



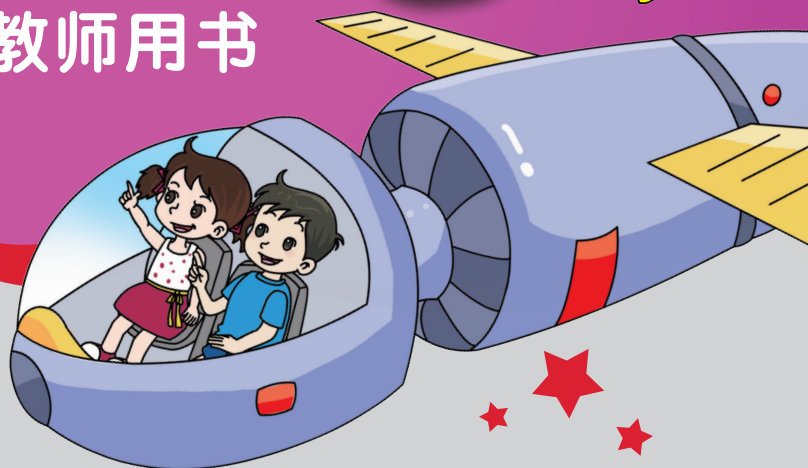
学科·英语整合课程

5A



Light Up 科学 Science

教师用书



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Scope and Sequence

Unit	Lesson	Science
		Key Concepts
1. Seeds (4 class hours)	1. Seed Dispersal 2. Seed Germination 3. Grow the Best Seedlings	<ul style="list-style-type: none"> Seeds need enough space to grow into healthy seedlings. Wind and animals can help to disperse seeds. Seeds need water and heat to germinate. Seeds do not need light to germinate. Seedlings need light, water and heat to grow. Soil is the best material for growing seedlings.
2. Sound (4 class hours)	1. Vibrations and Sound 2. Where Can Sound Travel? 3. Muffling Sound	<ul style="list-style-type: none"> Sounds come from vibrations. Sounds can have high pitch or low pitch. Fast vibrations have high pitch. Slow vibrations have low pitch. Sound can travel through solids, liquids and gases. Sound cannot travel in space. Sponge is a good material for muffling sound.
3. Microbes (4 class hours)	1. Kinds of Microbes 2. Yeast 3. Microbes and Food	<ul style="list-style-type: none"> Microbes are very small living things. I can use a microscope to see them. Some microbes are good. Some microbes are bad. Yeast is a microbe. When it grows, it makes a gas. Yeast needs sugar and warm water to grow well. Yeast helps bread to rise. Some food is made with microbes.
4. Earth, Moon and Sun (4 class hours)	1. A Day and a Year 2. Phases of the Moon 3. Our Solar System	<ul style="list-style-type: none"> The earth turns round once in 24 hours. This is called “one rotation”. The earth moves round the sun once in a year in a curved path. This is called an “orbit”. The moon reflects light from the sun. When you see the moon from the earth, the bright shapes are called the “moon’s phases”. The moon’s phases change. The moon moves round the earth once every month. There are eight planets in the solar system. A big group of stars is called a “galaxy”. Our galaxy is called “the Milky Way” galaxy.

Science			Language	
	Inquiry and Design Process Skills	Attitudes and Values	Key Words	Sentence Structures
	<ul style="list-style-type: none">● Observe● Model● Measure and record● Design and conduct simple experiments	<ul style="list-style-type: none">● Appreciate the wonder of nature● Care for living things	disperse, germinate, grow, heat, light, sand, seed, seedling, soil, water	<ul style="list-style-type: none">● (Wind/Animals) can help to disperse seeds.● Seeds need (water/heat) to germinate.● (Soil) is the best material for growing seedlings.
	<ul style="list-style-type: none">● Observe and compare● Model● Conduct simple experiments	<ul style="list-style-type: none">● Be curious about high/low pitched sounds● Be keen to do experiments	ear protector, gas, high, liquid, low, muffle, pitch, solid, sound, travel, vibration	<ul style="list-style-type: none">● The sound has a (high/low) pitch.● Sound can travel through (solids/liquids/gases).● (Sponge) muffles sound best.
	<ul style="list-style-type: none">● Observe● Classify● Conduct simple experiments	<ul style="list-style-type: none">● Develop an interest in microbes	bread, cold, food, microbe, rise, sugar, warm, yeast	<ul style="list-style-type: none">● (Yeast) is a microbe.● Yeast needs (sugar/warm water) to grow well.● (Bread/Yoghurt) is made with microbes.
	<ul style="list-style-type: none">● Observe● Model● Sequence	<ul style="list-style-type: none">● Begin to appreciate the vast scale of space	day, earth, galaxy, moon, moon's phases, orbit, planet, rotation, shine, solar system, star, sun, year	<ul style="list-style-type: none">● The (earth/moon) moves round the (sun/earth) once in a (year/month).● I can see (half the moon/a full moon).

