A FUN AND EDUCATIONAL GUIDE

Yeasts, superheroes with superpowers

Let's find out about these tiny living things: the ancestors of life on Earth.

7-10 years

LESAFFRE

SECTION 01

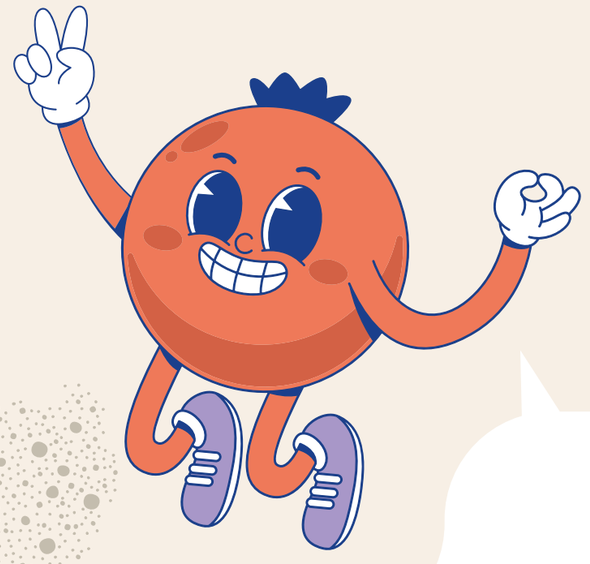
A superhero essential to life

Riddle:

Who is our superhero?
I'm one of the earliest life forms on Earth.
I'm essentially everywhere, even on your skin!
You've never seen me but I'm sure you've eaten me before.
I love making bubbles and I'm a must-have for every baker.
Who am I?

Connect the numbered dots in the correct order to make me appear.

Why am I called "Yeast"?
My name comes from the Old English word "gist", which means to "boil", "foam" or "bubble", because I fill the bread dough with air bubbles to make it rise before baking.



Did you know?
I'm a **microbe**. Also known as a microorganism, this tiny living thing is so small that you need a **microscope** to see it.

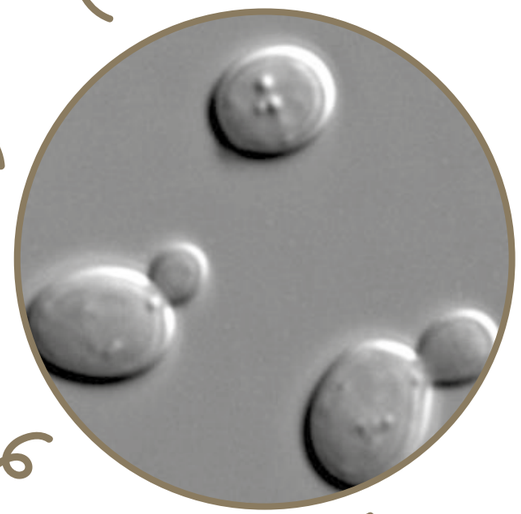
Observe me!

I'm ten times smaller than the width of a strand of your hair. I'm therefore **invisible to the naked eye** (without a microscope).

I need **food**, **warmth** and **moisture** in order to grow.

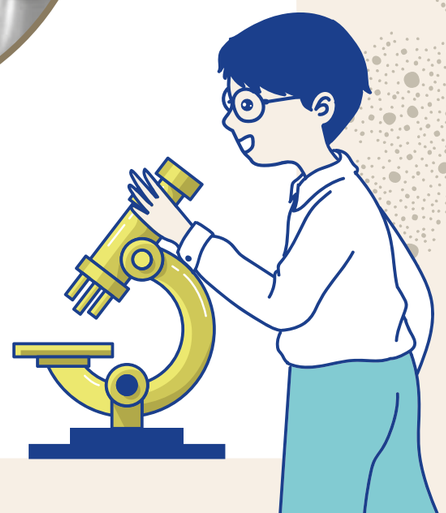
I'm a **live microorganism** so I breathe oxygen, just like you.

I'm a **single-celled fungus**, meaning I'm made up of just one cell.



I can form **colonies visible to the naked eye.**

I am **very popular among scientists** who use me as a tool for their research.



Bacteria, viruses and microalgae are also classified as microbes, but they are not the same as yeast and **belong to another group of microorganisms.**

The story of yeast

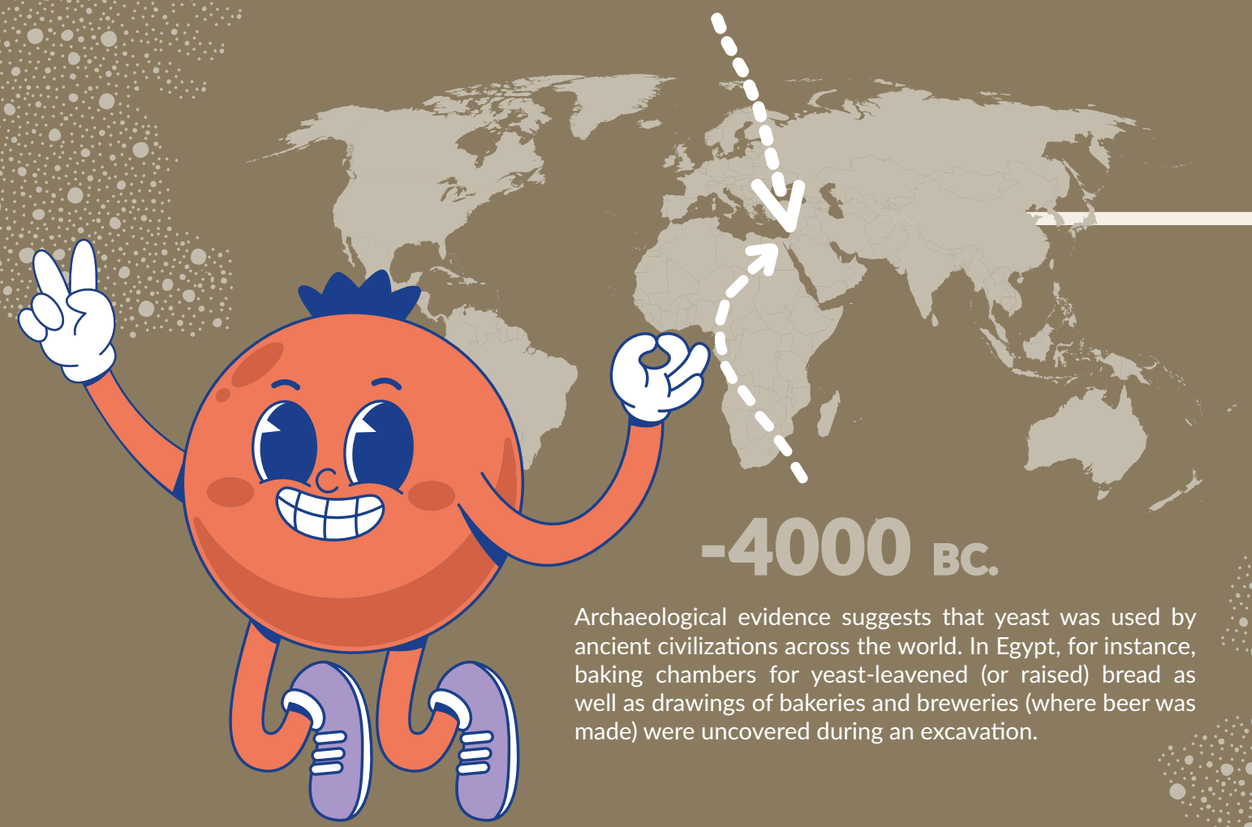
The first living microorganism on Earth.

