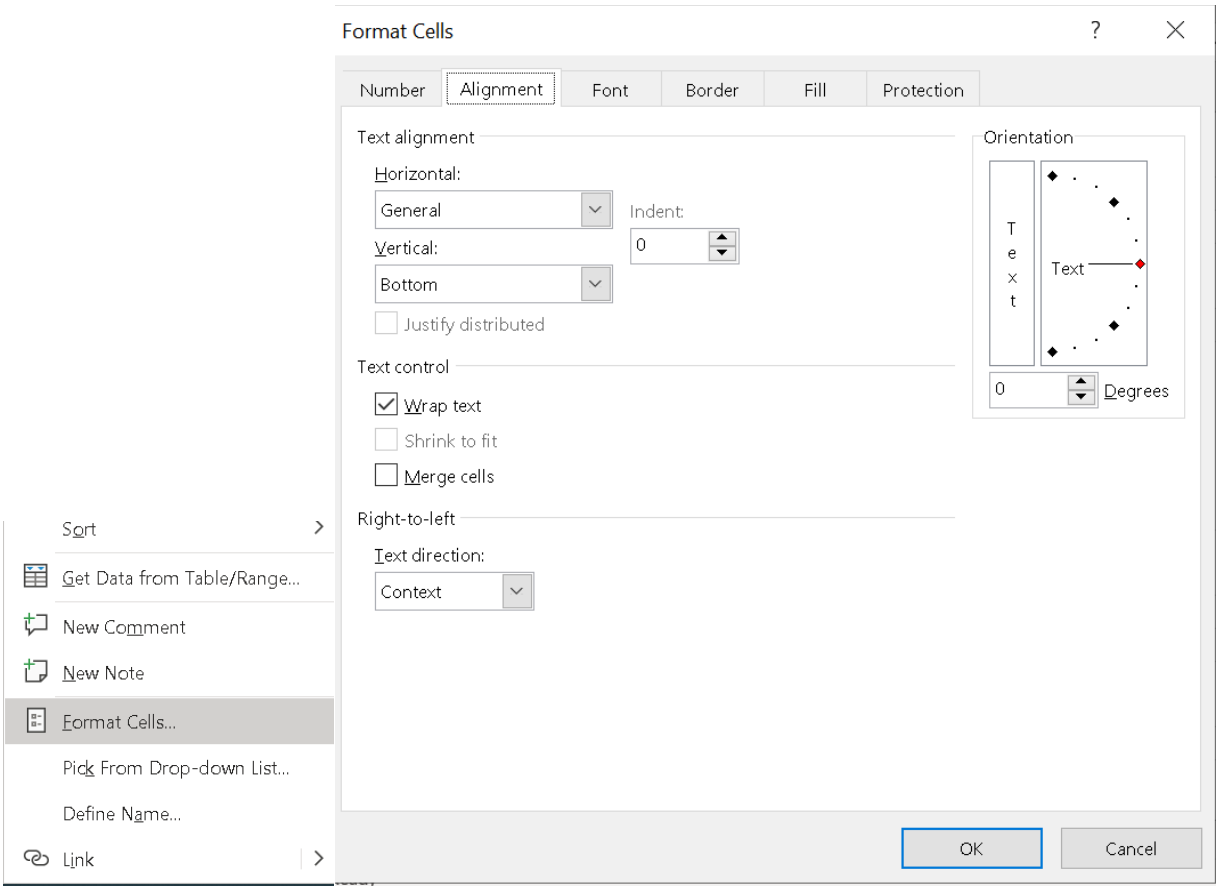
Step 4 – *Create the Recipe Table:* Enter the column headings between cells A7 to E7. In Excel, we don't need the column heading for Metric Conversion Factor because Excel has a function which contains its own conversion factors for units of measurement, which are more precise than the conversion factors we used for the calculator-based calculations. Ensure the column headings are centered, bolded, and wrapped.

The **wrap function** is found under Text Control in the Alignment tab of the Format Cells dialogue box.

To wrap the text, right-click on the cell where the text will be wrapped and then left-click on “Format Cells” in the pop-up menu (see Figure 4). Select “Wrap text” by left-clicking on the check box in the Format Cells dialogue box (see Figure 4). Left-click on the “OK” button.

Figure 4.

Step 4_How to Wrap Text



Resize the columns to ensure the column headings fit nicely in their respective cells. Type the ingredients for your recipe into column A, beginning with cell A8 (see Figure 5 on the next page).

Figure 5.

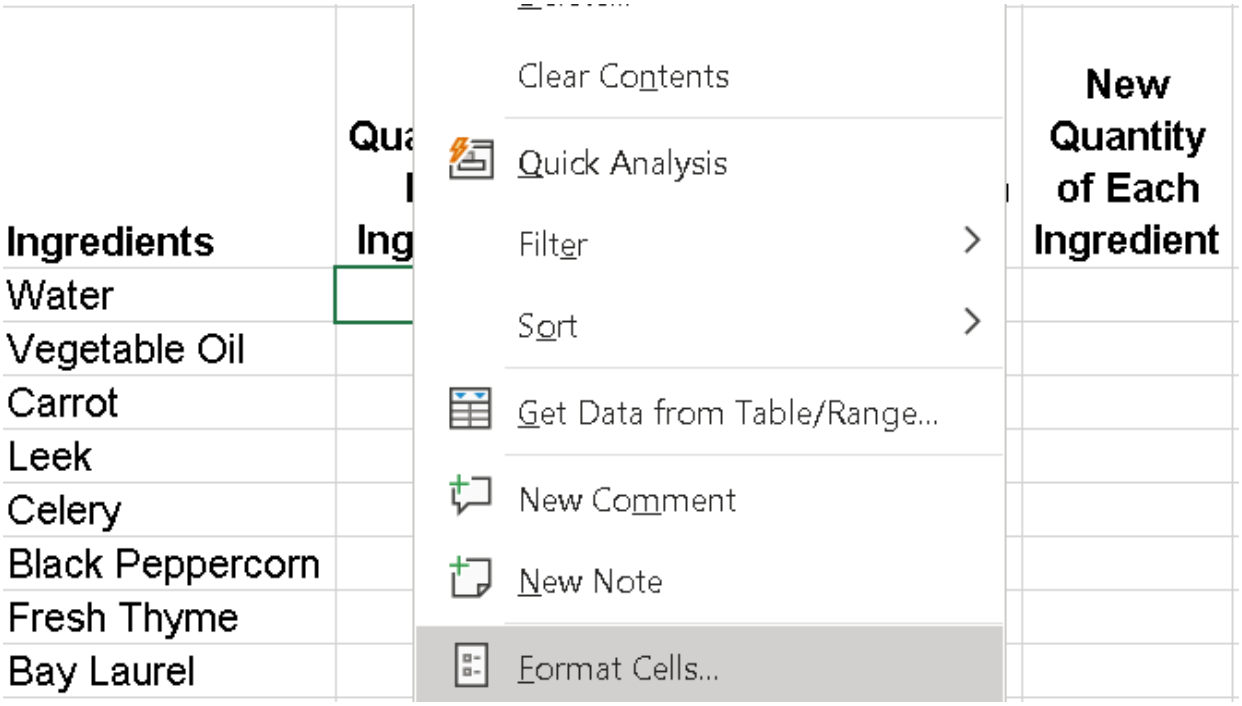
Step 4 Continued…Column Headings and Ingredients Entered into Spreadsheet

	A	B	C	D	E
1	**Vegetable Stock**				
2					
3	New Yield (L)	4			
4	Old Yield (L)	2			
5	Conversion Factor	2			
6					
7	**Ingredients**	**Old Quantity of Each Ingredient**	**Old Quantity of Each Ingredient in Metric**	**Conversion Factor**	**New Quantity of Each Ingredient**
8	Water				
9	Vegetable Oil				
10	Carrot				
11	Leek				
12	Celery				
13	Black Peppercorn				
14	Fresh Thyme				
15	Bay Laurel				

Step 5 – *Input the Quantity of Each Ingredient with Unit of Measurement, including the Desired Number of Decimal Places*: To do this, format the cell for each ingredient quantity, so the unit for each quantity appears in the cell, and the quantity displays two decimal places. For the ingredient water, right-click on cell B8, left-click on Format Cells (see Figure 6 on the next page).

Figure 6.

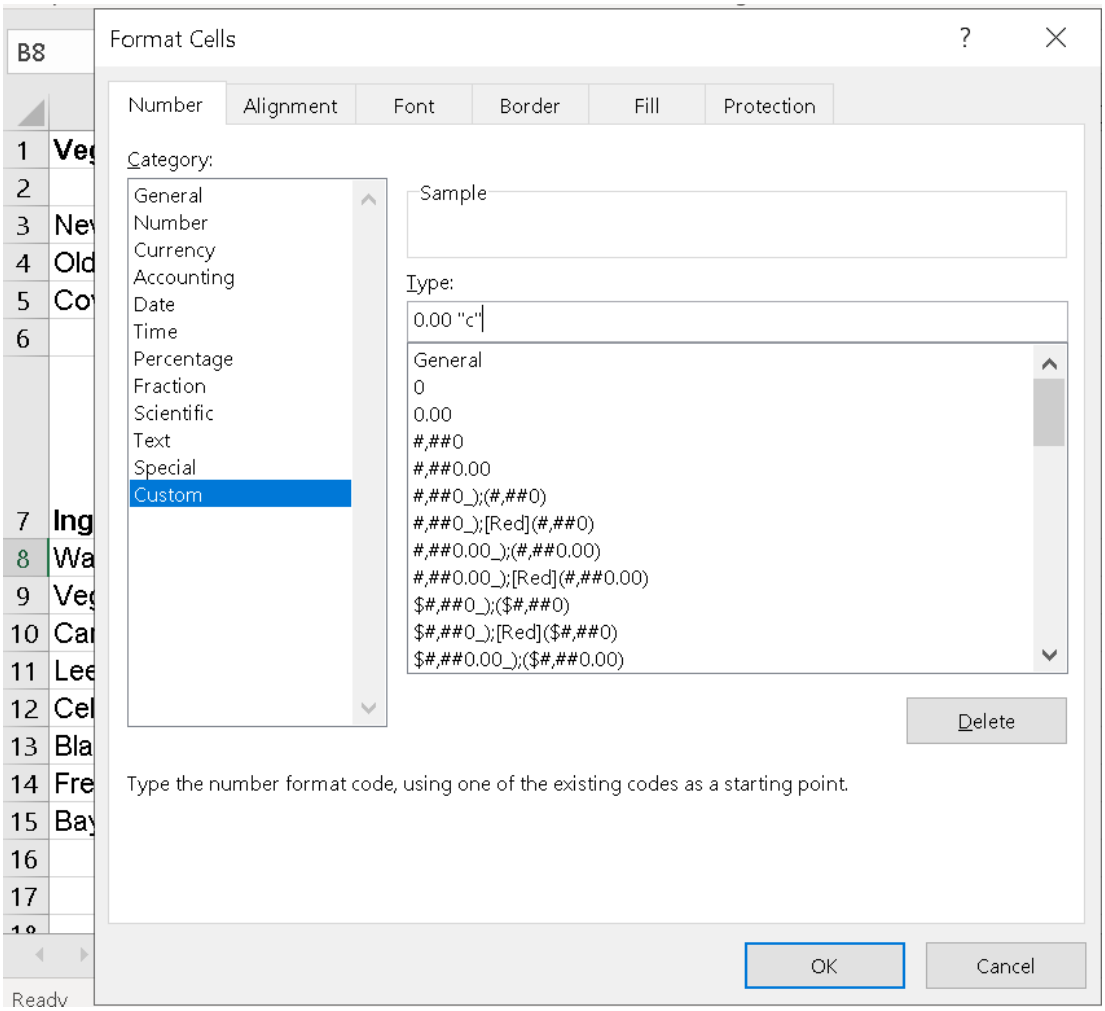
Step 5_Formatting Cell B8



When you're in the Format Cells dialogue box, left-click on Custom**.** Left-click on the option 0.00 (for 2 decimal places) or type it into the cell under Type: and then type the unit of the ingredient in quotations, in this case "c" for cup e.g., 0.00 "c". Click the OK button (see Figure 7 on the next page).