UNIT 3

MICROBES

SCIENCE OBJECTIVES

By the end of this unit, students will be able to:

- Understand what microbes are.
- Describe how microbes can be used to make food.
- Explain how to prevent the spread of diseases caused by microbes.

LANGUAGE OBJECTIVES

In this unit, students will have opportunities to use:

- Words relating to microbes and foods made with microbes.
- The sentence structures:
 - “(Yeast) is a microbe.” to describe a microbe.
 - “Yeast needs (sugar/warm water) to grow well.” to describe the conditions yeast needs for growth.
 - “(Bread/Yoghurt) is made with microbes.” to describe the use of microbes.

UNIT OVERVIEW

There are many living things far too small for us to see. Microbes are found in almost all places on earth. There are more microbes on your hand than there are people on the entire planet. In this unit, students will learn about microbes and their uses in daily life. The learning will be relevant and practical. All students will be able to relate their own lives to the contents and the practical examples within the unit.

The cover page shows microscopic images of microbes. Students may not have seen such images and may find them scary. Ask students what shapes they can see and what these shapes look like. The text introduces the idea of smaller living things playing a part in our lives. Lesson 1 introduces microbes, how they can be seen and where they can be found. Microbes are classified into bad ones and good ones. Lesson 2 focuses on yeast and what it needs to grow. Lesson 3 takes a look at how microbes can be used to make food.

Lesson 1 Kinds of Microbes

Objectives

By the end of this lesson, students will be able to:

- State that microbes are very small living things.
- Know that microbes can be seen under a microscope.
- Explain that some microbes are good and some are bad.

Overview

This lesson introduces what a microbe is. It is important to let students realize that not all microbes are bad. Another aim of the lesson is for students to know why they should wash their hands before eating or handling food and why household appliances like fridges are useful.

Stimulus Activity

The stimulus cartoon shows Mary telling Tom to wash his hands, but he says

his hands look clean. You might invite students to share their ideas about whether they think Tom's hands are clean or not, and why. Ask students questions such as: How often do you wash your hands? Why do you wash your hands?

Activity 1

If you have access to microscopes and prepared slides, allow students to look at the slides in pairs or small groups. Students can look at the slides in their hands and discuss what they can see. Compare this with what students can see through the microscope.

Lesson 1
Kinds of Microbes

Why should Tom wash his hands before eating?

Wash your hands, Tom.

My hands look clean.

Key Word
microbe (微生物)



Activity 1

Microbes are very small living things (生物). We can use a microscope (显微镜) to see microbes.



Lesson 1

There are some challenges when using a microscope — one is to ensure that students start with the lowest magnification and then increase it. Ask them to identify the numbers on the lenses, and make sure students are starting with the smallest. The second challenge is to ensure that students are seeing what you want them to see. It can be difficult to get around to everyone to check in a large class. Either have the slides set up first or have some images you can show to help students look at what they should do.

If you do not have access to a microscope, then use images to help students see the enlarged microbes.

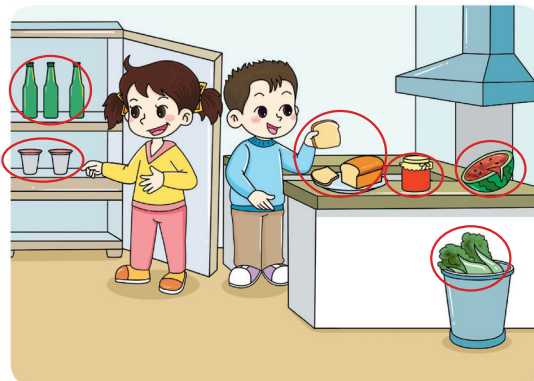
Microbes are found in all places and on all surfaces. However, in this illustration, there are particular locations where the conditions are right for microbes to flourish. Microbes might be living and growing in yoghurt, bread, dough, old fruit and vegetables, dirty surfaces, on hands, on the floor, etc. The yeast used to make bread will have been killed off during the baking process.

Activity 2

This activity begins to introduce the idea that there are good and bad microbes. Ask students to look carefully at the pictures, and then work in pairs or small groups to discuss what they see. Through this discussion, students can decide if they think the microbes are good (i.e. helpful in some way) or if they are bad (i.e. cause a negative effect).

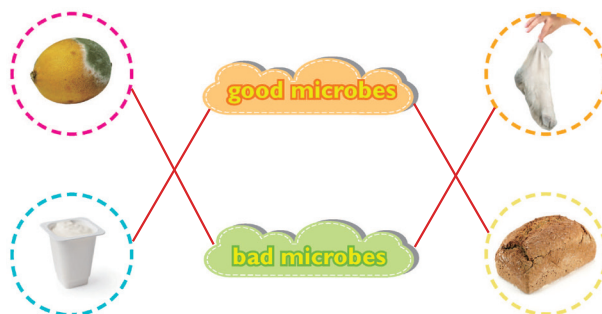
Unit 3 Lesson 1

Where can you find microbes? Circle the places.