Without yeast, there would be no life on the planet! The first yeast-like organisms appeared on Earth hundreds of millions of years ago, long before humans. Like bacteria, yeast is a microorganism that is crucial to the development of life on our planet.

A precious ally for humans since ancient times.

-5000 BC.

Very ancient yeast strains were even discovered in Israel. They were found in vessels that contained alcoholic beverages. At that time, people used yeast in the production of bread, wine and beer, but without really knowing what it was or how it worked.



-4000 BC.

Archaeological evidence suggests that yeast was used by ancient civilizations across the world. In Egypt, for instance, baking chambers for yeast-leavened (or raised) bread as well as drawings of bakeries and breweries (where beer was made) were uncovered during an excavation.

From discovery to discovery.

Yeast may be the earliest living organism domesticated by humans. By learning how to use it, they were able to select the most suitable types of this microorganism to produce the foods that they liked.

1680

Dutch scientist Antoni van Leeuwenhoek, who developed high-quality lenses for microscopes, was the first to observe and describe yeast cells.

1857

French chemist Louis Pasteur was able to prove that yeasts are living organisms. He demonstrated the role of yeast in fermentation and explained its role.

2025...

Research scientists have selected the most suitable and efficient yeast strains to produce fermented foods and enhance the taste of certain dishes. They have also discovered that yeast can be converted into fuel for cars and planes. This microorganism still holds many secrets and remains a topic of great interest among researchers across the globe.

More than 2,000 species of yeast have already been discovered!

Where to find me?

All around you!
Yeasts can be found almost everywhere in natural environments, especially in sugar-rich habitats. You'll find them on the skin of fruits, in plant sap, cactuses, soils and in the belly of a number of mammals and insects. They are also present on your skin and at the bottom of the ocean.

On your plate!
Have you ever had bread, cheese, cocoa, sauerkraut (a type of fermented cabbage) or soy sauce? Well, all of these foods are made with yeast - which can also be used for producing wine, beer and many other types of fermented foods consumed around the world.

Let's play!

Circle the foods that you think are made with yeast.

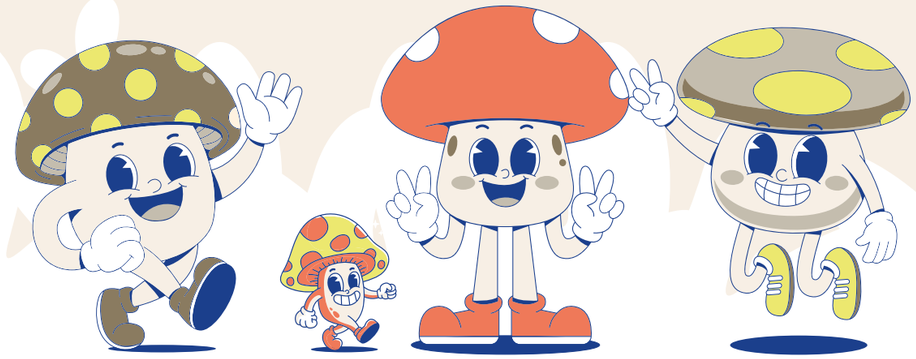
Circle the microorganisms in the following list.

mushroom
hair
bacteria
sand grain
cat
yeast
flea
virus
microalgae

Find out about my family

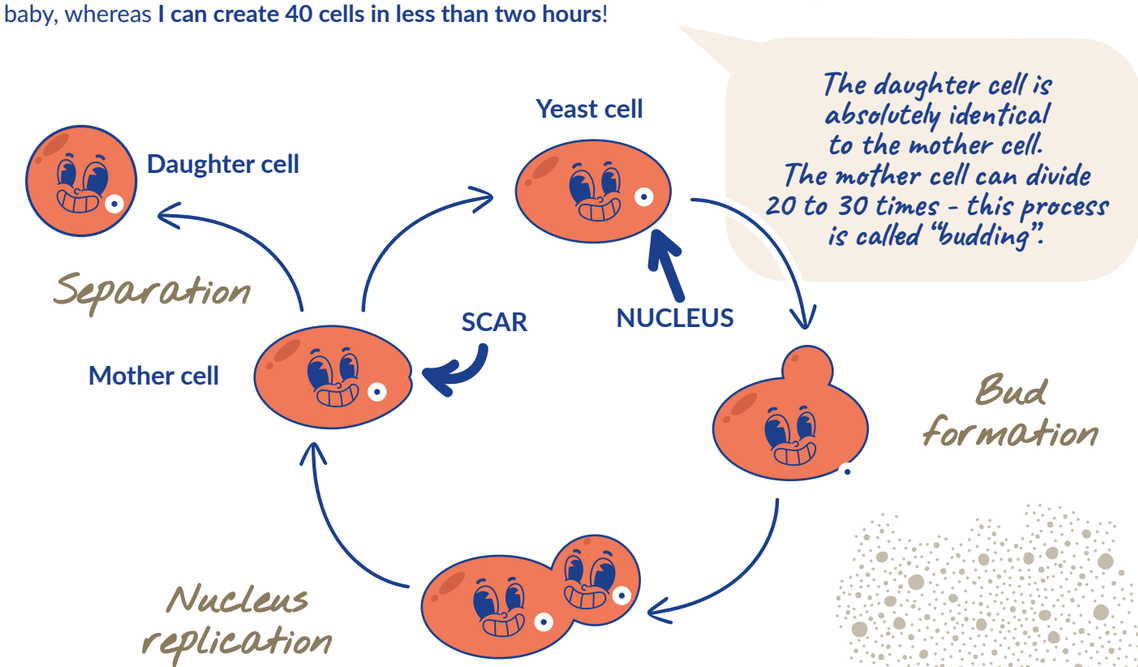
The fungi

I'm part of the fungi kingdom, just like mushrooms are. I represent a very small group of fungi, only about 1% of all fungal species on Earth. The most popular type of yeast is brewer's yeast or baker's yeast. It belongs to the species of Saccharomyces, which means "sugar fungus" (fungus that likes sugar).



How do I reproduce?

Like any other living organism, I can reproduce. Most yeast species don't need to have a mum and a dad to reproduce. **Sugar and water are all I need** to multiply.
I am capable of dividing myself into two identical cells. It takes a human being nine months to conceive a baby, whereas **I can create 40 cells in less than two hours**!