Figure 7.

Step 5 Continued…Custom Format Cells to Show Units and Two Decimal Places



Now you can enter the quantity of ingredient into cell B8, and after you press Enter on the keyboard, the quantity appears in the cell at two decimal places as well as its unit. You'll need to repeat this process for all the ingredients and their respective units (see Figure 8). The units, along with the desired number of decimal places, will be saved in the Custom Menu after you create them. If you require any of these units in the future,

you will now be able to select them from the bottom of the Custom menu, so there is no need to input them again.

Figure 8.

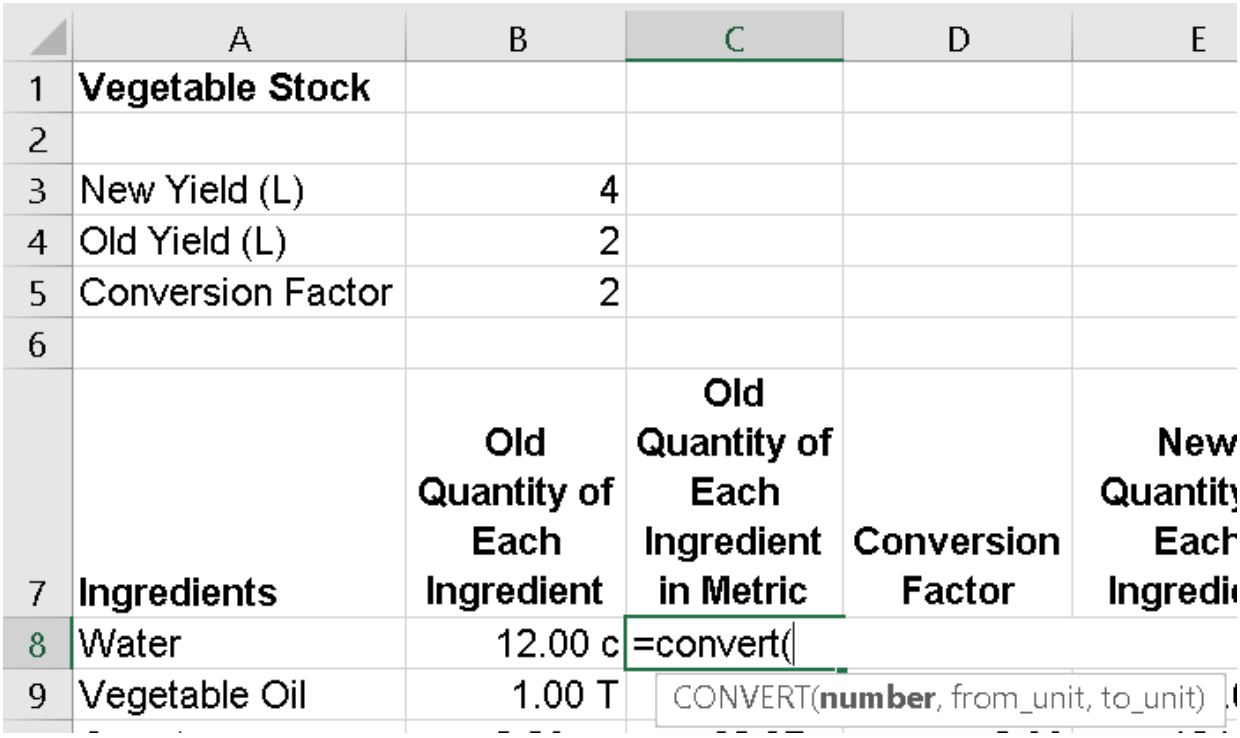
Step 5 Continued…Old Ingredient Quantities with Units and Set to Two Decimal Places

	A	B	C	D	E
1	**Vegetable Stock**				
2					
3	New Yield (L)	4			
4	Old Yield (L)	2			
5	Conversion Factor	2			
6					
7	**Ingredients**	**Old Quantity of Each Ingredient**	**Old Quantity of Each Ingredient in Metric**	**Conversion Factor**	**New Quantity of Each Ingredient**
8	Water	12.00 c			
9	Vegetable Oil	1.00 T			
10	Carrot	2.20 oz			
11	Leek	160.00 g			
12	Celery	4.00 oz			
13	Black Peppercorn	2.00 g			
14	Fresh Thyme	0.10 oz			
15	Bay Laurel	0.07 oz			

Step 6a – *Converting Non-Metric Units to Metric:* Excel has a convert function that enables users to easily convert within and between measurement systems. For example, to convert 12 cups of water to millilitres, left-click on cell C8, then type in the equal (=) sign followed by the word, convert(. Now follow the pattern that pops-up under the cell: CONVERT*(**number**, from_unit, to_unit)*. See Figure 9 for further clarification.

Figure 9.

Step 6a_Converting Non-Metric Old Ingredient Quantities to Metric



	A	B	C	D	E
1	**Vegetable Stock**				
2					
3	New Yield (L)	4			
4	Old Yield (L)	2			
5	Conversion Factor	2			
6					
7	**Ingredients**	**Old Quantity of Each Ingredient**	**Old Quantity of Each Ingredient in Metric**	**Conversion Factor**	**New Quantity Each Ingredi**
8	Water	12.00 c	=convert(		
9	Vegetable Oil	1.00 T			

Left-click on cell B8, then type a comma. After pressing the spacebar, in quotation marks type in the unit we're converting from, in this case cup ("cup"), and type a comma. After pressing the spacebar, in quotation marks type in the unit we're converting to, in this case millilitres ("mL") and then close the parentheses. Alternatively, you can choose units as they appear in the drop-down menu. See Figure 10 (next page) for further clarification.

Figure 10.

Step 6a Continued…Converting 12 Cups of Water to Millilitres

7	Ingredients	Old Quantity of Each Ingredient	Old Quantity of Each Ingredient in Metric	Conversion Factor	New Quantity of Each Ingredient
8	Water	12.00 c	=convert(B8, "cup", "mL")		
9	Vegetable Oil	1.00 T			
10	Carrot	2.20 oz			
11	Leek	160.00 g			
12	Celery	4.00 oz			
13	Black Peppercorn	2.00 g			
14	Fresh Thyme	0.10 oz			
15	Bay Laurel	0.07 oz			

Now, press Enter on the keyboard. You'll notice that the new metric quantity appears, but the units don't appear (see Figure 11).

Figure 11.

Step 6a Continued…12 Cups of Water Converted to Millilitres

7	Ingredients	Old Quantity of Each Ingredient	Old Quantity of Each Ingredient in Metric	Conversion Factor	New Quantity of Each Ingredient
8	Water	12.00 c	2839.0588		
9	Vegetable Oil	1.00 T			

We must format the cells in column C, so the units appear. Also, ingredient quantities will be rounded to two decimal places (see Figure 12 on the next page). To do so, follow a similar process as Step 5 above.

Figure 12.

Step 6a Continued…Metric Quantity of Water is Displayed with Unit and Set to Two Decimal Places

7	**Ingredients**	**Old Quantity of Each Ingredient**	**Old Quantity of Each Ingredient in Metric**	**Conversion Factor**	**New Quantity of Each Ingredient**
8	Water	12.00 c	2839.06 mL		
9	Vegetable Oil	1.00 T			

Use the instructions in Step 6a to convert the remaining non-metric ingredient quantities to metric. Follow a similar process as Step 5 to ensure the units are displayed for all ingredient quantities and the quantity is reported to two decimal places (see Figure 13).

Be aware that in the convert function, Excel recognizes some unit abbreviations differently than the more commonly used ones that we have used so far in the first two modules. In Excel's convert function, fluid ounce is abbreviated as "oz", and weight ounce is abbreviated as "ozm". Also, pound is abbreviated as "lbm", tablespoon as "tbs", teaspoon as "tsp", and as seen above, cup is abbreviated as "cup." Thus, you must use these abbreviations when using the convert function. Refer to Appendix B (at the end of this resource) to find these and other abbreviations for Excel's convert function.

Figure 13.

Step 6a Continued…Non-Metric Units Converted to Metric with Units Displayed and Quantities Set to Two Decimal Places

7	Ingredients	Old Quantity of Each Ingredient	Old Quantity of Each Ingredient in Metric
8	Water	12.00 c	2839.06 mL
9	Vegetable Oil	1.00 T	14.79 mL
10	Carrot	2.20 oz	62.37 g
11	Leek	160.00 g	
12	Celery	4.00 oz	113.40 g
13	Black Peppercorn	2.00 g	
14	Fresh Thyme	0.10 oz	2.83 g
15	Bay Laurel	0.07 oz	1.98 g

Step 6b: All units that were already in metric can now be entered into the cells in column C. In our example, Leek and Black Peppercorn are already in metric units. To enter the quantity of Leek and its unit in cell C11, left-click on the cell, type an equal sign (=), left-click cell B11, and then press Enter on the keyboard. Now if we change the quantity of the ingredient in cell B11, the quantity in cell C11 will change too. With this method, cell C11 will automatically sync with the B11 properties because of the settings we've implemented (see Figure 14 on the next page).

Figure 14.

