Stimulus question 29

Chocolate Cake

This is one of Ffion's favourite chocolate cake recipes.

Here are the ingredients:

- 200 g good quality dark chocolate, about 60% cocoa solids
- 200 g butter
- 1 tbsp instant coffee granules
- 85 g self-raising flour
- 85 g plain flour
- ¼ tsp bicarbonate of soda
- 200 g light muscovado sugar
- 200 g golden caster sugar
- 25 g cocoa powder
- 3 medium eggs
- 75 ml buttermilk (5 tbsp)
- grated chocolate or curls, to decorate

For the icing:

- 200 g good quality dark chocolate, as above
- 284 ml carton double cream
- 2 tbsp golden caster sugar

Question

The recipe calls for a round 20 cm cake tin. Ffion only has one cake tin, which is 20 cm square.

She is concerned that her square 20 cm tin is larger than a round 20 cm tin, so she needs to adapt her recipe.

How much of each ingredient would it be sensible for her to measure out?

Chocolate Cake Question – scoring

Full credit

Calculates the areas of the bases of both the circular and square tins.
Square tin: 20 cm × 20 cm = 400 cm^2
Circular tin: $\pi \times 10^2 = 314$ cm^2

Percentage increase = ((400 – 314)/ 314) × 100 = 27%
Choice of a suitable approximation may be suggested here – e.g. 25% or ¼, or 30% increase.

Ingredients adjusted accordingly:

Original recipe	**Adjusted, using an increase of between 25% and 30%**
• 200 g good quality dark chocolate, about 60% cocoa solids	• 250 g – 260 g
• 200 g butter	• 250 g – 260 g
• 1 tbsp instant coffee granules	• 1¼ tbsp
• 85 g self-raising flour	• Range between 100 g – 110 g
• 85 g plain flour	• Range between 100 g – 110 g
• ¼ tsp bicarbonate of soda	• Very slightly more than ¼ tsp! Accept ⅓ tsp
• 200 g light muscovado sugar	• 250 g – 260 g
• 200 g golden caster sugar	• 250 g – 260 g
• 25 g cocoa powder	• 30 g – 33 g
• 3 medium eggs	• 4 medium eggs (or 3 large!)
• 75 ml buttermilk (5 tbsp)	• 90 ml – 100 ml
• grated chocolate or curls, to decorate	
For the icing	
• 200 g good quality dark chocolate, as above	• 250 g –260 g
• 284 ml carton double cream	• 355 ml – 270 ml
• 2 tbsp golden caster sugar	• 2 ½ tbsp

Partial credit

Accept some margin of error in the more difficult ingredients – e.g. eggs and bicarbonate of soda
Accept an increase of perhaps ⅓ as an outside approximation of the increase of the area of the circle to the square.

No credit

Any other response

GCSE Subject Content		
Foundation	**Intermediate**	**Higher**
Calculating area of a square and circle. Standard metric units of length, mass and capacity. Calculating fractional and percentage changes (increase and decrease). Estimating and approximating solutions to numerical calculations.	This activity may be suitable for some learners at the Intermediate Tier, but all the content is at the Foundation Tier.	

Resources:

- Calculator
- See note below: other cake tins / baking trays for comparison and rulers for measuring.

Supplementary questions:

- What property of the cake tin is '20 cm' in each case?
- Should we use approximations here? What would be a sensible approximation of the increase?
- Which ingredient might be difficult to adjust?
- Do chocolate cakes have to be circular

Possible Extensions and reasoning questions to discuss and explore

- Could be turned into a practical activity (perhaps undertaken in Food Technology) so other cake tins/ trays for measuring and comparing may be introduced.
- Research – if we were considering a soufflé recipe, could we use a square dish?