Activity 2

Which microbes are good? Which microbes are bad? Draw lines.



Activity 3

If we do not do these things, what will happen? Draw pictures.



Wash your hands
before eating.



Put food into the
fridge.



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Activity 3

This activity needs students to start thinking about the consequences of not trying to prevent the spread of microbes. Students can draw pictures (some may want to annotate these) to demonstrate what will happen if they do not do these things in the pictures. The key point of the first image is to encourage students to realize that microbes can be transferred from hands to food and then to the mouth when eating. The second image tells the idea that cooler temperatures slow down microbial growth and thus slow down the rate at which food goes bad. There are other questions you can ask, such as: How did people prevent food from going bad before the fridge was invented? (By pickling, curing or salting.) Why can we keep food longer in the freezer than in the fridge? (Food can be kept longer in

the freezer, because the temperature in the freezer is colder than the fridge, typically -18°C . Bacterial growth stops at this temperature, allowing food to be kept longer.)

Lesson 1

Activity 4

In this activity, students sing a song to the tune of “Baa, Baa, Black Sheep”. “The Microbe Song” focuses on Molly and Marty. The song helps students to review that microbes are very small, reinforces the knowledge that microbial growth is faster in warm conditions, and introduces the term “yeast” and how yeast can be used to help make bread. You can use this to link to the next two lessons (Lesson 2 focuses on yeast, and Lesson 3 gives students an opportunity to make bread using yeast).

You can ask questions to consolidate students’ learning, such as: What would happen if the meat Molly was eating was kept in the fridge? (Microbes would grow more slowly.) What might happen if we did eat the meat Molly was growing on? (We might get sick.) Where might Molly have come from? (From dirty hands, for example.) You might also like to ask students if they know how Marty helps the bread to rise (by making a gas). This anticipates Lesson 2.

Unit 3 Lesson 1

Activity 4

What do you know about microbes? Sing the song.

The Microbe Song

Molly is a microbe too small to see.
Molly and her microbes, feeding on the meat.
If Molly and her microbes are given some warm meat,
Then this warm meat will not be good to eat.

Marty is a microbe in a pack of (一包) yeast (酵母).
Marty and his microbes are good for us to eat.
For Marty and his microbes help the bread to rise (膨胀),
There are friendly (友好的) microbes.
Now that is a surprise (意想不到的事)!

Now I Know ...

Microbes are very small living things. I can use a microscope to see them.
Some microbes are good. Some microbes are bad.

How I Know ...

- ☐ I did an experiment.
- ☒ I observed microbes.
- ☒ I classified microbes.



Now I Know ...

微生物是非常微小的生物，我可以用显微镜观察它们。
有些微生物是有益的，有些微生物是有害的。

How I Know ...

Learning in this lesson is through observing and discussing. Students also classify microbes into good microbes and bad microbes. There is no experiment in this lesson.

Find Out More!

How can microbes cause diseases (疾病)? A cough or sneeze (喷嚏) can spread microbes through the air for several metres (几米). What should Bob do? Draw in the circle.



Find Out More!

So far this lesson has focused on the transfer of microbes by touching, although there are other ways of spreading diseases. The activity introduces the idea of droplet infection. You can ask students what Bob should do to prevent his cold from spreading. There are different views on this, and it is important to trigger students' thinking, not necessarily to elicit a right or wrong answer. One method is to wash your hands frequently for good hygiene before eating. Another is to cover your mouth and nose when sneezing and coughing. A third possible idea is to wear a mask, which will prevent people from becoming ill and will stop someone who is already ill spreading a disease. The mask prevents the spread of illness because it acts as a physical barrier which stops microbes

from passing through it. For this reason it is important to fit a mask properly, otherwise some microbes may escape (or find their way in) from around the edges.

Lesson 2 Yeast

Objectives

By the end of this lesson, students will be able to:


- State that yeast is a microbe.
- Describe the best conditions yeast needs to grow.
- Explain that a gas is produced when yeast grows.

Overview

This lesson looks at yeast as an example of a microbe. It compares dry yeast with growing yeast, highlighting the conditions required for yeast to grow and that a gas is produced when yeast grows. Students will be able to collect this gas and compare the volumes produced under different growing conditions. This is a practical activity which allows students to make these comparisons.

Lesson 2 Yeast

Why does the bread look so fluffy (松软的)?




Key Words


cold (冷的)
sugar (糖)
warm (温暖的)
yeast (酵母)

Activity 1

Use a hand lens to look at the dry (干的) yeast. Can you see living things (生物)?



Add some sugar to a cup of warm water. Then add some dry yeast. Stir (搅拌) and wait. What can you see?



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Stimulus Activity

The stimulus activity shows a picture of leavened bread, i.e. bread made with yeast. It is worth asking students about different types of bread they have eaten to compare if they are all the same and what any differences might be. The bread looks fluffy because the yeast in the bread produces gas.