SECTION 02

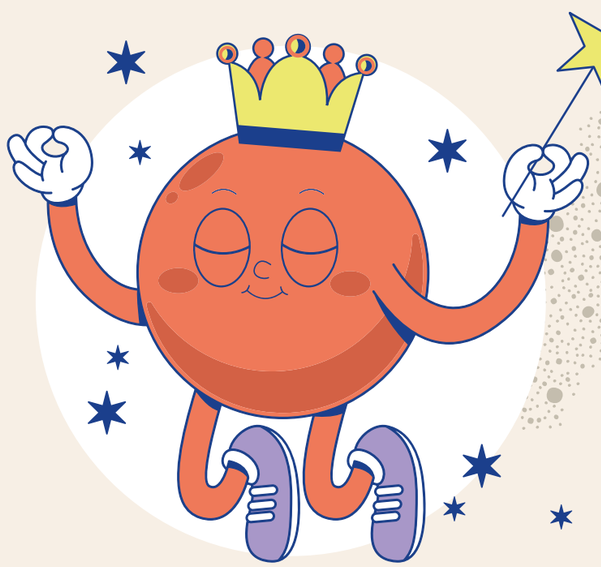
The superpowers of yeast

Yeast is a tiny organism with massive potential!
Let's find out about the superpowers of yeast that are the most useful to mankind.

I'm good at fermentation.
Unlike you, yeasts can also live without oxygen. They feed on sugar, which they can convert into carbon dioxide (CO_2) gas, alcohol and energy. This is what we call ethanol (or alcoholic) fermentation, a transformation process essential to the making of bread and fermented beverages like wine and beer.

I can be used to feed and protect plants.
I can shield plants from various diseases. Did you know that yeast is used to protect bananas from post-harvest diseases? And that it can act as a fertiliser to feed roses, strawberries and tomatoes?

I make food tasty.
During fermentation, yeast produces aroma compounds that impart flavour to food. The fermentation of cocoa beans, for example, is essential for creating a delicious chocolate flavour.



You already know what carbon dioxide (CO_2) is: it's the gas you release when you breathe out.

I make fuel for cars.
Yeast is capable of transforming plant biomass, such as corn or sugarcane, into a special fuel we call bioethanol. This type of fuel is used to power cars, and even planes. Today, yeast provides an alternative to petroleum-derived fuel.

I'm a tiny living factory.
Yeast can produce building blocks that are used in the manufacture of medicines and vaccines. Scientists use it to produce whatever we need to stay healthy or improve our everyday lives.

As you can see, yeast is a true superhero and uses its superpowers to nourish and protect the planet.

Now it's your turn to experiment!

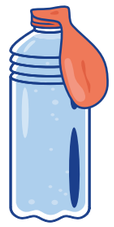
How does yeast make bread dough rise?
Put your researcher hat on and discover one of the superpowers of yeast.
Here are three experiments you can try, for which you will need the following:

1 *Equipment:*
- 3 small 300-ml bottles
- 3 inflatables balloons

2 *Ingredients :*
- 1 teaspoon of sugar
- 1 teaspon of baker's yeast
- 200 ml of lukewarm water

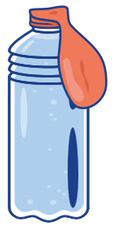
3 *Instructions :*
In each bottle, add the listed ingredients, stir well and place an inflatable balloon over the mouth of the bottle (use strong tap if necessary).

Experience A
water + yeast + sugar



Experience B
water + yeast

Experience C
water + sugar



4 Draw what happens after 20 minutes.

5 What does that tell you about the role of sugar on the action of yeast?

- ☐ The yeast drowns in water.
- ☐ The yeast eats the sugar and releases gas.
- ☐ The sugar absorbs the water and eats the yeast.

The balloon only inflates in Experiment A, with a gas called "carbon dioxide" (CO_2). Yeast finds sugars in flour or in the juice of fruit, like grapes or apples. The CO_2 produced by yeast makes bread dough rise and creates bubbles in champagne and cider.

SECTION 03

Yeast, a friend to your body

Tiny guardians of our health

How yeast looks after your health.

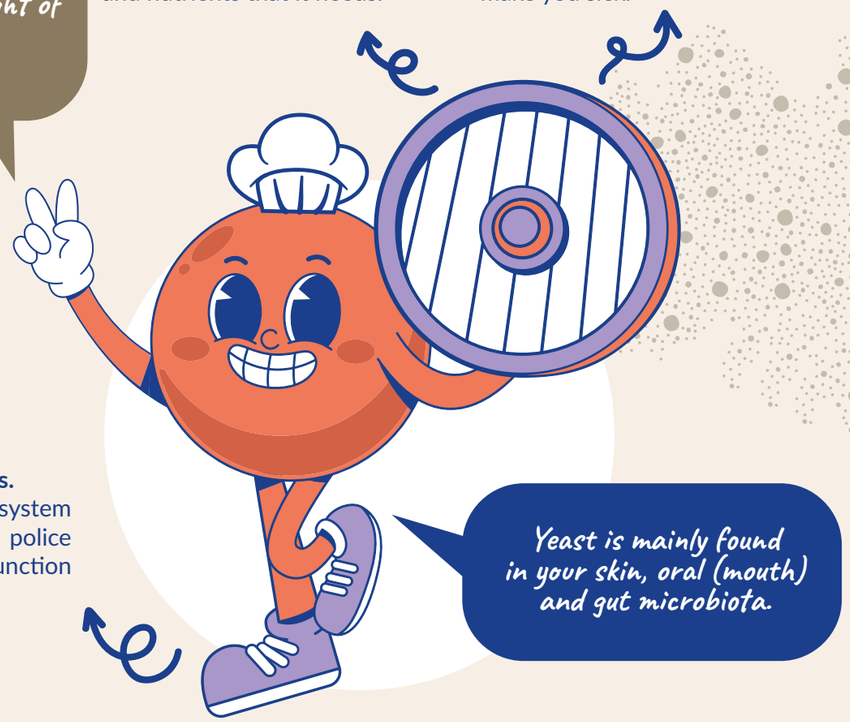
Our body is protected by a large number of microorganisms, such as yeast, bacteria and other tiny creatures, and they all get on well together. These little species living in our bodies form what we call the human microbiota. Let's take a look at our stomach, which is home to a whole world of microscopic organisms.

In your belly, the billions of microorganisms that make up the gut microbiome weigh a total of 1.5 kg, i.e. the weight of a large water bottle. Isn't that incredible?

Together, these tiny living things are working really hard to help you.

They are like cooks.
They transform what you eat to provide your body with the energy and nutrients that it needs.