Step 6b_Leek Quantity already in Metric Equated in Adjacent Cell, C11

	Ingredients	Old Quantity of Each Ingredient	Old Quantity of Each Ingredient in Metric
8	Water	12.00 c	2839.06 mL
9	Vegetable Oil	1.00 T	14.79 mL
10	Carrot	2.20 oz	62.37 g
11	Leek	160.00 g	=B11
12	Celery	4.00 oz	113.40 g
13	Black Peppercorn	2.00 g	
14	Fresh Thyme	0.10 oz	2.83 g
15	Bay Laurel	0.07 oz	1.98 g

	Ingredients	Old Quantity of Each Ingredient	Old Quantity of Each Ingredient in Metric
8	Water	12.00 c	2839.06 mL
9	Vegetable Oil	1.00 T	14.79 mL
10	Carrot	2.20 oz	62.37 g
11	Leek	160.00 g	160.00 g

Complete this step for any remaining ingredients e.g., Black Peppercorn (see Figure 15).

Figure 15.

Step 6b Continued…All Ingredient Quantities in Metric with Units Displayed and Quantities Set to Two Decimal Places

	Ingredients	Old Quantity of Each Ingredient	Old Quantity of Each Ingredient in Metric
8	Water	12.00 c	2839.06 mL
9	Vegetable Oil	1.00 T	14.79 mL
10	Carrot	2.20 oz	62.37 g
11	Leek	160.00 g	160.00 g
12	Celery	4.00 oz	113.40 g
13	Black Peppercorn	2.00 g	2.00 g
14	Fresh Thyme	0.10 oz	2.83 g
15	Bay Laurel	0.07 oz	1.98 g

Step 7 – *Enter the Conversion Factor into the cells of column D*:

To enter the conversion factor, right-click on the first cell of an ingredient row in column D, and then format the cell to Number and two decimal places. Afterwards, left-click on the OK button. In our example, we will format D8, Water, first. See Figures 16 and 17 for further clarification.

Figure 16.

Step 7_Formatting Cell D8

7	Ingredients	Old Quantity of Each Ingredient	Old Quantity of Each Ingredient in Metric	Con F
8	Water	12.00 c	2839.06 mL	
9	Vegetable Oil	1.00 T	14.79 mL	
10	Carrot	2.20 oz	62.37 g	
11	Leek	160.00 g	160.00 g	
12	Celery	4.00 oz	113.40 g	
13	Black Peppercorn	2.00 g	2.00 g	
14	Fresh Thyme	0.10 oz	2.83 g	
15	Bay Laurel	0.07 oz	1.98 g	

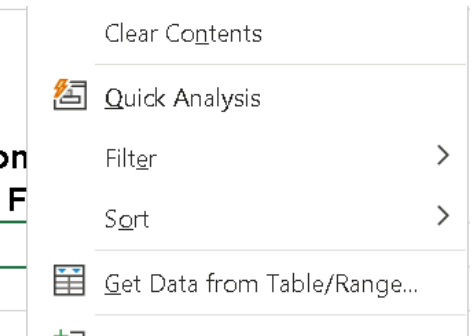
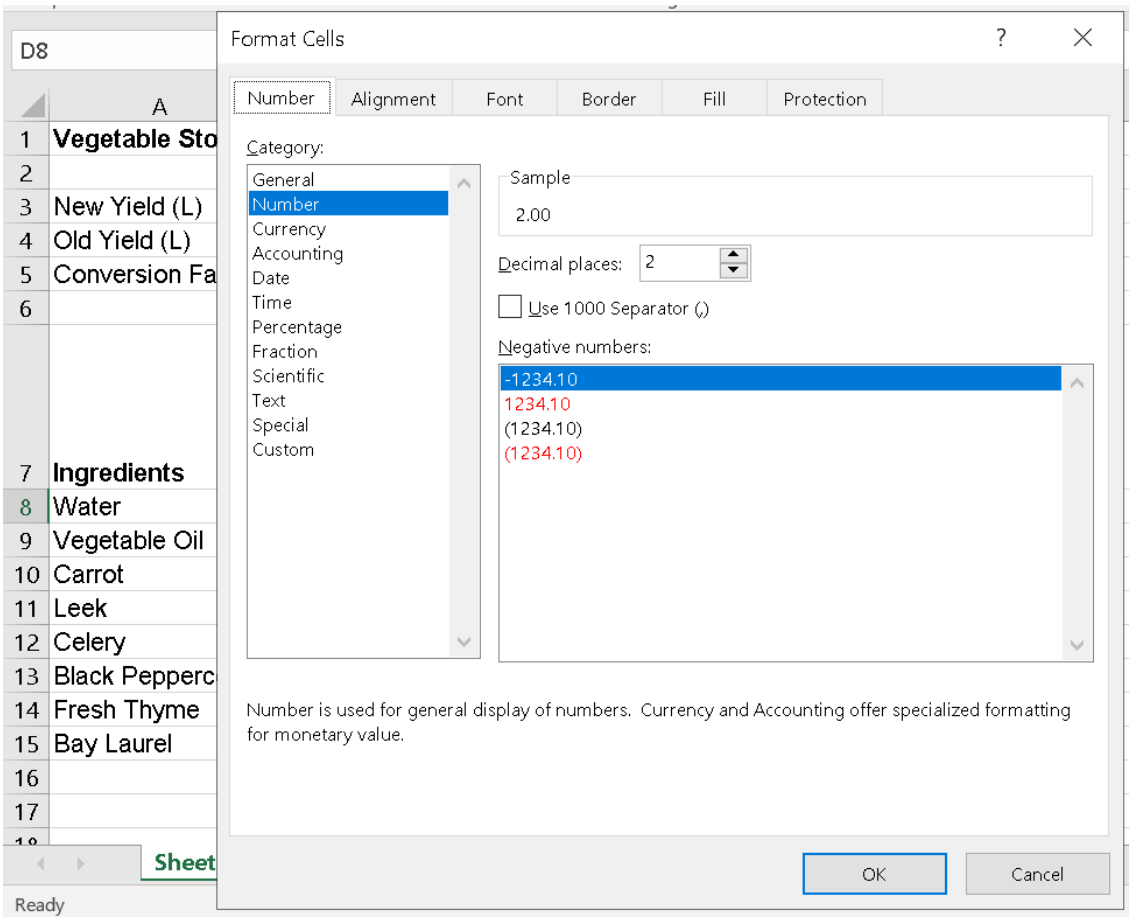


Figure 17.

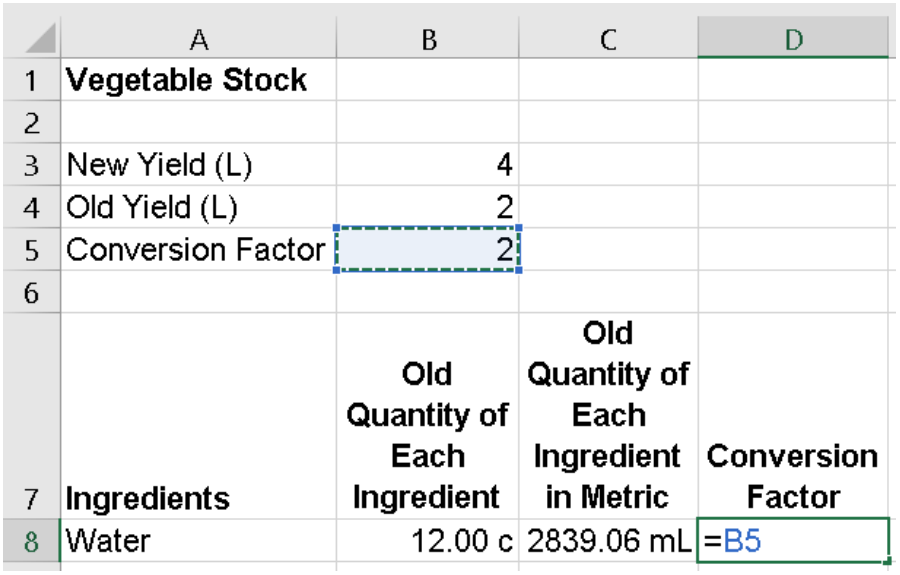
Step 7 Continued…Formatting Cell D8 to Number and Two Decimal Places



Next, left-click on the cell you just formatted, type an equal sign (=), left-click on the cell containing the conversion factor, create an absolute reference in that cell and press Enter on the keyboard. In the example, we left-click on cell D8, type the equal sign, and then left-click on cell B5 where the conversion factor is located (see Figure 18). To create an absolute reference type one dollar sign ($) before the B and one dollar sign between B and 5 (see Figure 19 on the next page). Press Enter on the keyboard (see Figure 20, also on the next page).

Figure 18.

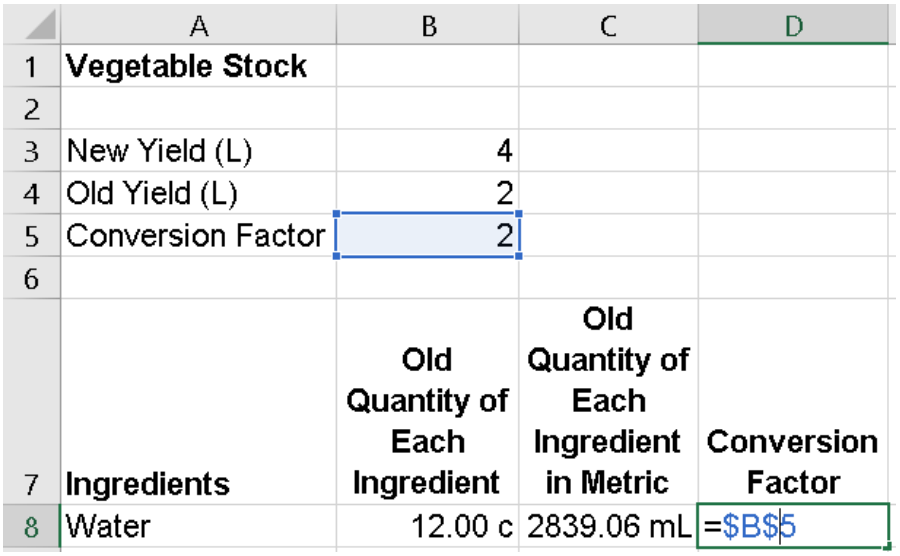
Step 7 Continued…Equating Cell D8 to Cell B5



	A	B	C	D
1	**Vegetable Stock**			
2				
3	New Yield (L)	4		
4	Old Yield (L)	2		
5	Conversion Factor	2		
6				
7	**Ingredients**	**Old Quantity of Each Ingredient**	**Old Quantity of Each Ingredient in Metric**	**Conversion Factor**
8	Water	12.00 c	2839.06 mL	=B5

Figure 19.