Activity 1

You will need some dry yeast in small containers for students to look at. Let them talk about what they see and how they would describe it. Note that the individual microbes are too small to see, and there will be millions of cells in a spoonful of dried yeast.

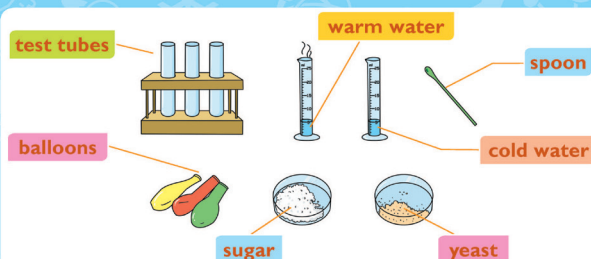


Yeast is a microbe. It uses sugar to grow. When yeast grows, it makes a gas.

Activity 2

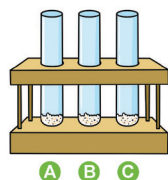
Does yeast need water to grow well?

You need



What to do

- 1 Add some sugar and yeast to the three test tubes (试管). Label (标记) them A, B and C.



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You can prepare some hand lenses for students to take a close look at the dry yeast. After the observation, students will have an opportunity to observe what happens when the yeast starts to grow. Only small quantities of yeast are needed, and do not need to be measured precisely. Mix some warm water (not too hot), a teaspoon of sugar and a teaspoon of yeast. Ask students to observe what happens. The water will become cloudy, which might distract them from the small bubbles that will form around the yeast. It will take about five minutes before bubbles appear. Ask students to think about how they know whether it is the water, the sugar or both that helps the yeast grow. (In the experiment, students will observe the changes that arise from adding warm and cold water to sugar and yeast. They will see that sugar and warm water helps yeast to grow.) This will lead to the

next activity. You could start one yeast and water mixture before the lesson so that it is active when students arrive.

Activity 2

For this activity, each group will need three test tubes, three balloons, some warm water, cold water, sugar and yeast. They will need a spoon for measuring sugar and yeast. As students are making a comparison, the quantities should be as close as possible in each test tube.

Lesson 2

Students will add sugar and yeast to all of the test tubes: one teaspoon of yeast and 1/4 teaspoon of sugar. The first test tube is labelled A, and no more is added to it. The second test tube is labelled B, with 5 ml of warm water added. The third is labelled C, with 5 ml of cold water added. Place a balloon over each of the tubes. Then wait for 30 minutes.

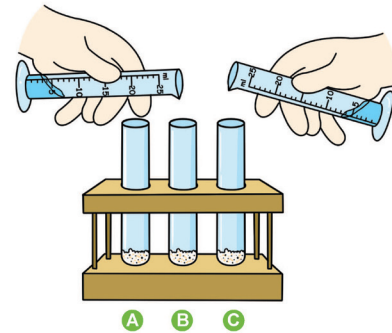
There is no change in A. The yeast requires water to grow, which has not been provided.

The balloon should be inflating as it collects the gas produced from B. The gas yeast produces is carbon dioxide (CO₂). As it fills the test tube, it will be trapped in the balloon, so the balloon inflates.

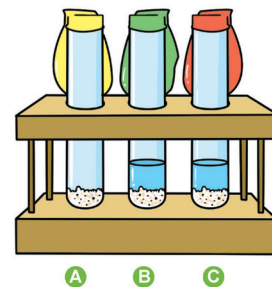
There should be little change in C, though a small amount of gas may be produced. Students may see bubbles around the yeast or the balloon inflating a little. Through comparison, students will find that yeast needs water to grow and that it grows better in warm water than in cold water.

Unit 3 Lesson 2

- 2 Add 5 ml of warm water to B. Add 5 ml of cold water to C. Stir.

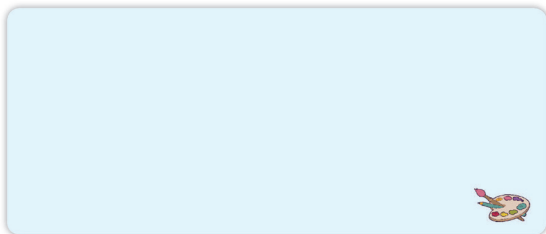


- 3 Put the balloons over the three tubes. Wait for 30 minutes.



Results

What can you see after 30 minutes? Draw a picture.



Conclusion

Yeast (needs / does not need) water to grow well.
Yeast grows better in (cold / warm) water.

Now I Know ...

Yeast is a microbe. When it grows, it makes a gas.
Yeast needs sugar and warm water to grow well.

How I Know ...

- ☒ I did a fair test.
- ☒ I saw yeast.
- ☐ I made a model.



Now I Know ...

酵母是微生物，生长时会产生气体。
糖和温水有利于酵母充分地生长。

How I Know ...

Learning in this lesson is through observing and by experimenting with yeast. Students do not make a model in this lesson.