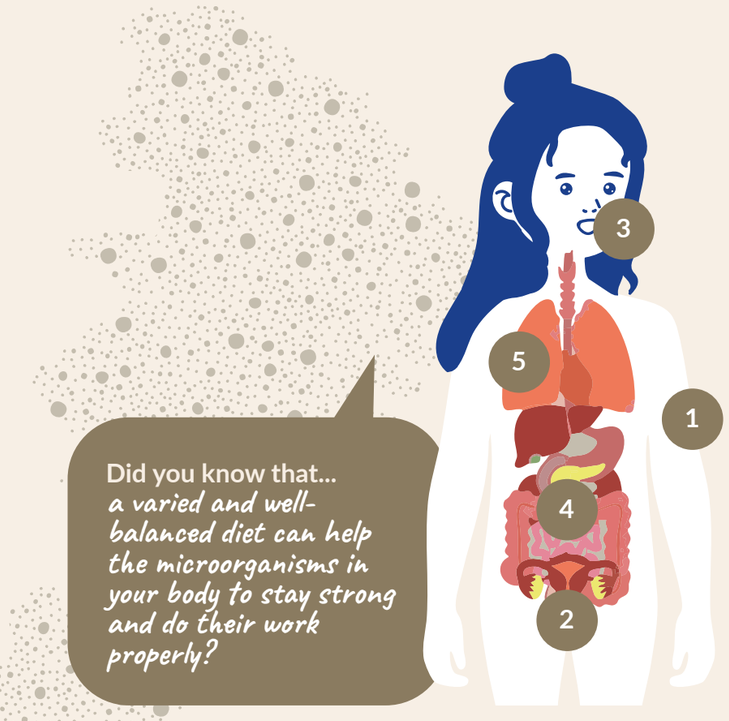
They act like guardians.
They protect your stomach against the bad bacteria that can make you sick.



They act like sport coaches.
They help your immune system (your body's very own police force) to stay strong and function properly.

Now it's your turn!

Can you locate our friends the microorganisms in Claire's body?



Put the correct number next to each microbiome:

..... Oral microbiome

..... Lung microbiome

..... Gut microbiome

..... Skin microbiome

..... Vaginal microbiome

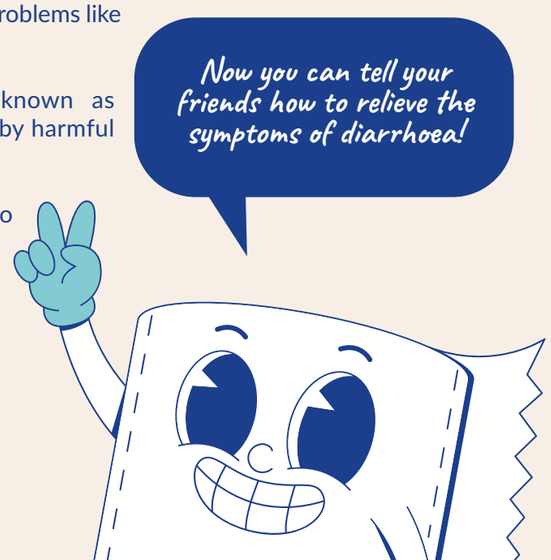
A very beneficial type of yeast

when your poo is soft.

A very long time ago, in 1923, a yeast strain from the well-known Saccharomyces species was found by a scientist on tropical fruit peels. The yeast they discovered was capable of relieving bowel problems like diarrhoea.

Today, people commonly use this type of yeast, known as **Saccharomyces boulardii**, for treating diarrhoea caused by harmful microorganisms.

Taking antibiotics destroys harmful bacteria, but it can also disrupt your gut microbiome and lead to poor digestion. Your tummy will need some extra help, so its muscles can work better. That's why the doctor may prescribe you some of that precious yeast, which is often trapped in a capsule.



Yeast

to help you stay in shape and look even better!

Yeast is like a superfood for your body. It gives you a secret boost to keep you in top shape and make you look even more handsome or beautiful than you already are. It offers so many essential nutrients that your body needs, including vitamins and proteins.

Here's what it does for you

Yeast is a source of B vitamins, which promote growth and make you feel more energised. These vitamins act like little energy boosters!

Yeast is also a great source of proteins, which act like building blocks that build and repair your body. If you play sports or often take part in physical play, proteins can increase strength and improve recovery time.

So even though you can't see it, yeast is a superhero that works day and night to keep you healthy and in good shape!

The benefits of yeast

You can find them in nutritional yeast. This type of yeast is not alive, so you can't make bread with it. It usually comes as a powder or in the form of light brown flakes that you can sprinkle on your favourite dishes, just like grated cheese.

High in vitamins, proteins and minerals, nutritional yeast is very good for your health, and also very tasty!

And here's a little secret to having beautiful hair and nails: yeast nourishes your hair and nails - kind of like fertilisers that provide nutrients to plants. The result: it supports healthy hair growth, strength and shine and restores strength and beauty to nails.

SECTION 04

Yeast, a superchef that spoils us!

Let's open the fridge and cupboards to find out which meals are prepared with yeast.

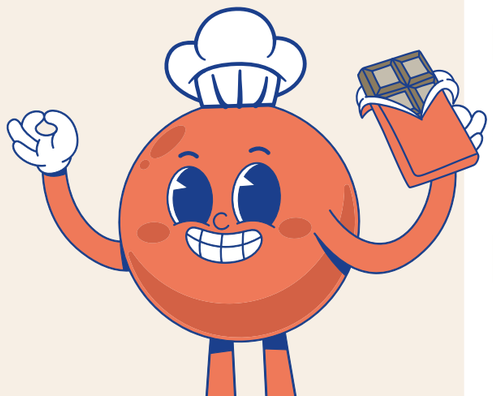
I make lots of delicious products!

Baker, winemaker, cheesemaker: yeast is so discreet that you can't see it. But it works hard to produce a large number of foods and beverages. Without it, there would be no pizzas to share or delicious burgers to enjoy. Yeast works secretly to transform basic ingredients into culinary delights.

Note:
Nutritional yeast, which we talked about in the previous section, is inactive and therefore not suitable for use in food production.

Bread and pastries

Do you enjoy deliciously warm baked breads like baguette, brioche or bread rolls? It's the yeast that makes them rise! It also gives a nice flavour to bread, pizzas and pastries. Yeast is an ingredient of many talents!



Bubbly beverages

Do you know what beer, cider and champagne all have in common? The secret agent that makes them bubble is none other than yeast. It releases gas in the form of small bubbles through the natural process of fermentation.
Today, it is also possible to find alcohol-free wine and beer, both of which are made with yeast.

Wine

Yeast is also used in wine production. It is naturally found on grape berries and added by winemakers before fermentation. During this process, yeast converts the sugars of the grapes into alcohol, producing a range of flavours and aromas. Yeast contributes to creating wine flavours such as banana, apple or red fruit.

Types of cheese

Camembert, brie, feta or pecorino cheese: yeast is present in raw milk or added to certain types of cheese during the cheesemaking process, e.g. to impart a fruity flavour.

And even chocolate!

Cocoa beans are fermented by yeast, which gives chocolate its unique and distinctive taste.

How does yeast make bread dough rise?

1 Mixing ingredients
To make bread dough, the baker needs to mix flour with water, salt and yeast.

2 Resting time
The dough then needs to rest. But remember this is different to proofing, which is when the yeast activates to ferment the dough.

3 Dough proofing (or rising)
The yeast releases gas that ferments the dough. This process makes the dough 'bubble up' before it rises.

