# Math-in-CTE Lesson Plan Template

**Lesson Title:** Edible Portion v. As purchased  

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**Occupational Area:** Advanced Culinary Arts

**CTE Concept(s):**  
- **HTPA04.01** Manage and use basic reading, writing, and mathematical skills for food production and guest services to provide a positive guest experience.

**CTE Standard:**  
- HTPA04.01.01.00 Apply mathematical, reading, and writing skills to correctly deliver food products and guest service.  
- HTPA04.01.01.02 Use proper measurements of ingredients.

**Math Concepts:**  
Percentages and transferring the information from usage to pricing

**Common Core SS Math Standard:**

**Lesson Objective:** Have the students develop the ability to evaluate the edible portion product and calculate the cost per serving using AP/EP

**Materials:**  
AP/EP/Yield PowerPoint, product for tactile, hands on experimentation with AP, EP and Yield.

## THE "7 ELEMENTS"

1. **Introduce the CTE lesson.**
   Show the peelings of skins of carrots/ the dark outside leaves of a head of lettuce, the inside of peppers, or any other unusable parts of the produce.
   Show these to the class and ask what should we do with them?
   Are there any ways I could use the waste?

## TEACHER NOTES  
(and answer key)
A/P means –“as purchased”
This means the untrimmed amount or “whole”
E/P mean – the “edible portion”
This means the part I can actually use
Begin with an introduction to AP/EP/Yield by going through the power point first.

| 2. Assess students’ math awareness as it relates to the CTE lesson. |  |
| What happens if my recipe calls for a lb of produce and after I throw away the unusable parts I am left with only ¾ of a pound? |  |
| How much of the produce in the above problem did I lose? |  |
| What Percentage of the product did I lose? |  |
| How much would I need to buy if I doubled the recipe? |  |

| 3. Work through the math example embedded in the CTE lesson. |  |
| Students will work through the examples of the PowerPoint together with instructor. |  |


| 5. Work through traditional math examples. |  |
| Stress the formulas of AP, EP and Yield. |  |

| 6. Students demonstrate their understanding. |  |
| Make a salad using as purchased ingredients where they weigh them before starting and then after trimming them to the edible portion weigh again. |  |
| For each produce item given to you in class: |  |
1. Record the AP weight.
2. Trim the food for use and then record the EP weight.
3. Record the difference between the AP weights and the EP weight and record it.
4. Record the percent (Yield Percentage = EP Quantity ÷ AP Quantity) and see how close it is to the yield chart given to you in class.

7. Formal assessment.
AP and EP testing and documentation of all deli menu items
Chapter 8

As Purchased, Edible Portion and Yields
As Purchased, Edible Portion and Yields

Now before we really get into the actual mechanics of the calculations we need to know the various terms used and what they are:
Definitions:

**As-Purchase Quantity (APQ)**

As purchased quantity is defined as the quantity (weight, volume, or count) of the product as it is received from a vendor.

A 50# bag of potatoes, before preparation, is the as-purchased quantity (APQ)
Definitions:

**Edible Portion Quantity (EPQ)**

Edible portion quantity (EPQ) is the quantity (weight, volume, or count) of the product after it has been cleaned, peeled or prepared and is ready for use.

If we were to peel a 50# bag of potatoes, you would have a pile of cleaned potatoes ready to be used in a dish, this is the Edible Portion Quantity (EPQ). The weight of these peeled potatoes would be approximately 42.5 pounds.
Definitions:

**Trim/Waste**

Trim is defined as the weight or volume of the waste, Trim, mathematically speaking, is the difference between APQ and EPQ

\[
\text{APQ} - \text{EPQ} = \text{TRIM or Waste}
\]

- A 50-pound bag of potatoes yield approximately 42.5 pounds of cleaned peeled potatoes, leaving approximately 7.5 pound of trim (in this case peels)
The EPQ, APQ, and Yield Percentage Triangle

The following triangle is a tool used to find the yield percentage, as-purchased quantity, and edible portion quantity.

It is similar to the Triangles we used in the previous lesson covering Hotel Statistics.

\[ \text{EPQ} = \text{APQ} \times \text{Y}\% \]
I. Yield % and Yield Factor

Most foods lose weight as a result of peeling, cutting off scraps, and cooking.