Lesson 3 Microbes and Food

Objectives

By the end of this lesson, students will be able to:

- Explain how to make bread.
- Identify different foods made using microbes.
- Describe why yeast is used to make bread.

Overview

This lesson draws upon the previous lesson by extending what students have learnt about yeast (it needs warm water and sugar to grow most quickly) and applies this to making bread. This lesson is very practical and allows students to make bread before looking at other foods made using microbes.

Stimulus Activity

The cartoon shows Mary and her mother making bread. You can ask questions such as: What ingredients can you see? (Flour, water, yeast and sugar.) What do you remember about yeast? (Yeast makes a gas as it grows.)

If you have a loaf or slice of bread, students can look closely at it. Point out how light it is. Look at the spongy texture. This is made by gas from the yeast.

Activity 1

This is a very simple method for making bread. Ensure that students wash their hands before they start. You can ask them why they need to do this and link back to Lesson 1 where you introduced the idea of invisible microbes being spread through contact with food.

Lesson 3 Microbes and Food



Key Words

bread	(面包)
food	(食物)
microbe	(微生物)
rise	(膨胀)
yeast	(酵母)

Activity 1

How can you make bread?

You need



What to do

- 1 Add the yeast to some warm water and sugar. Stir (搅拌) and wait for 5 minutes.



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Add the sugar water with yeast to the flour. Mix (混合) to make a dough (生面团).

3

Knead (揉) the dough.



4



Leave the dough in a warm place for 20 minutes. What happens?



5

Bake (烘烤) your bread dough in an oven.



Mix the sugar, warm water and yeast together. Ask students why warm water and sugar are added, to consolidate the previous lesson's learning. Add the warm water gradually. Do not make the dough too wet. Make sure the work area is clean.

After kneading the dough, leave it for about 20 minutes. Students should notice that the dough starts to rise. A good small dough might double in size as it rises, indicating that the yeast is doing its work and making gas. You may need to bake the bread in different batches depending upon the size of the oven available. It is also possible for students to take their dough home and bake it at home.

Students should be warned not to touch the top or sides of the oven when it is on and while the dough is baking inside.

Lesson 3

Activity 2

This activity could be done while the bread is baking, or afterwards if students are using the baking time to tidy up and clean.

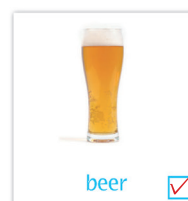
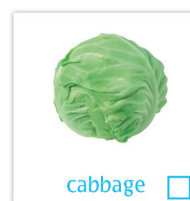
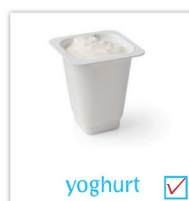
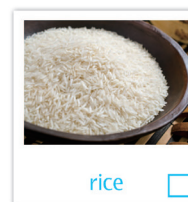
Students should know that bread is made using microbes (yeast), and beer is also made using yeast (you can make links with the bubbles when the bread rises and the bubbles in beer), and yoghurt is made using bacteria. Some examples were presented in Lesson 1 where students were asked to identify good and bad microbes.

Microbes are not used to prepare rice. However, cooked rice does contain a bacterium that can cause food poisoning. If cooked rice is left to stand for a long period of time in a warm place, the bacteria will reproduce in high numbers, which could cause illness.

Unit 3 Lesson 3

Activity 2

Which foods are made with microbes? Tick (✓).



Now I Know ...

Yeast helps bread to rise.
Some food is made with microbes.

How I Know ...

- ☒ I made bread.
- ☒ I classified food.
- ☐ I did an experiment.



Now I Know ...

酵母使面包膨胀。
有些食物是使用微生物制成的。

How I Know ...

Learning in this lesson is through linking the previous lesson to a real life context of making bread. There is no experiment in this lesson.

Find Out More!

Microbes can make food go bad. Where are the microbes from? What did they need to grow?

1



Put a piece of bread into a plastic bag.

2



Add some water.

3



Seal (密封) the bag. Observe the bread each day. What can you see?



Throw (扔) the bag into the rubbish bin (垃圾桶). Do not open it.



Let's Practise!

In this activity, students are able to observe changes over a period of time. The bread placed in the bag is fresh, but the growth of microbes is visible after some days. Ask students where these microbes have come from — they should be able to suggest that the microbes were invisible before the bread was placed in the bag. They might suggest the yeast has started to grow, as they now know this microbe is used in making bread. You can discuss what the yeast looked like compared with what they are seeing now, and they should be able to identify that this is different. Links can be made here with what would have happened if you had placed the bag in the fridge or on top of a radiator. You could ask students to take a photograph of the bread each day to make a timeline. Ask students to

briefly describe what is happening and why. (After water has been added to the bread, students should observe nothing on the first day. After a few days, students will be able to see tiny specks of microbes growing on the bread. Students will observe that larger amounts of microbes will grow on the bread as more days pass, until the entire piece of bread is covered with mould.)

Unit Review

- 1 This question is to see if students recognize the presence of microbes on their hands and the possibility of transferring them to food and their mouths if hands are not washed before eating.