Step 7 Continued…Creating An Absolute Reference to Cell B5 in Cell D8



	A	B	C	D
1	**Vegetable Stock**			
2				
3	New Yield (L)	4		
4	Old Yield (L)	2		
5	Conversion Factor	2		
6				
7	**Ingredients**	**Old Quantity of Each Ingredient**	**Old Quantity of Each Ingredient in Metric**	**Conversion Factor**
8	Water	12.00 c	2839.06 mL	=$B$5

Figure 20.

Step 7 Continued…Conversion Factor Set to Two Decimal Places Displayed in Cell D8

Ingredients	Old Quantity of Each Ingredient	Old Quantity of Each Ingredient in Metric	Conversion Factor
Water	12.00 c	2839.06 mL	2.00

Next, left-click on the cell where the conversion factor was just entered, D8 in the example. Grab the fill handle by left-clicking and holding the bottom-right corner of the cell. Drag the handle down the column all the way to the last row with an ingredient in it (D15 in the example) and release (see Figure 21). This will populate the remainder of column D with the conversion factor along with the proper format (See Figure 22).

Figure 21.

Step 7 Continued…Fill Handle Dragged from Cell D8 to Cell D15

7	Ingredients	Old Quantity of Each Ingredient	Old Quantity of Each Ingredient in Metric	Conversion Factor
8	Water	12.00 c	2839.06 mL	2.00
9	Vegetable Oil	1.00 T	14.79 mL	
10	Carrot	2.20 oz	62.37 g	
11	Leek	160.00 g	160.00 g	
12	Celery	4.00 oz	113.40 g	
13	Black Peppercorn	2.00 g	2.00 g	
14	Fresh Thyme	0.10 oz	2.83 g	
15	Bay Laurel	0.07 oz	1.98 g	

Figure 22.

Step 7 Continued…Cells D8 to D15 Populated with the Conversion Factor

7	Ingredients	Old Quantity of Each Ingredient	Old Quantity of Each Ingredient in Metric	Conversion Factor
8	Water	12.00 c	2839.06 mL	2.00
9	Vegetable Oil	1.00 T	14.79 mL	2.00
10	Carrot	2.20 oz	62.37 g	2.00
11	Leek	160.00 g	160.00 g	2.00
12	Celery	4.00 oz	113.40 g	2.00
13	Black Peppercorn	2.00 g	2.00 g	2.00
14	Fresh Thyme	0.10 oz	2.83 g	2.00
15	Bay Laurel	0.07 oz	1.98 g	2.00

Step 8 – *Calculate the New Quantity of Each Ingredient:*

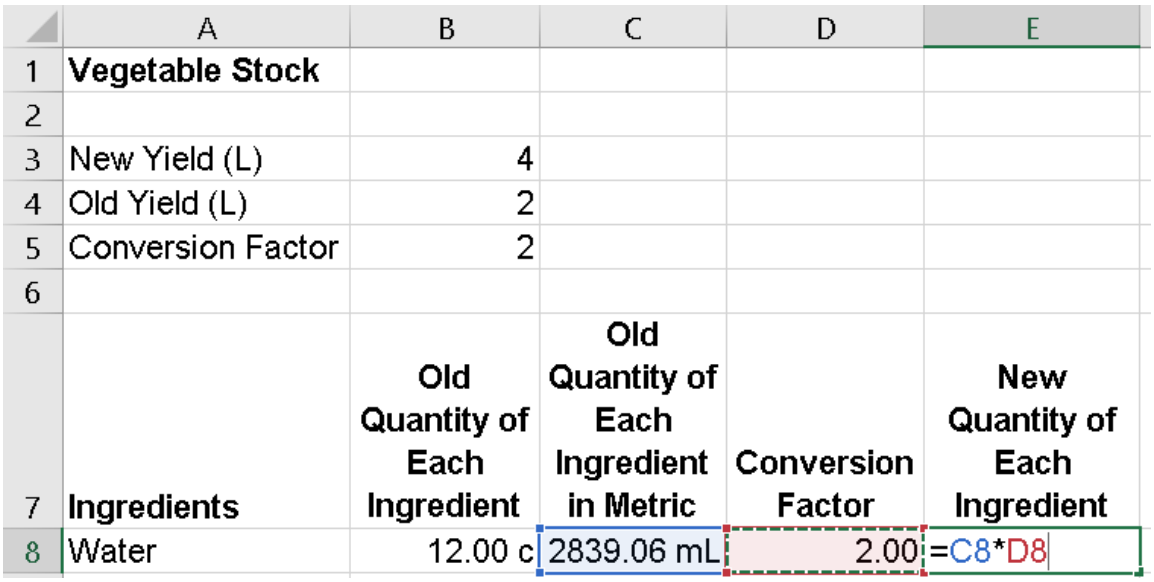
To calculate the new quantity of each ingredient, each metric ingredient quantity needs to be multiplied by the conversion factor (CF).

$$New\ Quantity\ of\ Each\ Ingredient = Old\ Quantity\ of\ Each\ Ingredient\ in\ Metric\ x\ CF$$

In Excel, we program this calculation once, and then we can use the fill handle to perform the calculation for the remaining ingredients. In our example, we'll enter the formula in cell E8 for Water. First, left-click on cell E8, type the equal sign (=), left-click on cell C8, type the multiplication sign (*), left-click on cell D8 (see Figure 23 on the next page), and press Enter on the keyboard (see Figure 24 also on the next page).

Figure 23.

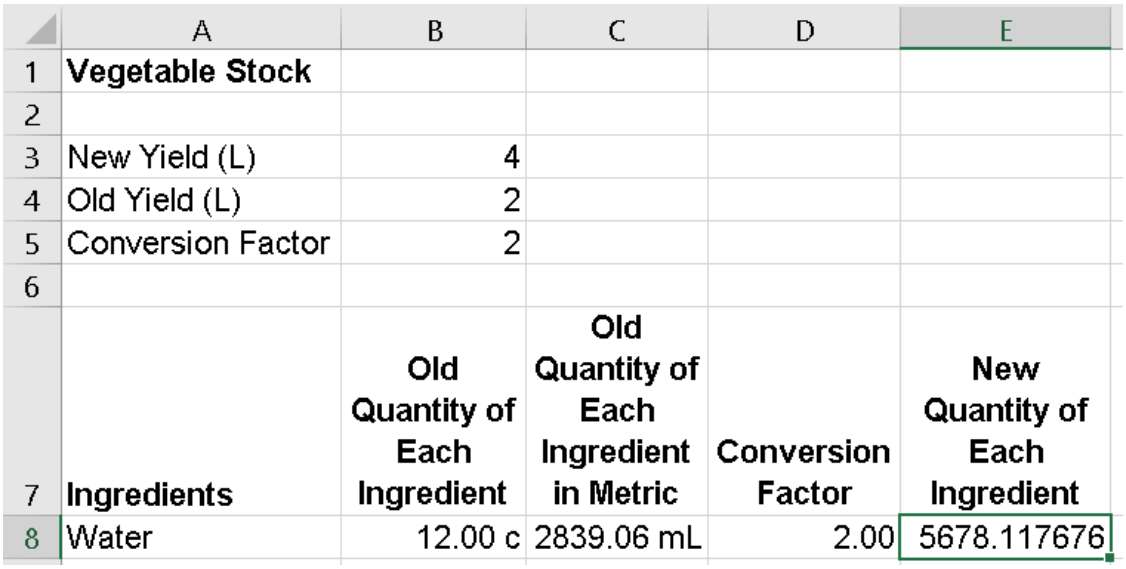
Step 8_Programming the Calculation for the New Quantity of Water in Cell E8



	A	B	C	D	E
1	**Vegetable Stock**				
2					
3	New Yield (L)	4			
4	Old Yield (L)	2			
5	Conversion Factor	2			
6					
7	**Ingredients**	**Old Quantity of Each Ingredient**	**Old Quantity of Each Ingredient in Metric**	**Conversion Factor**	**New Quantity of Each Ingredient**
8	Water	12.00 c	2839.06 mL	2.00	=C8*D8

Figure 24.

Step 8 Continued…New Quantity of Water without Units Displayed or Decimal Places Specified



	A	B	C	D	E
1	**Vegetable Stock**				
2					
3	New Yield (L)	4			
4	Old Yield (L)	2			
5	Conversion Factor	2			
6					
7	**Ingredients**	**Old Quantity of Each Ingredient**	**Old Quantity of Each Ingredient in Metric**	**Conversion Factor**	**New Quantity of Each Ingredient**
8	Water	12.00 c	2839.06 mL	2.00	5678.117676

Now we must grab the fill handle at cell E8 and drag the fill handle to the last cell with an ingredient in its row, cell E15 in the example (see Figure 25), and release. This action will calculate the new quantities of the remaining ingredients (see Figure 26).

Figure 25.

Step 8 Continued…Fill Handle Dragged from Cell E8 to Cell E15

7	Ingredients	Old Quantity of Each Ingredient	Old Quantity of Each Ingredient in Metric	Conversion Factor	New Quantity of Each Ingredient
8	Water	12.00 c	2839.06 mL	2.00	5678.117676
9	Vegetable Oil	1.00 T	14.79 mL	2.00	
10	Carrot	2.20 oz	62.37 g	2.00	
11	Leek	160.00 g	160.00 g	2.00	
12	Celery	4.00 oz	113.40 g	2.00	
13	Black Peppercorn	2.00 g	2.00 g	2.00	
14	Fresh Thyme	0.10 oz	2.83 g	2.00	
15	Bay Laurel	0.07 oz	1.98 g	2.00	

Figure 26.

Step 8 Continued…Cells E8 to E15 Populated with New Quantities

7	Ingredients	Old Quantity of Each Ingredient	Old Quantity of Each Ingredient in Metric	Conversion Factor	New Quantity of Each Ingredient
8	Water	12.00 c	2839.06 mL	2.00	5678.117676
9	Vegetable Oil	1.00 T	14.79 mL	2.00	29.57352956
10	Carrot	2.20 oz	62.37 g	2.00	124.7379018
11	Leek	160.00 g	160.00 g	2.00	320
12	Celery	4.00 oz	113.40 g	2.00	226.796185
13	Black Peppercorn	2.00 g	2.00 g	2.00	4
14	Fresh Thyme	0.10 oz	2.83 g	2.00	5.669904625
15	Bay Laurel	0.07 oz	1.98 g	2.00	3.968933238

However, we can see that the units are not present, and the decimal places are not standardized. Thus, we must format each cell, so it shows the required unit and number of decimal places (see Figure 27): for this activity, *round weights to two decimal places, items without units to one decimal place, and volumes to two decimal places and one decimal place for litre and millilitre, respectively.*

Figure 27.