4 Baking
The baker cooks the bread in the oven.
The dough rises a little more and the gas disappears.

5 Tasting
The bread is now cooked and its open crumb (filled with holes) looks delicious. Yummy!

Let's take a closer look at labels

Find out if yeast is present in your favourite foods!

Sauces, cereal bars, sausages or crisps: if you take a look at the labels of your favourite foods, you'll see that yeast extract is often included in the list of ingredients. Why? Because food manufacturers use it to naturally enhance the taste and texture of their products.

Yeast extract can also help to reduce the salt, fat and sugar content of certain dishes, without compromising on flavour. Clever!

I come in different forms

Granular or noodle-shaped
Dry but still alive, I get to work as soon as I'm added to a recipe. What's more, I come in packets and can last for a long time.

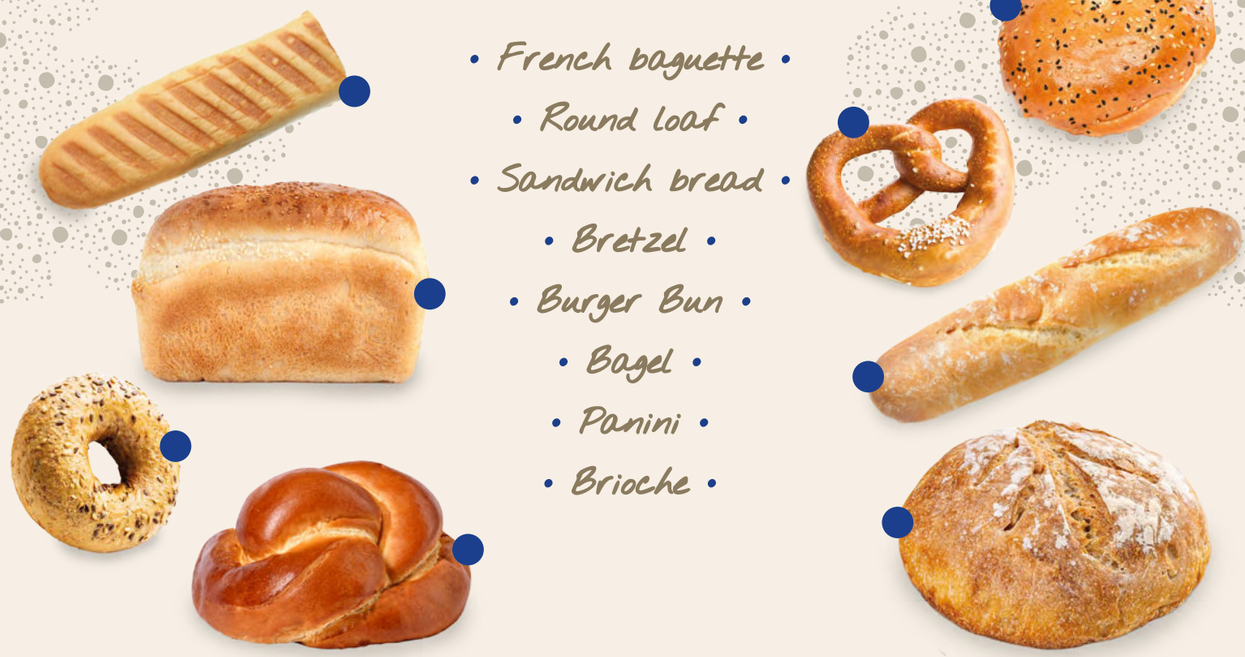
Fresh
I've already been cut into small cubes. I'm easy to use and I'm kept in the fridge.

Liquid
I'm very popular among bakers because I can be easily mixed with large quantities of flour.

Let's play!

Match each type of yeast bread to its corresponding image.

- French baguette
- Round loaf
- Sandwich bread
- Bretzel
- Burger Bun
- Bagel
- Panini
- Brioche



There are many different types of bread around the world. Create your own bread recipe and help the baker make it!

1 *Add the basic ingredients required to make the bread dough.*

- f.....
- y .....
- salt
- lukewarm water

2 *Add your own ingredients.*
Unusual flavour combinations, spices, etc. You get to choose!

- .....
- .....
- .....
- .....
- .....

3 *Let's get drawing!*
Draw your culinary creation to finalise the recipe. A bun, or a funny-shaped bread - you can do whatever you want!

4 *To help the baker make your recipe, put the steps of the breadmaking process in the correct order.* Put the right number next to each step.

..... Baking

5 Shape the bread dough
(Bakers call it "moulding the dough")

..... Knead the dough

..... Add the other ingredients (seeds, dried fruit, etc.) and mix everything together

..... Let the dough rise a little more

1 Mix the basic ingredients together

..... Resting and Fermentation (the dough rises)

You're the chef!

It's fun to cook with yeast, so let's make a delicious pizza dough!

1 Time

- 45 minutes
  (including 30 minutes resting time)

2 Ingredients

- A pinch of salt
- 1 teaspoon of sugar
- Half a cube of baker's yeast or half a packet of dried yeast
- 300 g of wheat flour
- 3 tablespoons of olive oil

3 Preparation

1 Activate the yeast

Mix the yeast and sugar into 500 ml of lukewarm water.

2 Mix the ingredients

Mix the flour with the salt, olive oil and yeast mixture.
Add water until the dough forms a compact ball without being sticky.

