Baking
Sweet Science: Muffins

Name(s):
Course/Block:

Quick breads: Loaves & Muffins

Role of Ingredients

Bakers need to know how ingredients in flour mixtures work with each other so that the best possible product can be created. By changing ingredients, amounts, type, temperature, and mixing method, you will produce very different products.

What to do in this unit:

- Prepare the muffin recipe attached but divide the recipe in half so you will make 6 muffins, NOT 12.
- Do a science experiment changing only one variable at a time; work in groups of 4. (We will do this in class!).
- Design a new muffin product suitable to be mass-produced and sold in our school cafeteria.
    - Write the recipe in the design challenge package and attach to this guide.
- Photograph your process prototype made in the Foods Lab and include it on ***My Blueprint Portfolio*** for Term 1.

*Remember, food photography is a HUGE part of selling a product. Research images BEFORE taking your own so that the quality of your work matches current standards on Pinterest or other sites. Look for props at home or at school to enhance your work; however, images must be taken in the Foods Room.

Planning, Monitoring and Assessment

1. Each contact block, demonstrate progress to your teacher.
2. For homework, research images, recipes that are similar. Make notes or be able to explain what you know to your teacher.

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Chocolate Chip Muffins

Ingredients:

Cut the original recipe in half to make 6 muffins:

Makes 12 Muffins ➡	**Makes 6 Muffins**
500ml Flour →	**___ ml Flour**
20ml Baking Powder →	**___ ml Baking Powder**
2ml Salt →	**___ ml Salt**
30ml Sugar →	**___ ml Sugar**
60ml oil →	**___ ml oil**
250ml Milk, RT* →	**___ ml Milk, RT**
2 Eggs, RT* →	**___ Egg, RT**
130ml Chocolate Chips →	**___ ml Chocolate Chips**

Preparation Method:

1. Preheat oven to 400 degrees F (200 degrees C).
2. Line muffin cups.
3. In a medium bowl, mix together the flour, baking powder, sugar, chocolate chips and salt.
4. In a separate bowl combine milk, oil and eggs together.
5. Add the liquid ingredients into the dry ingredients all at once
6. Fold ingredients just until dry ingredients are moistened. It will look lumpy
7. Fill muffin liners 2/3 full with batter.
8. Bake in preheated oven for 13 to 18 minutes, until a toothpick inserted into the center of a muffin comes out clean.

*RT=room Temperature

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Sweet Science:

"Getting a Rise" Experiment

<u>Exploration:</u> how can the addition or subtraction of ingredients impact the final product?

Salt and leavening agents (air, steam, baking soda, baking powder) can all affect the final baking product. This is why precision in technique (mixing, sifting etc.) and proper measuring is important.

A) Look at the pictures of the pound cake.

- **The addition of salt made a difference on the rise and texture of the crumb**
- **The differing amounts of baking powder can affect the rise; create a large crumb; cause large tunnels and holes; cause a cake to collapse.**

B) Our experiment:

- **Each group will be given the same basic recipe, but one ingredient will be changed (either more or less or omitted entirely).**
- **Follow the recipe exactly as given and bake**
- **After cooling, plate the item for the class to see**

C) Make observations on what you think is different (LOOK and TASTE)

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1. What was the variable item?

    - ❏ Salt Amount_____
    - ❏ Baking Powder Amount_____

OR what did you leave out?

- ❏ Egg
- ❏ Sugar

2. Hypothesis:

_____

_____

_____

_____

3. Look back at your Learning Guide and determine if your muffins meet the standards for a high quality of muffin (Some will not).

    a. Appearance:
    _____

    b. Texture:
    _____

    c. Tender:
    _____

    d. Flavour:
    _____

4. Explain the impact of your variable ingredient. How does it affect the finished product?

_____

_____

_____

Further Observations:

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Other notes

Standards of a high quality muffin:

1. Appearance: brown, pebbly surface or rough on top
2. Texture: uniform air cells with no tunnels
3. Tenderness: not tough or chewy
4. Flavour: not bitter or too sweet

Flour Proteins

-Glutenin and gliadin + liquid + mixing = **Gluten**

The oven heat dries and hardens the gluten thus forming the permanent structure.

Gluten Strands- are **elastic** and are stretched by the leavening agent. **Mixing and pouring** the batter **develops** the gluten strands. **Overmixing** results in a tough, chewy product with **tunnels.**

Leavening Agents

-the **leavening action** results from tiny **gas** bubbles throughout the batter which **expand** with the oven heat and cause the product to rise. Baking dries and hardens the gluten, trapping the air bubbles and forming an airy structure. Too much baking powder or baking soda produces a product that is bitter and crumbly (gluten stretches too much).

Leavening agents are affected by: 1) temperature of the oven and 2) how tough the gluten is.

Baking

-**coagulates the proteins** in flour and egg

Browning occurs because:

-sugar caramelizes

-starch changes to sugar

-milk causes browning