Step 8 Continued…New Quantities Displayed with Units and Standardized Decimal Places

	A	B	C	D	E
1	**Vegetable Stock**				
2					
3	New Yield (L)	4			
4	Old Yield (L)	2			
5	Conversion Factor	2			
6					
7	**Ingredients**	**Old Quantity of Each Ingredient**	**Old Quantity of Each Ingredient in Metric**	**Conversion Factor**	**New Quantity of Each Ingredient**
8	Water	12.00 c	2839.06 mL	2.00	5678.1 mL
9	Vegetable Oil	1.00 T	14.79 mL	2.00	29.6 mL
10	Carrot	2.20 oz	62.37 g	2.00	124.74 g
11	Leek	160.00 g	160.00 g	2.00	320.00 g
12	Celery	4.00 oz	113.40 g	2.00	226.80 g
13	Black Peppercorn	2.00 g	2.00 g	2.00	4.00 g
14	Fresh Thyme	0.10 oz	2.83 g	2.00	5.67 g
15	Bay Laurel	0.07 oz	1.98 g	2.00	3.97 g

Excel can save us time once we have built our recipe spreadsheet. Now, if we want to scale our recipe differently, we simply change the quantity of new yield, and the spreadsheet will automatically recalculate the conversion factor and necessary ingredient quantities for the new yield. As an example, if we want a new yield of 1 L, we simply type 1 for the new yield quantity (see Figure 28).

Figure 28.

Changing New Yield to Recalculate New Ingredient Quantities

	A	B	C	D	E
1	**Vegetable Stock**				
2					
3	New Yield (L)	1			
4	Old Yield (L)	2			
5	Conversion Factor	0.5			
6					
7	**Ingredients**	**Old Quantity of Each Ingredient**	**Old Quantity of Each Ingredient in Metric**	**Conversion Factor**	**New Quantity of Each Ingredient**
8	Water	12.00 c	2839.06 mL	0.50	1419.5 mL
9	Vegetable Oil	1.00 T	14.79 mL	0.50	7.4 mL
10	Carrot	2.20 oz	62.37 g	0.50	31.18 g
11	Leek	160.00 g	160.00 g	0.50	80.00 g
12	Celery	4.00 oz	113.40 g	0.50	56.70 g
13	Black Peppercorn	2.00 g	2.00 g	0.50	1.00 g
14	Fresh Thyme	0.10 oz	2.83 g	0.50	1.42 g
15	Bay Laurel	0.07 oz	1.98 g	0.50	0.99 g

Problem Set 2a. Scaling by Converting Yield

I. For the recipe below, use Excel to scale it to the following yields:

a) 1 L

b) 3.5 L

Recipe – Crème Anglaise (Yield = 1.62 L)

Ingredients	Quantity of Each Ingredient
Whole Milk	800 mL
Heavy Cream	400 mL
Egg Yolk	6 fl oz
Sugar	216 g
Vanilla Bean	0.35 oz

II. For the recipe below, use Excel to scale it to the following yields:

a) 250 mL

b) 1000 mL

Recipe – Egg Salad (Yield = 530 mL)

Ingredients	Quantity of Each Ingredient
Large Eggs	8
Mayo	8 T
Shallot	0.5 oz
Celery	0.4 oz
White Pepper	0.05 oz
Salt	4 g

Solutions to Problem Set 2a. Scaling by Converting Yield

**Round conversion factors to two decimal places and new quantities of ingredients, such as weights to two decimal places, items without units to one decimal place, and volumes to two decimal places and one decimal place for litre and millilitre, respectively.*

I. Crème Anglaise

a) Convert Yield to 1 L

	A	B	C	D	E
1	**Crème Anglaise**				
2					
3	New Yield (L)	1			
4	Old Yield (L)	1.62			
5	Conversion Factor	0.62			
6					
7	**Ingredients**	**Old Quantity of Each Ingredient**	**Old Quantity of Each Ingredient in Metric**	**Conversion Factor**	**New Quantity of Each Ingredient**
8	Whole Milk	800.00 mL	800.00 mL	0.62	493.8 mL
9	Heavy Cream	400.00 mL	400.00 mL	0.62	246.9 mL
10	Egg Yolk	6.00 fl oz	177.44 mL	0.62	109.53 g
11	Sugar	216.00 g	216.00 g	0.62	133.33 g
12	Vanilla Bean	0.35 oz	9.92 g	0.62	6.12 g

b) Convert Yield to 3.5 L

	A	B	C	D	E
1	**Crème Anglaise**				
2					
3	New Yield (L)	3.5			
4	Old Yield (L)	1.62			
5	Conversion Factor	2.16			
6					
7	**Ingredients**	**Old Quantity of Each Ingredient**	**Old Quantity of Each Ingredient in Metric**	**Conversion Factor**	**New Quantity of Each Ingredient**
8	Whole Milk	800.00 mL	800.00 mL	2.16	1728.4 mL
9	Heavy Cream	400.00 mL	400.00 mL	2.16	864.2 mL
10	Egg Yolk	6.00 fl oz	177.44 mL	2.16	383.36 g
11	Sugar	216.00 g	216.00 g	2.16	466.67 g
12	Vanilla Bean	0.35 oz	9.92 g	2.16	21.44 g

II. Egg Salad

a) Convert Yield to 250 mL

	A	B	C	D	E
1	**Egg Salad**				
2					
3	New Yield (mL)	250			
4	Old Yield (mL)	530			
5	Conversion Factor	0.47			
6					
7	**Ingredients**	**Old Quantity of Each Ingredient**	**Old Quantity of Each Ingredient in Metric**	**Conversion Factor**	**New Quantity of Each Ingredient**
8	Large Eggs	8	8	0.47	4
9	Mayo	8.00 T	118.29 mL	0.47	55.8 mL
10	Shallot	0.50 oz	14.17 g	0.47	6.69 g
11	Celery	0.40 oz	11.34 g	0.47	5.35 g
12	White Pepper	0.05 oz	1.42 g	0.47	0.67 g
13	Salt	4.00 g	4.00 g	0.47	1.89 g

b) Convert Yield to 1000 mL

	A	B	C	D	E
1	**Egg Salad**				
2					
3	New Yield (mL)	1000			
4	Old Yield (mL)	530			
5	Conversion Factor	1.89			
6					
7	**Ingredients**	**Old Quantity of Each Ingredient**	**Old Quantity of Each Ingredient in Metric**	**Conversion Factor**	**New Quantity of Each Ingredient**
8	Large Eggs	8	8	1.89	15
9	Mayo	8.00 T	118.29 mL	1.89	223.2 mL
10	Shallot	0.50 oz	14.17 g	1.89	26.74 g
11	Celery	0.40 oz	11.34 g	1.89	21.40 g
12	White Pepper	0.05 oz	1.42 g	1.89	2.67 g
13	Salt	4.00 g	4.00 g	1.89	7.55 g

2b. Scaling Recipes by Converting Portion Size in Excel

To scale recipes by converting portion size in Excel, we use the same formulas as we did in Chapter 1b:

$$Old\ Total\ Yield = \ Original\ Number\ of\ Portions\ x\ Original\ Portion\ Size$$

$$New\ Total\ Yield = Desired\ Number\ of\ Portions\ x\ Desired\ Portion\ Size$$

$$Conversion\ Factor = \frac{New\ Total\ Yield}{Old\ Total\ Yield}$$

These formulas will be inputted into the Excel spreadsheet, so it can calculate the *Old Total Yield*, *New Total Yield*, and *Conversion Factor* for us. Remember, it is necessary that both yields have the same units before dividing.

After we program Excel to calculate the conversion factor, we create our recipe table with the relevant column titles and ingredients and convert all non-metric units to metric. We can then program Excel to multiply the metric quantity of each item in the recipe by the conversion factor to determine the new quantities required to scale the recipe.

Example 2b: Scaling by Converting Portion Size

For the recipe below, scale the recipe using Excel to make **20 portions** with a **portion size** of **250 mL**.

Recipe – Creamy Hummus (Portions = 8, Portion Size = 120 mL)

Ingredients	Quantity of Each Ingredient
Dried Chickpeas	210 g
Tahini	165 g
Garlic	1 oz
Lemon Juice	5 fl oz
Olive Oil	6 fl oz
Salt	18 g

Step 1: Open Excel and create a new spreadsheet. Name and save the spreadsheet to the desktop, portable storage device, or Cloud.

Step 2: Create a title for your spreadsheet. The title should be the name of the recipe that you're scaling. Enter the recipe title in cell A1, and bold it if you like. Also, enter the variables Old # Portions, Old Portion Size, Old Total Yield, Desired # Portions, Desired Portion Size, New Total Yield, and Conversion Factor into cells A3, A4, A5, A7, A8, A9, A11, respectively. Enter the units of each portion size and yield in parentheses beside the variable titles. Resize column A by double clicking on the border between column A and B to ensure the title and variables all fit into column A. Enter the quantity of portions and portion sizes into cells B3, B4, B7, and B8. See Figure 29 on the next page.

Figure 29.

Step 2_ Recipe Title, Variable Titles, and Portion Quantities

	A	B
1	**Creamy Hummus**	
2		
3	Original # Portions	8
4	Orignal Portion Size (mL)	120
5	Old Total Yield (mL)	
6		
7	Desired # Portions	20
8	Desired Portion Size (mL)	250
9	New Total Yield (mL)	
10		
11	Conversion Factor	

Step 3 - *Calculate the Old Total Yield, New Total Yield, and Conversion Factor:* For the old total yield, left-click on cell B5, type an equal sign (=), left-click on cell B3, type the multiplication sign (*), left-click on cell B4, and then press Enter on the keyboard. See Figure 30 for clarification.

Figure 30.

Step 3_Calculating Old Total Yield

	A	B
1	**Creamy Hummus**	
2		
3	Original # Portions	8
4	Orignal Portion Size (mL)	120
5	Old Total Yield (mL)	=B3*B4

	A	B
1	**Creamy Hummus**	
2		
3	Original # Portions	8
4	Orignal Portion Size (mL)	120
5	Old Total Yield (mL)	960

For the new total yield, left-click on cell B9, type an equal sign (=), left-click on cell B7, type the multiplication sign (*), left-click on cell B8, and then press Enter on the keyboard (see Figure 31).

Figure 31.