3 Let the dough rest

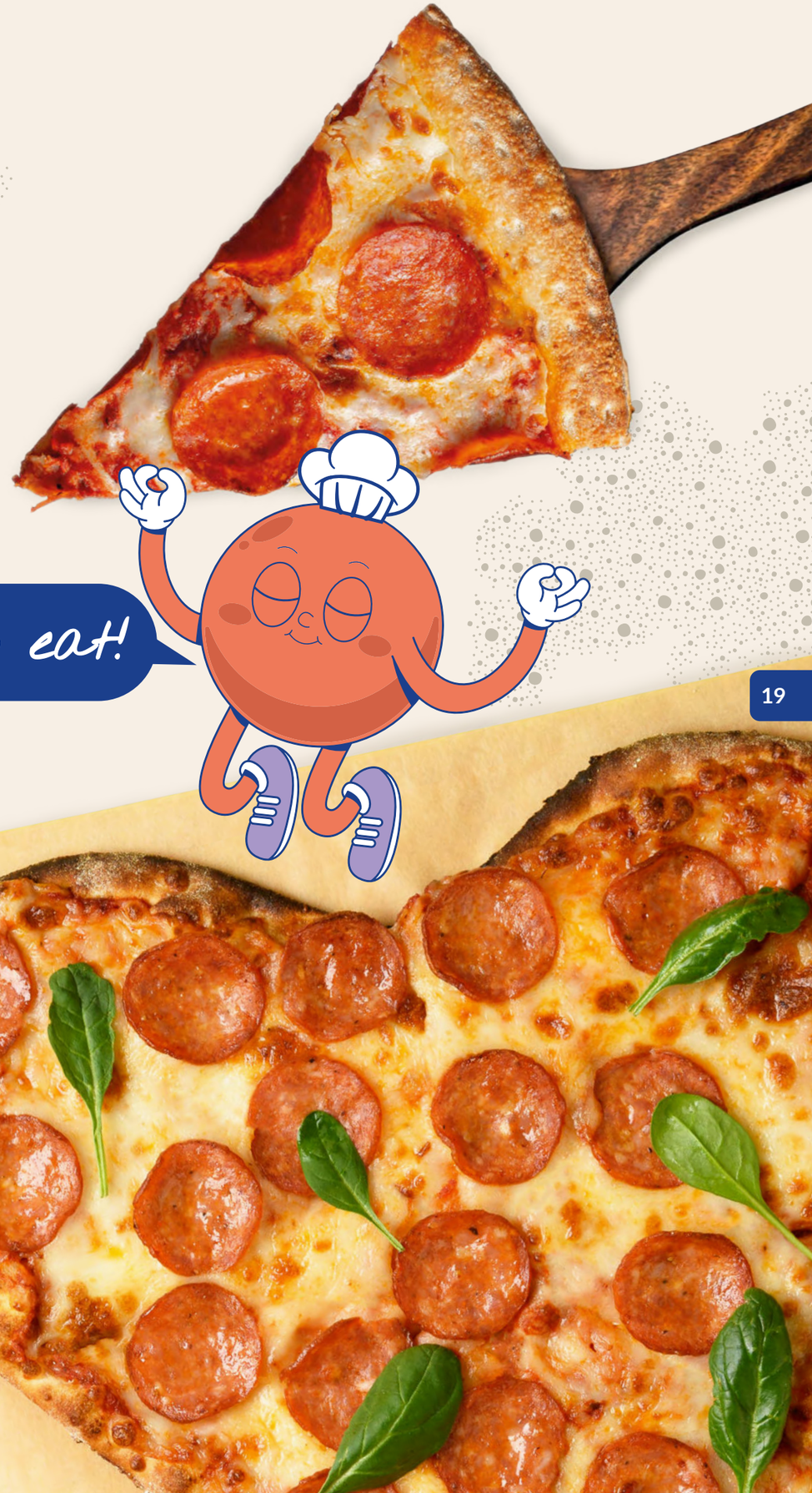
Allow the dough to rest for 30 minutes. On a baking sheet, flatten the dough into the shape that you like.
Leave it to rest for another few minutes before adding your toppings.

4 Make your pizza

Add the topping ingredients of your choice to your pizza.

4 Baking

Once you've added the toppings, ask an adult to bake your pizza in the oven for 10 to 15 minutes at 210°C.



SECTION 05

Yeast, an animal's best friend!

Whether they are furred, feathered or scaled, animals can also benefit from the magical powers of yeast.

My goal is to help pets stay healthy!
Yeast is sometimes added to the food and treats of our four-legged friends. It can help them in different ways.

Yeast is full of **vitamins**, **minerals** and **proteins**. They are tiny nutrients that animals need in order to stay healthy. That's why we add yeast to their food. **Your favourite animal can also eat yeast, just like you do!**

Cats and dogs

- I can improve their digestion and support the growth of good bacteria in their gut.
- I can whet the appetite of the fussiest pets and make food more appealing to them.
- I give them healthier skin, a shiny coat and strong claws.
- I strengthen their immune system against diseases.
- I help them to adjust to different types of foods, for instance when they switch from dry to wet food.
- I can also improve the consistency and smell of their poo.

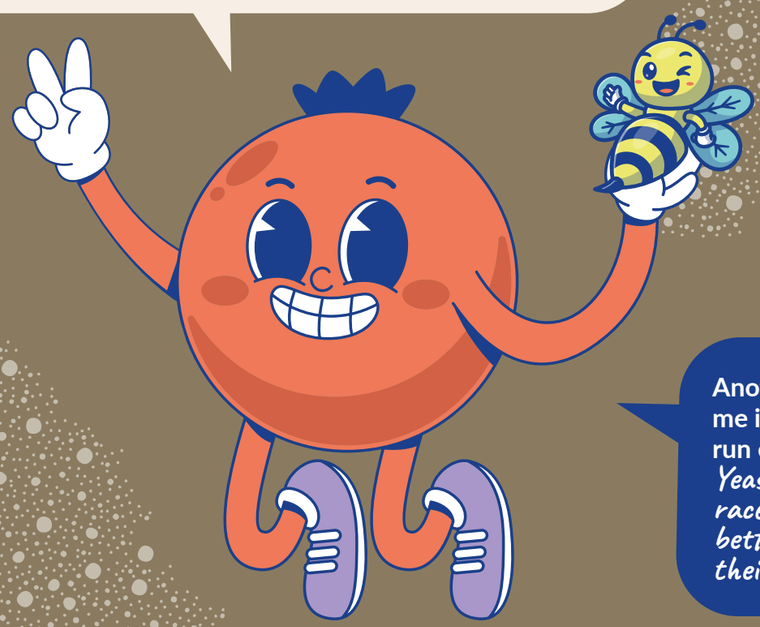
Puppies

- Yeast promotes healthy digestion in puppies.
- It prevents the growth of bad bacteria in their belly.
- It also supports their growth and development.

Let's play!

Many animals benefit from the superpowers of yeast: here are the farmed animals that love yeast. But one of them stands out from the rest - can you spot the odd one out?

Did you know?
Some wasps have yeast in their stomach! They eat it when they feed on fermented fruit and then leave some of that yeast behind. Wasps therefore contribute to the fermentation process that turns grapes into wine. Incredible, no?