Unit Review



- 1 Why must Tom wash his hands before eating? Tick (✓).



- ☐ Because his mother told him to.
- ☐ Because water makes food taste good.
- ☒ Because there are microbes on his hands.
- ☐ Because there are microbes in his food.

- 2 Yeast is a microbe. What is yeast used for? Tick (✓).



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Unit 3 Review

3 Mary's mother wants to make bread. What will she need?
Tick (✓).



oven



salt



flour



meat



water



jam



sugar



yeast

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Notes

第三单元 微生物

科学目标

通过本单元的学习，学生将能够：

- 理解什么是微生物。
- 描述如何使用微生物做食物。
- 解释如何防止微生物引起的疾病的传播。

语言目标

在本单元中，学生将有机会使用：

- 与微生物和使用微生物制成的食物相关的词汇。
- 句型：
 - “(Yeast) is a microbe.” 来描述哪个是微生物。
 - “Yeast needs (sugar/warm water) to grow well.” 来描述酵母的生长条件。
 - “(Bread/Yoghurt) is made with microbes.” 来描述微生物的用途。

单元概述

许多生物太过微小，我们无法用肉眼看到。地球上几乎所有地方都能发现微生物，人们手上的微生物数量比地球上的总人数还要多。在本单元中，学生将学习有关微生物的知识，以及微生物在日常生活中的用途。本单元的学习内容既实用又切合实际，所有学生都能把自己的生活与本单元的内容和实例联系起来。

篇章页展示了微生物的显微图像。学生也许没见过这样的图片，可能会觉得它们很吓人。提问学生他们看到了哪些形状，这些形状看起来像什么。篇章页的文字引出了微生物在我们日常生活中的作用这一概念。第一课介绍了微生物，怎样才能看见它们以及可以在哪里找到它们。微生物可以分为有害的和有益的两大类。第二课关注酵母以及酵母生长所需要的条件。第三课介绍如何使用微生物制作食物。

第一课 各种各样的微生物

教学目标

通过本课的学习，学生将能够：

- 说出微生物是极小的生物。
- 知道可以在显微镜下看见微生物。
- 解释有些微生物是有益的，有些则是有害的。

概述

本课介绍什么是微生物。重要的是要让学生认识到并非所有微生物都是有害的。本课的另一个目的是让学生知道为什么饭前或拿食物之前要洗手，以及像冰箱之类的家电为什么有用。

导入活动

导入活动的卡通图展示了玛丽让汤姆去洗手，汤姆说他的手看上去很干净。教师可以请学生就汤姆的手是否干净这一问题展开讨论，并说出原因。向学生提出一些问题，比如：你多久洗一次手？你为什么要洗手？

活动一

如果教师有显微镜和准备好的玻片，请学生两人一组或几人一组观察这些玻片。学生可以观察手中的玻片，讨论他们所看到的東西。让学生对肉眼观察到的结果和通过显微镜观察到的结果进行比较。

在使用显微镜时，教师会遇到一些挑战。第一个挑战是要确保学生从最低的放大倍数开始观察，然后逐渐增加放大倍数。让学生识别镜头上的数字，确保他们从标有最小数字的镜头开始。第二个挑战是确保学生看到的结果是教师想要他们看到的。在一个大的班级里，要核查每个学生的观察结果很难。教师可以事先装好玻片，或者展示一些图片帮助学生明白他们应该怎样做。

如果教师没有显微镜，可以让学生观察放大后的微生物图片。

微生物无处不在。然而在这幅插图中，展示了一些特殊的、具备微生物繁殖的条件合适的地方。微生物可能在酸奶、面包、生面团、不新鲜的水果蔬菜、脏东西的表面、

手上、地板上等地方生存和生长。而用来制作面包的酵母在烘烤过程中就被杀死了。

活动二

本活动开始介绍微生物分为有益的和有害的这一概念。让学生仔细观察图片，然后两人一组或几人一组，讨论他们所看到的结果。通过讨论，学生可以判断出图中的微生物是有益的（即：在某些方面有用）还是有害的（即：会产生负面影响）。

活动三

本活动需要学生开始思考不阻止微生物传播的后果。请学生通过画图（有些学生可能想给图画加注释）来展示如果没有按照图片上那样做，将会发生什么。第一幅图旨在鼓励学生认识到微生物可以从手上转移到食物上，然后在吃东西的时候进入嘴里。第二幅图介绍了这样一个概念，即较低的温度会使微生物的生长变慢，从而减缓了食物变质的速度。教师可以提问其他问题，比如：在冰箱发明之前，人们是如何防止食物变质的？（腌制、熏制和盐渍。）为什么冷冻室里的食物比冷藏室里的食物保存时间更长？（食物可以在冷冻室里保存更长时间，因为冷冻室温度比冰箱低，一般为 -18°C 。在这个温度下，细菌停止生长，食物可以保存更久。）