Step 3 Continued…Calculating New Total Yield

7	Desired # Portions	20
8	Desired Portion Size (mL)	250
9	New Total Yield (mL)	=B7*B8

7	Desired # Portions	20
8	Desired Portion Size (mL)	250
9	New Total Yield (mL)	5000

For the conversion factor, right-click on Cell B11, left-click on Format Cells, left click on Number, ensure 2 decimal places are selected, and left click on the OK button. This will ensure that the conversion factor has no more than 2 decimal places. To enter the conversion factor formula into the spreadsheet, type an "=" sign into cell B11, click on cell B9, type "/" (this is the division sign) into the cell, and lastly, click on cell B5. This formula will calculate the conversion factor to scale the recipe (see Figure 32). If desired, it's now optional to change the yields so the conversion factor can automatically change, accordingly.

Figure 32.

Step 3 Continued…Calculating the Conversion Factor

	A	B
1	**Creamy Hummus**	
2		
3	Original # Portions	8
4	Orignal Portion Size (mL)	120
5	Old Total Yield (mL)	960
6		
7	Desired # Portions	20
8	Desired Portion Size (mL)	250
9	New Total Yield (mL)	5000
10		
11	Conversion Factor	=B9/B5

11	Conversion Factor	5.21

Step 4 – *Create the Recipe Table:* Enter the column headings between cells A13 to E13. In Excel, the Metric Conversion Factor does not need a column heading because Excel operates with its own conversion factors for units of measurement. Ensure the column headings are wrapped, centered, and bolded, and then resize the columns to ensure the column headings fit nicely in their respective cells. Enter the ingredients for your recipe into column A, beginning with cell A14 (see Figure 33).

Figure 33.

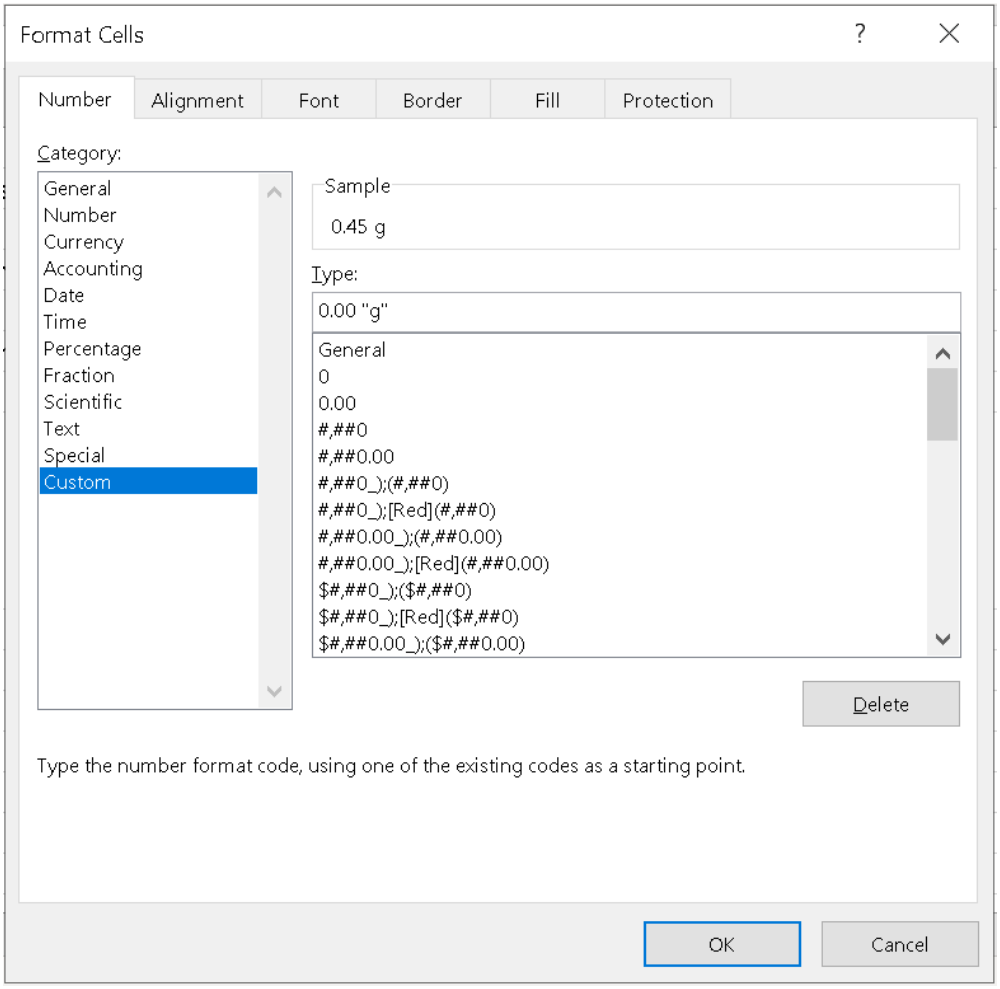
Step 4_Column Heading and Ingredients Entered into the Spreadsheet

	A	B	C	D	E
1	**Creamy Hummus**				
2					
3	Original # Portions	8			
4	Orignal Portion Size (mL)	120			
5	Old Total Yield (mL)	960			
6					
7	Desired # Portions	20			
8	Desired Portion Size (mL)	250			
9	New Total Yield (mL)	5000			
10					
11	Conversion Factor	5.21			
12					
13	**Ingredients**	**Old Quantity of Each Ingredient**	**Old Quantity of Each Ingredient in Metric**	**Conversion Factor**	**New Quantity of Each Ingredient**
14	Dried Chickpeas				
15	Tahini				
16	Garlic				
17	Lemon Juice				
18	Olive Oil				
19	Salt				

Step 5 – *Input the Quantity of Each Ingredient with Unit of Measurement, including the Desired Number of Decimal Places*: To do this, format the cell for each ingredient quantity, so the unit and two decimal places for each quantity appear in the cell. For the ingredient Dried Chickpeas, right-click on cell B14, left-click on Format Cells. In the Format Cells menu, left-click on Custom. Left-click on the option 0.00 (for 2 decimal places) or type it into the cell under Type:, and then type the unit of the ingredient in quotations, in this case “g” for grams (see Figure 34). For Dried Chickpeas, the correct format is 0.00 “g”. Left-click the OK button.

Figure 34.

Step 5_Formatting the Units and Decimal Places for Dried Chickpeas



Now you can type the quantity of ingredient into cell B14, and the quantity at two decimal places and unit will appear in the cell after you press Enter on the keyboard. You'll need to repeat this process for all the ingredients and their respective units (see Figure 35). The unit, along with the desired number of decimal places, will be saved in the Custom Menu once it's created. If you've formatted that unit, you can now choose the desired unit from the bottom of the menu.

Figure 35.

Step 5 Continued…Old Quantity of Each Ingredient Displays Unit and Two Decimal Places

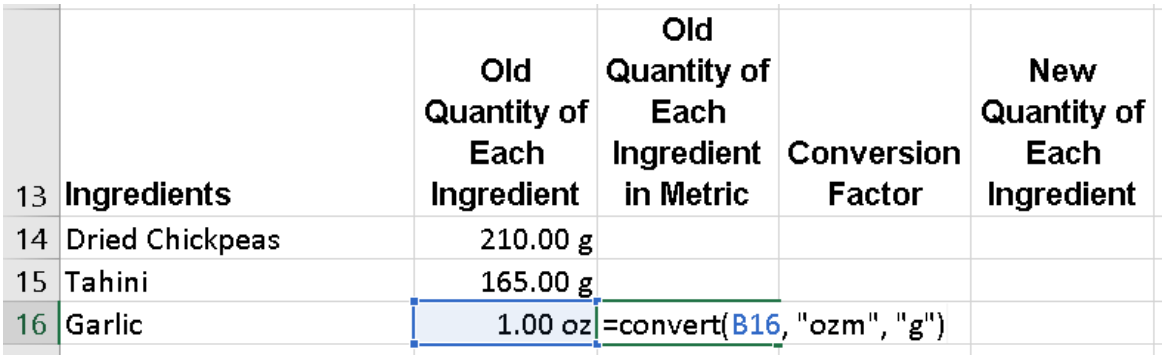
13	Ingredients	Old Quantity of Each Ingredient
14	Dried Chickpeas	210.00 g
15	Tahini	165.00 g
16	Garlic	1.00 oz
17	Lemon Juice	5.00 fl oz
18	Olive Oil	6.00 fl oz
19	Salt	18.00 g

Step 6a – *Converting Non-Metric Units to Metric:* Excel has a convert function that enables users to easily convert within and between measurement systems. For example, to convert 1 ounce of garlic to grams, left-click on cell C16, then type the equal (=) sign followed by the word, convert(. We now follow the pattern that pops-up under the cell: *CONVERT(**number**, from_unit, to_unit)*. Left-click on cell B16 and then type a comma. After pressing the spacebar, in quotation marks type in the unit we're converting from, in this case mass ounces ("ozm"), type a comma. After pressing the spacebar, in quotation marks type in the unit we're converting to, in this case grams ("g"), and then close the parentheses (see Figure 36 on the next page).

Alternatively, you can choose units as they appear in the drop-down menu. Refer to Appendix B to find other abbreviations for Excel's convert function.

Figure 36.

Step 6a_Converting Quantity of Garlic from Non-Metric to Metric



Now, **press Enter** on the keyboard. You'll notice that the new metric quantity appears, but the units don't appear (see Figure 37).

Figure 37.

Step 6a Continued…Metric Quantity of Garlic Show without Unit and Decimal Places not Specified

This is because we must format the cells in column C, so the units appear, and the quantity is rounded to two decimal places. To formal the cells, follow a similar process as Step 5 (process used above). Using the instructions in Step 6a, convert the remaining non-metric ingredient quantities to metric. Follow the same process as Step 5 to ensure the units appear and the quantity is reported to two decimal places.

Step 6b: All units that were already in metric can now be entered into the cells in column C (see Figure 38). In our example, Dried Chickpeas, Tahini, and Salt are already in the metric unit of grams. For example, to enter the quantity of Dried Chickpeas and the unit in cell C14, left-click on the cell, type in an equal sign (=), left-click cell B14, and then press Enter on the keyboard.

Figure 38.

Step 6b_All Ingredient Quantities Displayed with Metric Unit at Two Decimal Places

13	**Ingredients**	**Old Quantity of Each Ingredient**	**Old Quantity of Each Ingredient in Metric**
14	Dried Chickpeas	210.00 g	210.00 g
15	Tahini	165.00 g	165.00 g
16	Garlic	1.00 oz	28.35 g
17	Lemon Juice	5.00 fl oz	147.87 mL
18	Olive Oil	6.00 fl oz	177.44 mL
19	Salt	18.00 g	18.00 g

Step 7 – *Enter the Conversion Factor into the cells of column D*: To do this, right-click on the first cell of an ingredient row in column D and format the cell to Number and two decimal places and left-click on the OK button. In the example shown, we format D14, Dried Chickpeas, first.