The weight of cooked foods is called **Edible Portion Quantity (EPQ) or yield**.

The yield can be expressed as a percentage of weight of the raw food, (i.e. the **As Purchased Quantity (APQ)**)

In this case it is called **yield %**.
Decimal Value

The decimal value of the Yield % is known as *Yield Factor*.
For instance, if the Yield % = 91%, then the yield factor = 0.91
The equation

\[
yield \% = \frac{Edible \ Portion \ Quantity \ (EPQ)}{As \ Purchased \ Quantity \ (APQ)} \times 100
\]

and

\[
Yield \ Factor = \frac{Edible \ Portion \ Quantity \ (EPQ)}{As \ Purchased \ Quantity \ (APQ)}
\]
Example 1: 6 lb of oranges were purchased to make freshly squeezed orange juice. 5 lb of orange juice was produced. Determine the Yield % and yield factor.

Solution: 1)

\[ \text{Yield} \% = \frac{\text{EPQ}}{\text{APQ}} \times 100 \]

\[ \frac{5 \text{ lb}}{6 \text{ lb}} \times 100 = 83.3333\% \]

Solution: 2)

\[ \text{Yield factor} = \frac{\text{EPQ}}{\text{APQ}} \]

\[ \frac{5 \text{ lb}}{6 \text{ lb}} = 0.8333 \]
II. Edible Portion Quantity (EPQ)

Using the Primary formula, we can determine the Edible Portion Quantity (EPQ) as:

**Edible Portion Quantity (EPQ) = As Purchased Quantity (APQ) x yield factor**
Example 2: The yield factor of veal is 0.80. Calculate the Edible Portion Quantity (EPQ) of 3lb 7oz of veal. Express your final answer in Pounds and ounces.

Solution:
Step 1: Convert the weight of the raw veal into ounces.
3 lb 7oz = 55 oz

Step 2: Calculate the Edible Portion Quantity (EPQ) in ounces.
EPQ = APQ x YF
   = 55 oz x 0.8 = 44 oz

Step 3: Express the Edible Portion (EPQ) in Pounds and Ounces.

EPQ = \frac{44 \text{ oz}}{16 \text{ oz/lb}}
   = 2.75 \text{ lb} \quad (.75 \text{ lb} \times 16 \text{ oz/lb} = 12 \text{ oz})
   = 2 \text{ lb} 12 \text{ oz}
III. As Purchased Quantity (APQ)

The expression for As Purchased Quantity (APQ) can also be found from the Primary Formula:

\[
\text{As Purchased Quantity (APQ)} = \frac{\text{Edible Portion Quantity (EPQ)}}{\text{Yield Factor}}
\]

\[\text{EPQ} = \text{APQ} \times Y\%\]
Example 3: How many kilogram of apples should be purchased to make 8.64 kg of apple juice, if apples have a 0.72 yield factor?

Solution:

\[
\text{APQ} = \frac{\text{EPQ}}{Y}\]

\[
\text{APQ} = \frac{8.64}{.72} = 12 \text{ kg}
\]
Food Cost per Portion

To calculate the food cost per portion, we have to take into consideration the difference between

the As Purchased Cost (APC) and the Edible Portion Cost (EPC).

The As Purchased Cost (APC) is the cost of a unit of weight of the raw product. For instance, the As Purchased Cost (APC) of veal is $5.00 per lb or $11.00 per kg.

Since the weight of the cooked product differs from the weight of the raw product, the value of one unit of cooked weight also differs from the As Purchased Cost (APC).
Therefore the **Edible Portion Cost (EPC)** is the value of one unit of cooked weight.

\[ \text{APC} = \text{EPC} \times \text{EPQ} \]
10 lb. of meat were purchased at $3.59 per lb. The Edible Portion Quantity (EPQ) after cooking was 8 lb. Find the Edible Portion Cost of meat.

Solution: 1) The total or As Purchased Cost (APC) of 10 lb. of meat:

\[ 3.59 \times 10 = 35.90 \]

2) The Edible Portion Cost (EPC) of cooked meat:

\[
EPC = \frac{APC}{EPQ} = \frac{35.90}{8 \text{ lb}} = 4.4875 \text{ per lb or } 4.49 \text{ per lb}
\]