

CBA1 Mathematical Investigation: Making Doughnuts

the problem I am trying to investigate? I am making 20 donuts, 10 glazed and 10 chocolate -

I will have to make 20 donuts for as cheap as possible using ingredients from a shop. I will have to go to two shops and compare the prices between the two shops and find which shop will sell the ingredients cheapest.

this is the recipe and ingredients I will need

doughnut dough recipe

- 4 cups of flour
- 75g of sugar
- 1 tsp of salt
- 1 1/2 tsp of yeast
- 56g butter
- 2 small-medium eggs
- 1 1/4 cups of warm milk

Light Glaze

- 113g unsalted butter
- 375g confectioners sugar
- 1 1/2 cup ORIZOHI Milk
- 1-2 tsp of Vanilla

Chocolate icing

- 2tbsp of butter
- 60g semi-sweet ^{chocolate} confectioners sugar,
- 2-3 tbsp boiling water

Poses a problem

Records data

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By going to compare prices in tesco and lunnes
~~Stores~~, these are the prices I got in each shop

Tesco -

plain flour - €1.59 2kg

sugar - €0.89 500g

salt - €0.44 750g

yeast - €0.99 6x7g

butter - €2.19 454g

unsalted butter - €1.25 227g

eggs - €1.69 6 free range

milk - €0.99 1L

easter sugar - €0.99 1kg

vanilla - €1.99 25ml

chocolate bar - €1.69 200g

Total price - €14.70

€1.59

€+0.89

€+0.44

€+0.99

€+2.19

€+1.25

€+1.69

€+0.99

€+0.99

€+1.99

€+1.69

€14.70

Chooses an appropriate strategy to engage with the problem

Records data

Follows suitable mathematical procedures

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Dunnas Stores:

Plain flour - €1.00 2kg
 Sugar - €0.75 500g
 Salt - €0.44 750g
 yeast - €2.99 50g, 8x7g
 butter - €2.19 500g
 unscalted butter - €1.25 227g
 eggs - €1.59 6 free range
 milk - €0.75 1L
 caster sugar - €1.00 500g
 Vanilla - €1.95 25ml
 Chocolate bar - €1.00 100g

Total Price - ~~€~~ 14.91

€1⁴.00
 + €0.⁵75 * I am going to do my shopping
 + €0.44 for the ingredients at tesco
 + €2.99 because I will be able to get
 + €2.19 them cheaper there by 21c
 + €1.25
 + €1.59 I will calculate the amount of each
 + €0.75 ingredient and see how much I'll
 + €1.00 have left after I use some for
 + €1.95 my doughnuts.
 + €1.00
€14.91
~~€14.70~~
 00.21

Makes a concrete connection to the original question

Uses everyday familiar language to communicate ideas

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Revisits strategy

flour / $2\text{kg} - 128\text{g} = 2000\text{g} - 128\text{g} = 1,872\text{g}$
sugar / $500\text{g} - 75\text{g} = 425\text{g}$
salt / $750\text{g} - 4\text{g} = 746\text{g}$
yeast / $4\text{bsp} = 4.2\text{g}$, $\frac{1}{2}\text{bsp} = 2.1$, $4 + 2 = 6.3\text{g} = 5\text{ sachets left}$
butter / $454\text{g} - 84\text{g} = 370\text{g}$
unsalted butter / $22.7\text{g} - 11.3\text{g} = 11.4\text{g}$
eggs / $6 - 2 = 4\text{ eggs}$
milk / $1\text{kg is } 1000\text{g}$, $1000\text{g} - 57\text{g} = 943$
~~caster sugar~~
Vanilla / $25\text{ml} - 9.858\text{ml} = 15.142\text{ml}$
chocolate bar / $200\text{g} - 60\text{g} = 140\text{g}$
caster sugar / $1,000\text{g} - 503 = 497\text{g}$

that is ~~how much~~ ^{the amount} I'll have left of the ingredients after I use the amount I need.
 I know these answers are right because I used a calculator to get the exact amounts.
 I am checking whether we enough to make another 20 doughnuts.