Next**,** left-click on the cell you just formatted, type an equal sign (=), left-click on the cell containing the conversion factor, create an absolute reference in that cell and press Enter on the keyboard. In our example, left-click on cell D14, type the equal sign and then left-click on cell B11 where the conversion factor is located. To create an absolute reference, type a dollar sign ($) before the B and between B and 11 (see Figure 39). Press Enter on the keyboard (see Figure 40 on the next page).

Figure 39.

Step 7_Equating Cell D14 to B11 and Creating an Absolute Reference

	A	B	C	D
4	Orignal Portion Size (mL)	120		
5	Old Total Yield (mL)	960		
6				
7	Desired # Portions	20		
8	Desired Portion Size (mL)	250		
9	New Total Yield (mL)	5000		
10				
11	Conversion Factor	5.21		
12				
13	**Ingredients**	**Old Quantity of Each Ingredient**	**Old Quantity of Each Ingredient in Metric**	**Conversion Factor**
14	Dried Chickpeas	210.00 g	210.00 g	=$B$11

Figure 40.

Step 7 continued…Conversion Factor Displayed in Cell D14

13	Ingredients	Old Quantity of Each Ingredient	Old Quantity of Each Ingredient in Metric	Conversion Factor
14	Dried Chickpeas	210.00 g	210.00 g	5.21

Next, left-click on the cell where the conversion factor was just entered, D14 in the example. Grab the fill handle by left-clicking and holding the clicker down on the bottom-right corner of the cell, drag the handle down the column all the way to the last row with an ingredient in it and release. We'll drag to and release at cell D19 in this example (see Figure 41). This will populate the remainder of column D with the conversion factor along with the proper format.

Figure 41.

Step 7 Continued… Populating Cell D15-D19 with Conversion Factor Using Fill Handle

13	Ingredients	Old Quantity of Each Ingredient	Old Quantity of Each Ingredient in Metric	Conversion Factor
14	Dried Chickpeas	210.00 g	210.00 g	5.21
15	Tahini	165.00 g	165.00 g	5.21
16	Garlic	1.00 oz	28.35 g	5.21
17	Lemon Juice	5.00 fl oz	147.87 mL	5.21
18	Olive Oil	6.00 fl oz	177.44 mL	5.21
19	Salt	18.00 g	18.00 g	5.21

Step 8 – *Calculate the New Quantity of Each Ingredient:* To calculate the new quantity of each ingredient, each ingredient needs to be multiplied by the conversion factor (CF).

$$New\ Quantity\ of\ Each\ Ingredient = Old\ Quantity\ of\ Each\ Ingredient\ in\ Metric\ x\ CF$$

In Excel, we program this calculation once and then use the fill handle to perform the calculation for the remaining ingredients. In our example, we'll enter the formula in cell E14 for Dried Chickpeas. First, left-click on cell E14, type the equal sign (=), left-click on cell C14, type the multiplication sign (*), left-click on cell D14 (see Figure 42) and press Enter on the keyboard (see Figure 43).

Figure 42.

Step 8_Calculating the New Ingredient Quantity for Dried Chickpeas

13	Ingredients	Old Quantity of Each Ingredient	Old Quantity of Each Ingredient in Metric	Conversion Factor	New Quantity of Each Ingredient
14	Dried Chickpeas	210.00 g	210.00 g	5.21	=C14*D14

Figure 43.

Step 8 Continued…New Ingredient Quantity for Dried Chickpeas

13	Ingredients	Old Quantity of Each Ingredient	Old Quantity of Each Ingredient in Metric	Conversion Factor	New Quantity of Each Ingredient
14	Dried Chickpeas	210.00 g	210.00 g	5.21	1093.75
15	Tahini	165.00 g	165.00 g	5.21	

Now grab the fill handle at the bottom right corner of cell E14 and drag the fill handle to the last cell with an ingredient in its row, cell E19 in the example, and release. This action will calculate the new quantities of the remaining ingredients. Upon observation, you can see that the units are not present, and the decimal places are not standardized. Thus, you must format each cell, so it shows the required unit and number of decimal places (see Figure 44): for this activity, *round weights to two decimal places, items without units to one decimal place, and volumes to two decimal places and one decimal place for litre and millilitre, respectively.*

Figure 44.

Step 8 Continued…New Ingredient Quantities with Units and Decimal Places

	A	B	C	D	E
1	**Creamy Hummus**				
2					
3	Original # Portions	8			
4	Orignal Portion Size (mL)	120			
5	Old Total Yield (mL)	960			
6					
7	Desired # Portions	20			
8	Desired Portion Size (mL)	250			
9	New Total Yield (mL)	5000			
10					
11	Conversion Factor	5.21			
12					
13	**Ingredients**	**Old Quantity of Each Ingredient**	**Old Quantity of Each Ingredient in Metric**	**Conversion Factor**	**New Quantity of Each Ingredient**
14	Dried Chickpeas	210.00 g	210.00 g	5.21	1093.75 g
15	Tahini	165.00 g	165.00 g	5.21	859.38 g
16	Garlic	1.00 oz	28.35 g	5.21	147.65 g
17	Lemon Juice	5.00 fl oz	147.87 mL	5.21	770.14 mL
18	Olive Oil	6.00 fl oz	177.44 mL	5.21	924.17 mL
19	Salt	18.00 g	18.00 g	5.21	93.75 g

Problem Set 2b. Scaling by Converting Portion Size

I. **For the recipe below, scale it to the following portions and portion sizes using Excel**:

a) 15 x 50 g

b) 10 x 150 g

Recipe – Gravlax (Portions = 8, Portion Size = 100 g)

Ingredients	Quantity of Each Ingredient
Side Salmon	2 lb
Coarse Salt	41 g
Sugar	38 g
Black Peppercorns	0.30 oz
Fresh Dill Weed	50 g
Beet Juice	0.25 c

II. For the recipe below, scale it to the following portions and portion sizes using Excel:

a) 10 x 100 mL

b) 10 x 240 mL

Recipe – Potato and Celeriac Purée (Portions = 8, Portion Size = 150 mL)

Ingredients	Quantity of Each Ingredient
Russet Potatoes	1 lb
Celeriac	250 g
Unsalted Butter	3 oz
Heavy Cream	2 fl oz
Salt	21 g

Solutions to Problem Set 2b. Scaling by Converting Portion Size

**Round conversion factors to two decimal places and new quantities of ingredients, such as weights to two decimal places, items without units to one decimal place, and volumes to two decimal places and one decimal place for litre and millilitre, respectively.*

I. Gravlax

a) Convert portions and portion size to 15 x 50 g

	A	B	C	D	E
1	**Gravlax**				
2					
3	Original # Portions	8			
4	Orignal Portion Size (g)	100			
5	Old Total Yield (g)	800			
6					
7	Desired # Portions	15			
8	Desired Portion Size (g)	50			
9	New Total Yield (g)	750			
10					
11	Conversion Factor	0.94			
12					
13	**Ingredients**	**Old Quantity of Each Ingredient**	**Old Quantity of Each Ingredient in Metric**	**Conversion Factor**	**New Quantity of Each Ingredient**
14	Side Salmon	2.00 lb	0.91 kg	0.94	0.85 kg
15	Coarse Salt	41.00 g	41.00 g	0.94	38.44 g
16	Sugar	38.00 g	38.00 g	0.94	35.63 g
17	Black Peppercorns	0.30 oz	8.50 g	0.94	7.97 g
18	Fresh Dill Weed	50.00 g	50.00 g	0.94	46.88 g
19	Beet Juice	0.25 c	59.15 mL	0.94	55.45 mL

b) Convert portions and portion size to 10 x 150 g

	A	B	C	D	E
1	**Gravlax**				
2					
3	Original # Portions	8			
4	Orignal Portion Size (g)	100			
5	Old Total Yield (g)	800			
6					
7	Desired # Portions	10			
8	Desired Portion Size (g)	150			
9	New Total Yield (g)	1500			
10					
11	Conversion Factor	1.88			
12					
13	**Ingredients**	**Old Quantity of Each Ingredient**	**Old Quantity of Each Ingredient in Metric**	**Conversion Factor**	**New Quantity of Each Ingredient**
14	Side Salmon	2.00 lb	0.91 kg	1.88	1.70 kg
15	Coarse Salt	41.00 g	41.00 g	1.88	76.88 g
16	Sugar	38.00 g	38.00 g	1.88	71.25 g
17	Black Peppercorns	0.30 oz	8.50 g	1.88	15.95 g
18	Fresh Dill Weed	50.00 g	50.00 g	1.88	93.75 g
19	Beet Juice	0.25 c	59.15 mL	1.88	110.90 mL

II. Potato and Celeriac Purée

a) Convert portions and portion size to 10 x 100 mL

	A	B	C	D	E
1	**Potato and Celeriac Purée**				
2					
3	Original # Portions	8			
4	Orignal Portion Size (mL)	150			
5	Old Total Yield (mL)	1200			
6					
7	Desired # Portions	10			
8	Desired Portion Size (mL)	100			
9	New Total Yield (mL)	1000			
10					
11	Conversion Factor	0.83			
12					
13	**Ingredients**	**Old Quantity of Each Ingredient**	**Old Quantity of Each Ingredient in Metric**	**Conversion Factor**	**New Quantity of Each Ingredient**
14	Russet Potatoes	1.00 lb	0.45 kg	0.83	0.38 kg
15	Celeriac	250.00 g	250.00 g	0.83	208.33 g
16	Unsalted Butter	3.00 oz	85.05 g	0.83	70.87 g
17	Heavy Cream	2.00 fl oz	59.15 mL	0.83	49.29 mL
18	Salt	21.00 g	21.00 g	0.83	17.50 g

b) Convert portions and portion size to 10 x 240 mL

	A	B	C	D	E
1	**Potato and Celeriac Purée**				
2					
3	Original # Portions	8			
4	Orignal Portion Size (mL)	150			
5	Old Total Yield (mL)	1200			
6					
7	Desired # Portions	10			
8	Desired Portion Size (mL)	240			
9	New Total Yield (mL)	2400			
10					
11	Conversion Factor	2.00			
12					
13	**Ingredients**	**Old Quantity of Each Ingredient**	**Old Quantity of Each Ingredient in Metric**	**Conversion Factor**	**New Quantity of Each Ingredient**
14	Russet Potatoes	1.00 lb	0.45 kg	2.00	0.91 kg
15	Celeriac	250.00 g	250.00 g	2.00	500.00 g
16	Unsalted Butter	3.00 oz	85.05 g	2.00	170.10 g
17	Heavy Cream	2.00 fl oz	59.15 mL	2.00	118.29 mL
18	Salt	21.00 g	21.00 g	2.00	42.00 g

2c. Communication Activity

You've been hired as kitchen staff for a special function taking place this weekend. One of the desserts being prepared for the function requires 3.5 L of crème anglaise. Your chef has asked you to scale the house crème anglaise recipe to a yield of 3.5 L and to then send it to him/her/them via email.