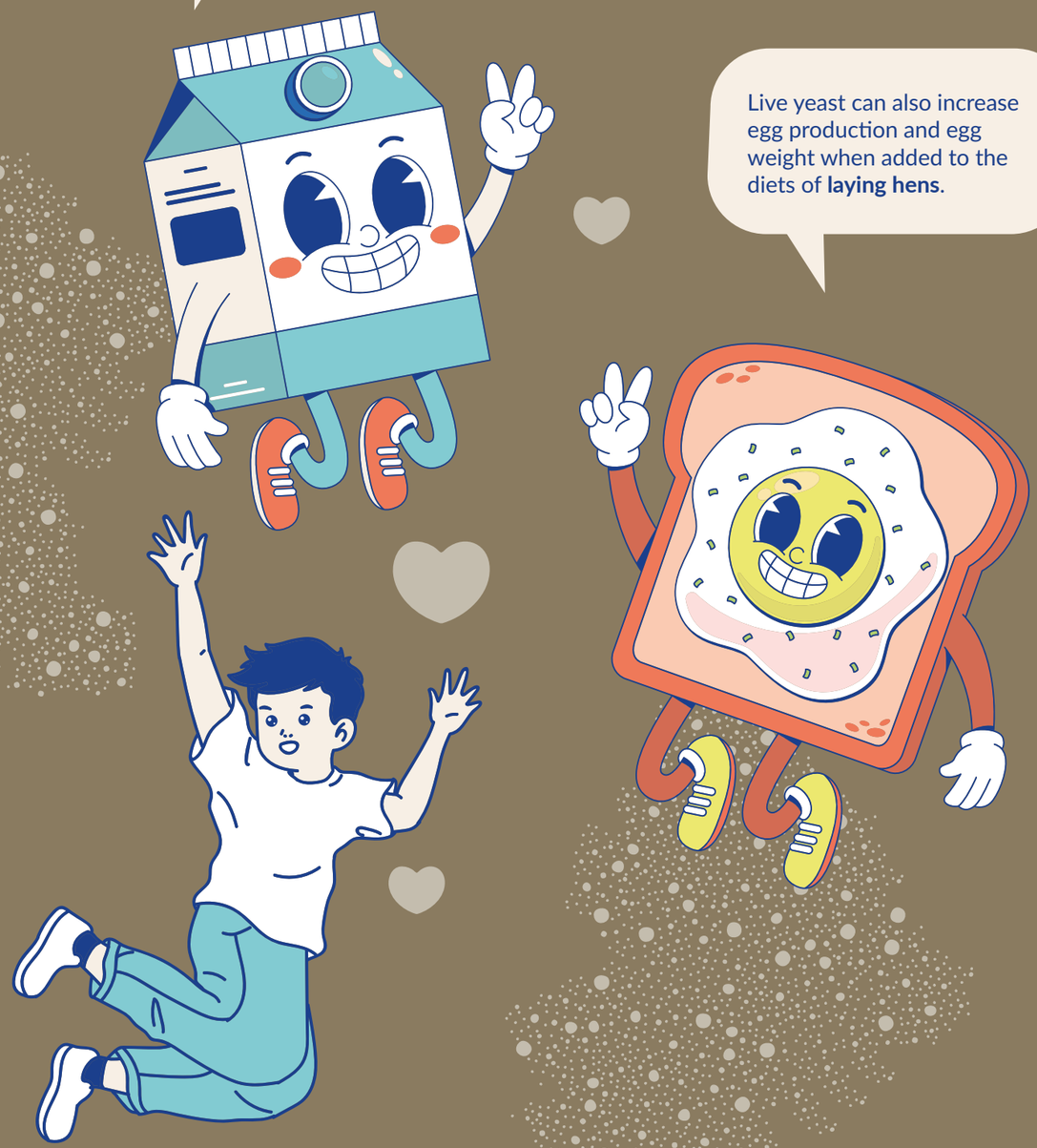


Another great thing about me is that I can help horses run even faster!
Yeast can also help racehorses to perform better, improving both their health and speed.

From yeast to delicious milk and eggs

Incorporating live yeast into the diets of **dairy cows** can have beneficial effects on their health and improves milk quality and production. Great for your hot chocolate in the morning or after school!

Live yeast can also increase egg production and egg weight when added to the diets of **laying hens**.



Now it's your turn!

Answer the questions in this quiz by circling the correct answer.

1 Why is yeast added to pet food?

A To extend the shelf-life of food

B To improve the digestion of pets and help them fight off diseases

C To improve thair behaviour

2 What effect does yeast have on the coat of animals?

A It gives it a lighter colour

B It makes it curl

C It makes it shinier

3 What can help hens to lay more eggs?

A Adding yeast to their diets

B Tickles

C Playing rock music in their barn

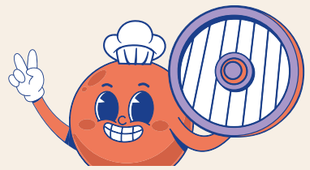
To sum up

Yeast is your everyday ally.

In this guide, you have learned that yeast is an incredible living organism - super small but with superpowers! Yeast can be found all around you - in the environment, in your body, in the kitchen - and plays an essential role in your life. You've also learned that:

Yeast is a microscopic fungus and one of the earliest life forms on Earth. It can be found anywhere around you and humans have used it for thousands of years.

Yeast holds incredible powers: it plays a role in food fermentation, enhances the flavour of dishes, produces fuel, and also protects plants.

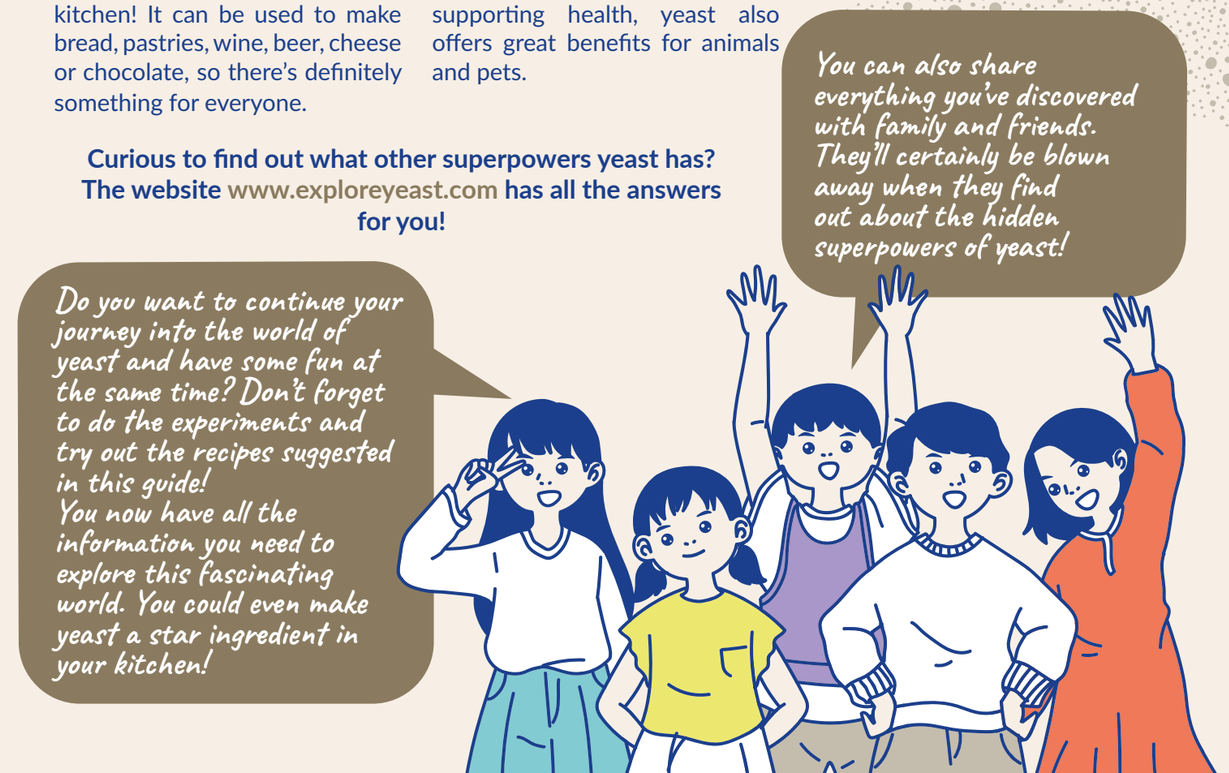


Good for your health, yeast helps your body to fight off infections and promotes healthy digestion. It can also add shine to your hair and restore beauty to your nails.

