



Science is all around us!
The Physics of Pancakes

Why are pancakes round?

If the pan is flat, gravity pulls on the fluid evenly in all directions, resulting in a round shape. The edge of the pancake is also rounded because the surface tension of the fluid keeps the batter together

as it flows onto the pan.

What state of matter is a pancake?

Pancake batter is a fluid (actually a suspension- a fluid with small pieces of flour floating in it). It flows to fill the shape of its container; it would fill the whole pan if you kept pouring it.

As a pancake cooks, it undergoes a chemical change and becomes a solid. If you look closely, it is a mixture of solid and gas, like a sponge or piece of foam.

If adding heat turns a liquid into a gas, then why does the hot pan turn the liquid pancake into a solid?

Because the matter (batter) doesn't just heat up, it chemically changes into a different substance as it cooks. (OK this is chemistry, but it is still fun science!)

What happens when two pancakes touch?

When two pancakes touch each other, their surface tension is broken, allowing the two pancakes to join together quickly.

What causes the bubbles in pancakes?

Rising agents, such as baking soda and baking powder produce carbon dioxide. The gas is trapped in the batter, producing bubbles that expand when heated.



Why do the bubbles rise to the surface?

Carbon dioxide is less dense than the surrounding batter, so the bubbles rise to the top of the pancake. This causes the first side of the pancake that you cook to be smoother than the second side.

How does cooking time change with altitude?

Although liquids boil at a lower temperature at higher altitudes, this probably won't have much effect on cooking a pancake.

Does our dry climate make dry pancakes?

That depends on the chef! The flour is drier in our climate, so it does tend to absorb more liquid. This means that you may not need as much flour in your perfect pancake recipe.

Would pancakes be larger or smaller on the moon?

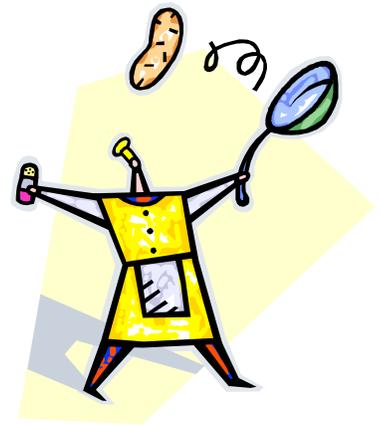
If you only take gravity into account, they would have a smaller diameter, but (due to the conservation of mass) they would be thicker.

How do you flip the perfect pancake from the pan so that it returns to the pan (and not the floor)?

Practice, practice, practice!

This is a complicated calculation that involves kinetic energy, torque, gravity, and velocity.

Dr. Tungate, a senior physics lecturer at Birmingham University, found that "a pancake should be flipped into the air at a speed of 10 miles-an-hour, which means that it takes less than .5 of a second to reach the top of its trajectory."— Hmmm. . . I wonder what the mass of his pancake was?



What about wind resistance, convection currents, friction with the spatula. . . AHHHH! Let's not go there!

If you have additional comments or ideas for pancake physics, please let us know!

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