Compose an email to your instructor as though he/she/they were the Chef in this scenario, include your scaled recipe for crème anglaise (problem set 2a) yielded to 3.5L.

Refer to the checklist below to ensure you have completed all requirements for the activity.

Checklist:

I have…	**Yes**	**No**
addressed the email to my educator	☐	☐
included an appropriate subject in the subject line	☐	☐
written an opening salutation	☐	☐
written a 2-3 sentence description of what is being sent and why	☐	☐
written a closing salutation	☐	☐
named the Excel file appropriately	☐	☐
attached the scaled recipe as an Excel file	☐	☐
sent the email to my educator	☐	☐
used proper spelling	☐	☐
used proper punctuation	☐	☐
used proper sentence structure	☐	☐

Email Scoring Instructions.

Learner Name: _____ Date: _____

Evaluation Criteria	Yes	Partly	No
Addresses the email to their educator	☐	☐	☐
Includes an appropriate subject in the subject line	☐	☐	☐
Writes an opening salutation	☐	☐	☐
Writes a 2-3 sentence description of what is being sent and why	☐	☐	☐
Writes a closing salutation	☐	☐	☐
Names the Excel file appropriately	☐	☐	☐
Attaches the scaled recipe as an Excel file	☐	☐	☐
Sends the email, successfully	☐	☐	☐
Uses proper spelling	☐	☐	☐
Uses proper punctuation	☐	☐	☐
Uses proper sentence structure	☐	☐	☐
	(1 mark)	**(1/2 mark)**	

Outcome:

Each checkmark in the “Yes” column receives one mark. Each checkmark in the “Partly” column receives a half mark.

Success = at least 7 /11

Total: /11	Successful: Y N

Chapter 3 – Yield Factors

In the previous chapters, we defined yield as the quantity of product produced when following a recipe. In the kitchen, yield is associated with another meaning. A **yield factor** is defined as the "ratio of usable quantity to purchased quantity" (Labensky et al., 2006, p. 68) of a food item.

When food items are received from food distributors or purveyors, these items are in **as purchased** condition until they are processed. Processing food, such as produce or meat, often results in two parts: an **edible (usable) portion** and **trim (often unusable)**. For example, if the as purchased condition of an onion is unprocessed, the onion must be peeled before it can be used for a recipe. The onion remaining after peeling is the edible portion because it can now be used to make edible food products. The onion skin is considered trim or trim loss, and it is often a waste product because it cannot be used in any edible food product.

However, there are instances where trim is not wasted or discarded because it can be used to produce other edible products. For instance, a whole whitefish (such as halibut or cod) is normally delivered drawn (gutted), and the as purchased condition of the fish includes the flesh, head, bones, and skin. Some cooks may consider the head, bones, and skin to be non-useable trim, but they are not waste items. Both the head and bones can be used to make delicious fish stock, and the skin is edible and delicious. Therefore, the ratio of edible product to trim varies depending on the particular food item being processed, and not all trim is considered unusable or waste.

Generally, to calculate the yield factor, the edible portion quantity is divided by the purchased quantity. More specifically, when calculating the yield factor by weight, a scale can be used to determine the edible portion weight and if necessary, the as purchased weight. The edible portion weight can also be found by weighing the unusable trim (also known as trim loss) and subtracting its weight from the as

purchased weight. In either method, the edible portion weight is then divided by the purchased weight to calculate the yield factor.

The method used to measure the edible portion weight will depend on the quantity of the item to be weighed. It may be more practical and convenient to weigh the unusable trim, rather than the edible portion, if the edible portion is awkward or timely to weigh.

$$Yield\ Factor\ = \frac{Edible\ Portion\ Weight}{As\ Purchased\ Weight}$$

or

$$Yield\ Factor = \frac{As\ Purchased\ Weight - Trim\ Loss}{As\ Purchased\ Weight}$$

Food items without trim loss have a yield factor of 1, but food items with trim loss will always have a yield factor of less than one. For example, salt has a yield factor of 1 because it does not require processing, but onions can have a yield factor of 0.90 (Labensky et al., 2006) because they need to be peeled before they can be used. This means that 100% of the salt (the yield percent) is available to use, but 10% of the onion is waste or trim loss while 90% of the onion (the yield percent) is usable.

It is important to know the yield factors of food items. Since the quantity of waste affects the quantity of edible portion available for food production, the cost of the edible portion is impacted. In other words, a food item becomes more expensive as trim loss increases. As the yield factor decreases, the cost of the edible portion increases.

Therefore, yield factors of an edible portion that are below 1 are more expensive than the as purchased cost of the unprocessed food item. In the next module, the effects of yield factors on edible portion cost will be covered in more detail. For the last activity of this module, you will conduct a yield test.

Yield Test Activity

Some kitchens may choose to conduct in-house yield tests because they want to be more precise in their recipe costing. Yield factors are not constants because they can vary from year to year, month to month, week to week, and even day to day. For example, older onions will have a thicker skin than newer onions due to moisture loss, which means the older onions will have a higher percentage of trim loss.

As another example, the skill of the kitchen staff can influence yield factors. As a rule, highly skilled prep cooks produce less waste than unskilled cooks when processing food items. To calculate a realistic yield factor that accounts for these variations, many yield tests are conducted for a food item, and then the yield factors from each yield test are averaged. However, many smaller food service establishments do not have the capacity to conduct their own yield tests, so they will use yield factors found online or in cooking textbooks.

Follow the steps below to conduct your own yield test:

1. Purchase a citrus fruit from a grocery store or market to conduct a simple yield test on the fruit. A citrus fruit, such as an orange, tangerine or grapefruit, is recommended for this activity because a knife is not required to peel it. If you have an allergy or aversion to citrus, a banana is another easy to peel option.

2. After you purchase the fruit, borrow a kitchen scale from your instructor, and then weigh the unpeeled fruit to find the as purchased weight. Next, peel the fruit. Weigh the peeled fruit to determine the edible portion weight, and then weigh the peels to determine the trim loss weight. If you don't like to eat seeds, you'll need to remove the seeds and add them to the peels before weighing the trim loss.

3. Use the weights to calculate the yield factor for the fruit you purchased and document the weights on the Yield Test Worksheet on the following page. Then, answer the follow-up questions.

Yield Test Work Sheet

1. Type of Fruit: _____
2. As Purchased Weight in grams (Unpeeled): _____
3. Edible Portion Weight in grams (Peeled): _____
4. Trim Loss Weight in grams (Peels and Seeds): _____
5. Calculate the Yield Factor:

$$Yield\ Factor\ = \frac{Edible\ Portion\ Weight}{As\ Purchased\ Weight}$$

$$Yield\ Factor\ = \frac{\square}{\square}$$

$$Yield\ Factor\ = \square$$

6. Conduct a web search to find a yield factor for the type of fruit that you conducted the yield test with. If you can only find the yield percent, you'll need to divide the yield percent by 100 to find the yield factor.

Questions:

a. What yield factor did you find online?

b. Does the online yield factor differ from the yield factor you found in your yield test?

c. If the yield factors differ, what reasons can you think of for this difference?

Yield Test Scoring Instructions.

Learner Name: _____ Date: _____

Evaluation Criteria	**Yes**	**Partly**	**No**
Brings a suitable fruit to conduct a yield test	☐	☐	☐
Weighs the fruit before peeling and provides the weight in grams	☐	☐	☐
Peels the fruit	☐	☐	☐
Weighs the peeled fruit and provides the weight in grams	☐	☐	☐
Weighs the peels and provides the weight in grams	☐	☐	☐
Calculates the yield factor	☐	☐	☐
Finds an appropriately related yield factor or yield percent online	☐	☐	☐
Answers the remaining questions to the satisfaction of the professor/instructor/teacher	☐	☐	☐
	(1 mark)	**(1/2 mark)**	

Outcome:

Each checkmark in the “Yes” column receives one mark. Each checkmark in the “Partly” column receives a half mark.

Success = at least 6/8

Total: /8	Successful: Y N

Summary

This module is the second in a five-part series meant to provide those interested in cooking and/or restaurant operations with basic theoretical knowledge pertaining to kitchen math and science.

In this module, you first learned how to scale recipes by yield and by portion size with a calculator and then with Excel. Next, you learned about yield factors and yield tests.

In the next module, you will learn basic recipe costing using a calculator and Excel. As well, you will be introduced to food cost percentage pricing.

References

Labensky, S.R., Hause, A.M., Malley, F.L., Bevan, A., & Sicoli, S. (2006). *On cooking: A textbook of culinary fundamentals* (3rd Canadian ed.). Pearson.

Appendix A

Quick Reference Sheet

General Conversion Formula

Unit Converting From x $\frac{Unit\ Converting\ To}{Unit\ Converting\ From}$ = Unit Converting To

Weight Conversion Factors

U.S.		Metric
2.2 lb	=	1 kg
1 oz	=	28.4 g

Volume Conversion Factors

U.S.		Metric
1 t	=	5 mL
1 T	=	15 mL
1 fl oz	=	30 mL
1 c	=	240 mL

Recipe Scaling

Converting by Yield

$$Conversion\ Factor = \frac{New\ Yield}{Old\ Yield}$$

Converting by Portion Size

$$Old\ Total\ Yield = Original\ Number\ of\ Portions\ x\ Original\ Portion\ Size$$

$$New\ Total\ Yield = Desired\ Number\ of\ Portions\ x\ Desired\ Portion\ Size$$

$$Conversion\ Factor = \frac{New\ Total\ Yield}{Old\ Total\ Yield}$$

Calculating New Ingredient Quantities

$$New\ Quantity\ of\ Each\ Ingredient = Old\ Quantity\ of\ Each\ Ingredient\ in\ Metric\ x\ CF$$

Calculating Yield Factors and Yield Percent

$$Yield\ Factor\ = \frac{Edible\ Portion\ Weight}{As\ Purchased\ Weight}$$

$$Edible\ Portion\ Weight = As\ Purchased\ Weight - Trim\ Loss$$

$$Yield\ Percent = Yield\ Factor\ x\ 100\ \%$$

Appendix B

Excel Measurement Conversion Abbreviations

Measurement Unit	Excel Abbreviation
Gram	g
Kilogram	kg
Ounce	ozm
Pound	lbm
Millilitre	ml
Litre	l
Gallon	gal
Quart	qt
Pint	pt
Cup	cup
Fluid Ounce	oz
Tablespoon	tbs
Teaspoon	tsp