活动四

在本活动中，学生将用“Baa, Baa, Black Sheep”的曲调唱这首歌。“The Microbe Song”这首歌关注的对象是莫莉和马蒂。这首歌将帮助学生复习“微生物是极小的”这一概念，巩固所学知识——微生物在温暖的环境中生长速度较快，同时引入了“yeast”这一单词以及如何使用酵母制作面包这一主题。教师可以将这首歌和接下来的两课联系起来（第二课重点讲酵母，第三课给学生提供使用酵母制作面包的机会）。

教师可以通过提问帮助学生巩固所学的知识，比如：如果我们把莫莉吃的肉放在冰箱里会怎么样？（微生物会生长的更慢。）如果莫莉在肉上生长，而恰好我们吃了这块肉，会发生什么事情？（我们会生病。）莫莉可能从哪里来？（比如：来自不干净的手。）教师也可以提问学生是否知道马蒂是如何帮助面包膨胀的（通过产生气体）。这一点将第二课中提到。

现在我知道……

微生物是非常微小的生物，我可以用显微镜观察它们。

有些微生物是有益的，有些微生物是有害的。

我是如何知道的……

在本课中，学生的学习是通过观察和讨论完成的。学生还把微生物分为有益的和有害的。本节课没有实验。

- ☐ 我做了实验。
- ☒ 我观察了微生物。
- ☒ 我给微生物分类。

发现更多!

到目前为止，本课关注了微生物通过接触传播的方式，当然疾病传播还有其他方式。本活动介绍了飞沫传染的方式。教师可以提问学生，鲍勃应该如何防止自己将感冒传染给别人？就这一问题学生可以有不同的观点，重要的是激发学生的思考，而不必非要判断学生的答案是对还是错。一种方法是饭前勤洗手，保持卫生。另一种方法是打喷嚏、咳嗽时捂住嘴和鼻。第三种可行的方法是戴口罩，防止被传染，也可以防止已经生病的人传播疾病。口罩是一种物理屏障，能够阻止微生物通过，所以能防止疾病的传播。因此，戴合适的口罩很重要，否则一些微生物会从周边空隙中逃脱（或者进入）。

第二课 酵母

教学目标

通过本课的学习，学生将能够：

- 说出酵母是一种微生物。
- 描述酵母生长所需的最佳条件。
- 解释酵母生长时会产生气体。

概述

本课介绍了酵母这种微生物，将干酵母与生长中的酵母进行比较，强调酵母生长需要的条件以及酵母生长时会产生气体这一现象。学生将收集酵母生长时释放的气体，并比较不同生长条件下产生的气体体积。这是一个让学生进行比较的实践活动。

导入活动

导入活动展示了一张松软面包的图片，即加了酵母的面包。教师可以让学生说一说他们吃过的不同类型的面包，比较这些面包是否相同，又有哪些不同。面包之所以松软是因为面包中的酵母产生了气体。

活动一

教师需要在小容器里准备一些干酵母让学生观察。让他们说出观察到了什么，并进行描述。需要注意的是，单个酵母太过微小以至于肉眼看不到，一勺干酵母中会有数百万个细胞。

教师可以准备一些放大镜，让学生近距离观察干酵母。之后，学生将有机会观察酵母开始生长时会产生什么现象。实验只需用到少量酵母，不需要精确测量。将一些温水（不要太烫）、一小勺糖和一小勺酵母混合在一起。让学生观察产生的现象。水会变得浑浊，这可能会干扰学生观察酵母周围产生的小气泡。大约五分钟后，便会产生气泡。请学生思考他们是如何知道究竟是水、还是糖或是二者共同作用使酵母生长的。（在实验中，学生将观察向糖和酵母分别加入温水和冷水时的不同反应。他们会发现糖和温水有助于酵母生长。）这将引出下一个活动。上课前，教师可以把酵母和水混合在一起，这样在上课时，酵母就已经有了活性。

活动二

在本活动中，每组学生需要三个试管、三个气球、温水、冷水、糖和酵母。他们还需要一把勺子量取糖和酵母。因为学生需要进行比较，所以每个试管中的量要尽可能一致。

学生应向所有试管中加入糖和酵母：一勺酵母、四分之一勺糖。第一个试管标记为 **A**，里面不要再加入其他东西。第二个试管标记为 **B**，要再加入 5 毫升温水。第三个试管标记为 **C**，要再加入 5 毫升冷水。在每个试管口上套一个气球，等待 30 分钟。

A 中不会发生任何变化，因为酵母需要水才能生长，而这个试管中没有加水。

随着 **B** 中产生的气体进入气球，气球应该逐渐膨胀。酵母产生的气体是二氧化碳（ CO_2 ）。气体充满试管之后会进入气球，因此气球会膨胀起来。

C 中虽然会有少量气体产生，但是变化会比较小。学生可能会观察到酵母周围少量的气泡，或是气球膨胀了一点儿。通过比较，学生会发现：酵母生长需要水，并且在温水中比在冷水中生长得好。