flour / $1,872\text{g} - 128\text{g} = 1,744\text{g}$
sugar / $425\text{g} - 75\text{g} = 350\text{g}$
salt / $746\text{g} - 4\text{g} = 742\text{g}$
yeast /
butter / $370\text{g} - 84\text{g} = 286\text{g}$
unsalted butter / $11.4\text{g} - 11.3\text{g} = 1\text{g}$
eggs / $4\text{ eggs} - 2\text{ eggs} = 2\text{ eggs left}$
milk / $943 - 57\text{g} = 886\text{g}$
Vanilla / $15\text{ml} - 10\text{ml} = 5\text{ml}$
chocolate bar / $140\text{g} - 60\text{g} = 80\text{g}$
caster sugar / $497\text{g} - 503\text{g} = -6\text{g}$
 I cannot make 20 donuts because I was short 6g in caster sugar.

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I wasn't able to make 20, but can I make 19?

Flour - $128g \div 20 = 6.4 \times 19 = 121.6g$

Sugar - $75g \div 20 = 3.75 \times 19 = 71.25g$

yeast - $4.2g \div 20 = 0.21 \times 19 = 4g$

Salt - $4g \div 20 = 0.2 \times 19 = 3.8g$

butter - $84g \div 20 = 4.2 \times 19 = 79.8g$

unsalted butter - $113g \div 20 = 5.65 \times 19 = 107.35g$

eggs - $2 \div 20 = 0.1 \times 19 = 1.9 (2)$

milk - $57ml \div 20 = 2.85 \times 19 = 54.15ml$

Vanilla - $9.3658ml \div 20 = 0.46829 \times 19 = 9.3651ml$

chocolate bar - $60g \div 20 = 3 \times 19 = 57g$

caster sugar - $503g \div 20 = 25.15 \times 19 = 477.85g$

I was able to make 19

Flour $1,872g - 121.6g = 1,750.4g$

sugar $425g - 71.25g = 353.75g$

yeast $6.3g - 4g = 2.3g$

salt $746g - 3.8g = 742.2g$

butter $370g - 79.8g = 290.2g$

unsalted butter $114g - 107.35g = 6.65g$

eggs $4 - 2 = 2$ eggs

milk $943ml - 54.15ml = 888.85ml$

Vanilla $15.142ml - 9.3651ml = 5.7769ml$

chocolate bar $140g - 57g = 83g$

caster sugar $497g - 477.85g = 19.15g$

Follows suitable mathematical procedures

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Total doughnut price

All together I was able to make 39 donuts for the price €14.70.

Now we find the total cost for 1 doughnut.

$$\underline{\underline{\text{€} 14.70 \div 39 = 0.37692308 \text{ / } 38c}}$$

1 doughnut is €0.38, ~~if a customer were to buy 39 it would be~~
~~€0.38 x 39 = €14.82~~

If I charge a customer €1.00 ^{per} doughnut I will make €39. ~~per doughnut~~
but I spent €14.70.

~~€14.70~~ €39.00

~~€14.70~~

$$\text{€}24.30$$

* I think my solution was reasonable because it costed me €14.70 to make 39 doughnuts, I charged €1.00 per doughnut and in the end my profit was €24.30. I think charging €1.00 per doughnut is a fair price to charge someone with because an average cost for a doughnut would be around the same price. Overall I'm fairly happy with my project and I wouldn't charge anything, because I feel like I chose good shops to shop in and I chose a good price for my 20 glazed and 19 chocolate doughnuts. I also used mathematical language and I posed a problem.

Comments on the reasonableness of the solution and makes concrete connection to the original question.

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$$\% \text{ profit} = \frac{\text{profit}}{\text{cost}} \times 100$$

$$= \frac{€24.30}{€14.70} \times 100$$

$$= 165\%$$

Assumptions-

I did not consider the cost of the mixer = €9.99

the cost of electricity = 10 mins = 10c per hour / 1,000 watts
Oven = 30 mins

40 mins of electricity = 10c / 1,000 watts per hour.

Altogether = €10.10

$$\begin{array}{r} €14.70 \\ + €10.10 \\ \hline €24.80 \end{array}$$

Follows suitable mathematical procedures

Acknowledges assumptions

Overall judgement:  In line with expectations