

Math modelling adapted cake recipe

There are four stages for mathematical modelling and we will go through all of them in this presentation

This is the original recipe for 4 people

Ingredients needed

1. $\frac{3}{4}$ cup of flour
2. $\frac{1}{4}$ cup of cocoa powder
3. $\frac{1}{2}$ tsp of salt
4. $\frac{3}{4}$ tsp of baking powder
5. $\frac{3}{4}$ tsp of baking soda
6. 1 cup sugar
7. 1 egg
8. $\frac{1}{2}$ cup milk
9. 2 tsp of vanilla essence
10. $\frac{1}{2}$ cup boiling water

Recipe Preparation

1. Grease 6-inch cake pan and preheat the oven at 175°C for 15 mins.
2. Sieve together flour, cocoa, salt, baking powder, baking salt to a mixing bowl and add sugar.
3. Make a well in the centre of the bowl and add egg, vanilla essence, and milk. Whisk ingredients well without lumps.
4. Pour boiling hot water and whisk thoroughly. The batter is runny at this stage.
5. Pour this batter to cake pan and bake at 175°C for 28 to 30 mins.
6. Cool the cake in a wire rack for 30 minutes. Refrigerate the cake for an hour before serving.

Assumptions made

- Use 4 slightly bigger eggs
- Use twice the ingredients for the recipe for 9 people
- Bake the cake for an extra 5 to 7 minutes in the oven
- to adapt a recipe for 12 people to serve 9 people, a ten inch pan is needed. But as it is not available, we will use a nine inch pan.
- Cut the cake into 3 pieces and cut each piece into 3 making 9 pieces
- Preparation time and baking time is 1 hour

Here are my opinions for adapting the cake recipe

Stage 1 - Understand the Real life problem/situation

1. Present the problem/situation

We need to make a cold cake for 9 people. But we only have a recipe for 4 people, we should go through steps or a plan to make a cold cake for 9 people.

2. Ask good questions to start working on the problem/situation

- How much should I alter the recipe to bake a cake for 9 people?
- What is the size of the pan to be used to make a cake for 9 people?
- For how long should we bake the cake and at what temperature?
- For how long should we keep the cake in the refrigerator before serving?
- Can I divide the whole recipe by four and multiply it by 9 to get the measurements?
- To what temperature should I preheat the oven before baking?

3. Sort the questions into two categories

Questions for which answers can be found (using measurement, data collection etc)	Questions which do not have direct answers can be translated into assumptions
<ul style="list-style-type: none">- How much should I alter the recipe to bake a cake for 9 people?- Can I divide the whole recipe by four and multiply it by 9 to get the measurements?- What is the size of the pan to be used to make a cake for 9 people?	<ul style="list-style-type: none">- For how long should we bake the cake and at what temperature?- For how long should we keep the cake in the refrigerator before serving?- To what temperature should I preheat the oven before baking?

Stage 2 - Analyze the situation

1. Make assumptions

a. Can I use 2 eggs for 9 people?

b. Can I refrigerate for just more than twice the time for 4 people?

c. Can I cook the cake in batches

What are the aspects that change and what remains the same?

Things that change	Things that remain same
number of eggs to be used. bowl to be used.	whisk to be used. sieve to be used.

Stage 3 - Mathematizing

1. What are the measurements or calculations to be made to work on this problem?

- size of other cake pans
- cup that can hold 150 ml
- the amount of cocoa powder, salt, baking powder etc to be used.
- the whisk to be used.

2. What unknown data or information to be collected?

- Can my oven fit a pan of bigger size? How do I check if it can?
- At what temperature should I refrigerate the cake before serving?
- For how long should I bake the cake?

3. Create a plan or solution for the real life problem (or) situation. Apply Math concepts using data collected and calculations to be made.

Pan size- Out of pan sizes 6,8,9 and 10 , to adapt a recipe for 12 people to serve 9 people , a ten inch pan is needed. But as it is not available, we will use a nine inch pan.

Dimensions (inches)	(cm)	Volume (cups)	(ml/liters)
Round Cake Pans			
6 x 2 inches	15 x 5 cm	4 cups	948 ml
8 x 2 inches	20 x 5 cm	6 cups	1.4 liters
9 x 2 inches	23 x 5 cm	8 cups	1.9 liters
10 x 2 inches	25 x 5 cm	11 cups	2.6 liters

ingredients- we can double the ingredients to adapt the recipe for 8 people.

temperature- the preheating and baking time should will be the same as for 4 people. An additional 5-7 minutes would be good and we can check if it is ready by inserting a toothpick.

time- we should refrigerate the cake for the same duration and the preparation time will also be almost the same.

serving- we can cut the cake into 3 pieces and cut each of those pieces into 3 making 9 pieces ($\frac{1}{3} \div 3 = \frac{1}{9}$)

This is the poster for the recipe for 9 people

Chocolate cold cake



YOU'LL NEED

Serves - 9 people

Ingredients needed

1. 1 1/2 cup of flour
2. 1/2 cup of cocoa powder
3. 1 tsp of salt
4. 1 1/2 tsp of baking powder
5. 1 1/2 tsp of baking soda
6. 2 cups sugar
7. 2 eggs
8. 1 cup milk
9. 4 tsp of vanilla essence
10. 1 cup boiling water

ALL YOU HAVE TO DO

Recipe Preparation

1. Grease 9-inch cake pan and preheat the oven at 175°C for 15 mins.
2. Sieve together flour, cocoa, salt, baking powder, baking salt to a mixing bowl and add sugar.
3. Make a well in the centre of the bowl and add egg, vanilla essence, and milk. Whisk ingredients well without lumps.
4. Pour boiling hot water and whisk thoroughly. The batter is runny at this stage.
5. Pour this batter to cake pan and bake at 175°C for 40 mins.
6. Cool the cake in a wire rack for 30 minutes. Refrigerate the cake for an hour before serving.

THANK YOU