Yeast works wonders in the kitchen! It can be used to make bread, pastries, wine, beer, cheese or chocolate, so there's definitely something for everyone.

From promoting growth to supporting health, yeast also offers great benefits for animals and pets.

Curious to find out what other superpowers yeast has? The website www.exploreyeast.com has all the answers for you!



My research notes

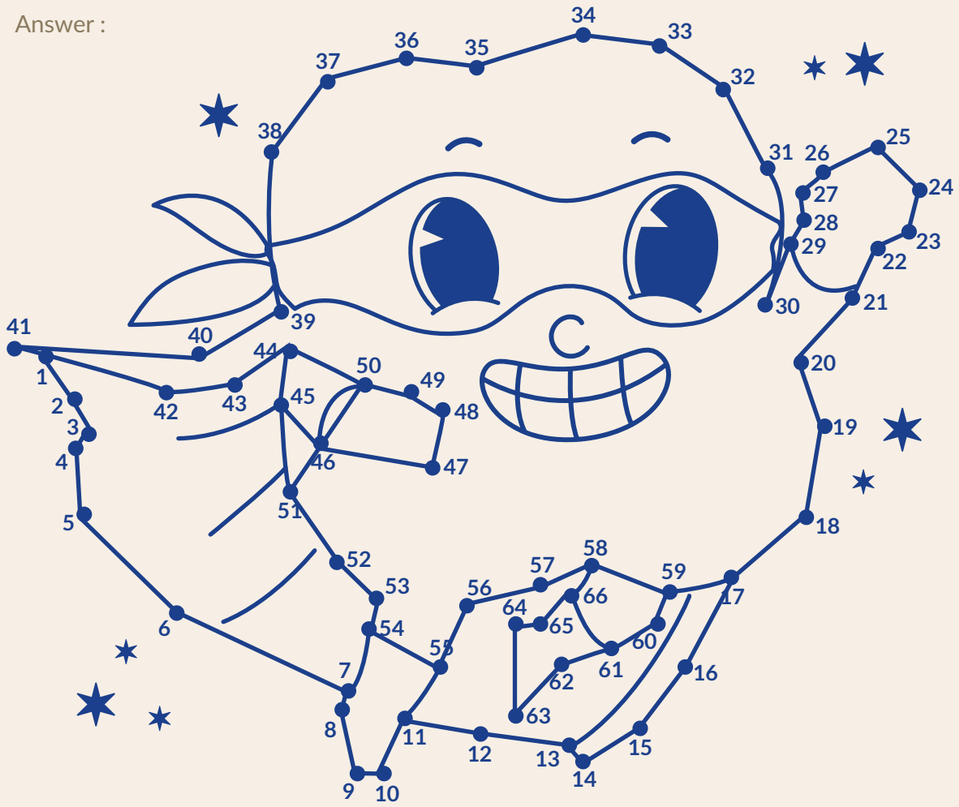
Quiz answers

You'll find the answers to all the games below.

Page 2

Connect the numbered dots in the correct order to make me appear.

Answer :



Page 6

Circle the foods made with yeast.

Answers : chocolate, beer and brioche.

Circle the microorganisms in the following list.

Answers : yeast, viruses, bacteria, microalgae.

Page 11

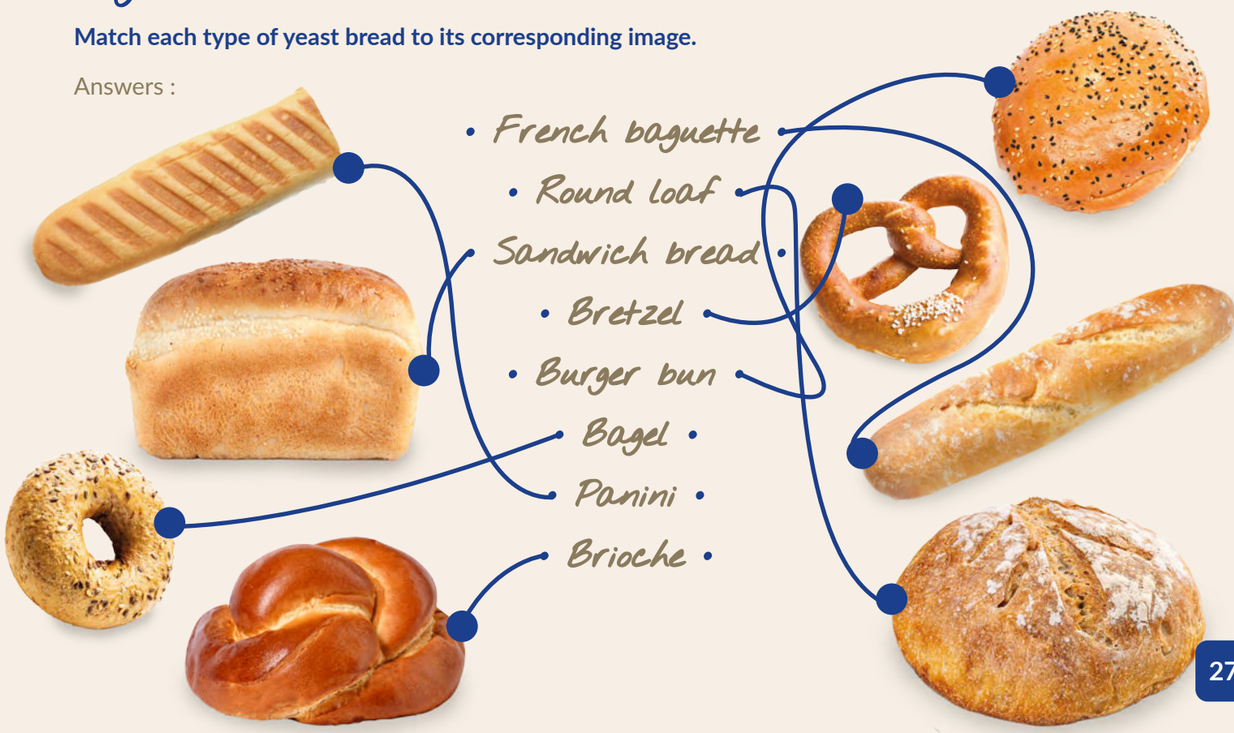
Put the correct number next to each microbiome.

Answers : Oral microbiome: 3, Lung microbiome: 5, Gut microbiome: 4, Skin microbiome: 1, Vaginal microbiome: 2

Page 16

Match each type of yeast bread to its corresponding image.

Answers :



Page 17

Create your own bread recipe and help the baker make it!

Answers :
1 - Flour, yeast
4 - Put the right number next to each step:
- 1 - Mix the basic ingredients together
- 2 - Knead the dough
- 3 - Add the other ingredients
- 4 - Resting and Fermentation
- 5 - Shape the bread dough
- 6 - Let the dough rise a little more
- 7 - Baking

Page 21

Can you spot the odd one out?

Answer : the gorilla

Page 23

Answer the questions in this quiz by circling the correct answer.

Answers : 1-B, 2-C, 3-A

www.lesaffre.com
www.exploreyeast.com