

THE LAB

Three things to make and do

Kitchen Chemistry

1 Can you solve the pancake problem?

Make some flippin' fabulous pancakes and test your puzzle-solving skills.

What you need

- 200g **flour**
- 2 tsp baking powder
- 1 tbsp sugar
- 3 large **eggs**
- 200ml milk
- 25g melted **butter**
- Oil
- Large bowl
- Cereal bowl
- Fork
- Whisk
- Frying pan
- Spatula

Allergy warning!

Ingredients in **bold** are allergens (substances that cause allergic reactions). Learn more at tinyurl.com/SN-allergy

Instructions

- 1 Mix the dry ingredients (flour, baking powder and sugar) in a large bowl. Crack the eggs into the cereal bowl and use a fork to whisk them. Pour the whisked eggs into the large bowl, add the milk and melted butter, and mix the whole lot together until fairly smooth.
- 2 Pour a little oil into the frying pan put on a medium heat. Pour out enough mixture for one pancake into the frying pan and cook until little bubbles form on top. Carefully flip it over with a spatula. Cook the other side and then place it onto a plate. Make three pancakes – one small, one medium-size and one large.
- 3 Once your three pancakes are cooked, you're ready to tackle the pancake problem. Read the rules (in "How does it work?") and then attempt to answer the puzzle (right). Your prize is eating the pancakes!

How many flips would it take to get each pancake stack into size order?

1		2	
 Flips	 Flips
3		4	
 Flips	 Flips
5		6	
 Flips	 Flips

How does it work?

Ask someone to stack three pancakes in any order they like on top of each other. Your task is to arrange them into size order, with the largest pancake at the bottom of the stack and the smallest at the top. You do this by inserting your spatula anywhere you like in the stack and flipping all the pancakes above it. After you've worked out the fewest flips you would need to get each of these six stacks into size order, the "pancake number" is the highest of these. Can you work out the number of flips for each of the different combinations of stacks possible with three pancakes (left)? What's the pancake number for three pancakes? You can find the answers on page 50. Mathematicians have only been able to calculate the pancake number of stacks of up to 19 (it's 22), but so far, no one has been able to calculate the pancake number of a stack of 20.

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