现在我知道……

酵母是微生物，生长时会产生气体。

糖和温水有利于酵母充分地生长。

我是如何知道的……

在本课中，学生的学习是通过观察酵母和用酵母做实验完成的。在本课中，学生没有制作模型。

☒ 我做了公平实验。

☒ 我观察了酵母。

☐ 我制作了一个模型。

第三课 微生物和食物

教学目标

通过本课的学习，学生将能够：

- 解释如何制作面包。
- 识别使用微生物制作的不同的食物。
- 描述使用酵母制作面包的原因。

概述

在上一课中，学生已经学到酵母需要温水和糖才能迅速地生长，本课在这一知识的基础上进行了拓展，学生将运用这些知识制作面包。这一课非常具有实践性，先让学生制作面包，再让学生观察使用微生物做的其他食物。

导入活动

卡通图展示了玛丽和妈妈正在做面包。教师可以提出一些问题，比如：你们看到了哪些原料？（面粉、水、酵母和糖。）关于酵母，你们还记得什么？（酵母生长时会产生气体。）

如果教师有一条面包或一个面包片，学生可以近距离观察面包。指出面包有多轻，

观察它的疏松结构，这一结构是由酵母产生的气体导致的。

活动一

这是一个非常简单制作面包的方法。确保学生在开始制作面包之前洗手。教师可以问学生为什么要先洗手，从而把这节课与第一课联系起来。在第一课中，已经介绍通过接触可以将肉眼看不到的微生物传播到食物中这一概念。

将糖、温水和酵母混合在一起。问学生为什么要加温水和糖，以巩固学生上一课所学的知识。慢慢地加温水，不要让面团太湿。保证工作区干净。

揉好面团之后，等待约 **20** 分钟。学生应当注意到面团开始膨胀。一个发酵好的小面团随着膨胀，体积可达原来的 **2** 倍，表明酵母发挥了作用并产生气体。教师要根据烤箱的大小分批烘烤面包。学生也可以把面团带回家烘烤。

当烤箱运行，烘烤面团时，应提醒学生不要碰烤箱的顶部和四周。

活动二

本活动可以在烘烤面包时进行，如果学生利用烘烤面包的时间收拾、整理实验物品的话，也可以稍后进行这个活动。

学生应该知道面包是使用微生物（酵母）制成的，啤酒也是使用酵母制成的（教师可以将面包膨胀时产生的气泡和啤酒中的气泡联系起来），酸奶则是使用细菌制成的。一些例子已经在第一课分辨有益的和有害的微生物时提到过。

制作米饭时不需要用到微生物。但是煮熟的大米中包含一种细菌，会使食物产生毒素。如果煮熟的大米在温暖的环境中放得过久，细菌会大量繁殖，可能会引发疾病。

现在我知道……

酵母使面包膨胀。

有些食物是使用微生物制成的。

我是如何知道的……

在本课中，学生的学习是通过将前两课的学习内容与现实生活中做面包的例子联系起来完成的。本课中没有实验。

☒ 我制作了面包。

☒ 我给食物分类。

☐ 我做了实验。

让我们练习吧！

在本活动中，学生将在一段较长的时间内观察面包发生的变化。放入袋子时面包还是新鲜的，但几天后就能看到微生物在面包上的生长。问学生，这些微生物来自哪里——学生应该能提出面包被放进袋子之前，上面的微生物是看不见的。因为学生现在知道用酵母制作面包，他们也许会提出面包的变化是因为酵母的生长。教师和学生一起讨论、比较酵母和他们所看到的面包的变化，学生应该能够识别出其间的不同。教师可以问学生，如果把袋子放在冰箱里或暖气片上，将会发生什么，从而和前面的学习内容联系起来。教师可以要求学生每天拍一张面包的照片，制作一张时间表。让学生简单描述面包的变化及原因。（给面包加水后，第一天学生应该观察不到什么。几天后，学生将观察到面包上长出的少量的微生物。随着时间的推移，学生将观察到面包上更多的微生物，直到整片面包发霉。）

单元复习

1. 这一问题是为了考查学生是否知道手上有微生物，是否认识到如果吃饭之前没有洗手，这些微生物有可能会转移到食物上，从而进入嘴里。

教学反思

Unit 2

Practise the Words!


What does Susan say? Write the letters.

A **high** B **low** C **muffle**
 D **travel** E **vibrations**

- Sounds come from **E**.
- Fast vibrations have **A** pitch. Slow vibrations have **B** pitch.
- Sound can **D** through solids, liquids and gases.
- If a sound is too loud, you can use an ear protector to **C** the sound!

9

Which Is Fastest?



A runner (赛跑运动员) travels 20 km (千米) in one hour. A racing car (赛车) travels 150 km in one hour. A passenger plane (客机) travels 500-1000 km in one hour. Sound travels 1,224 km in one hour.



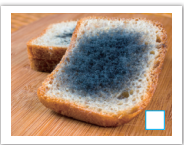

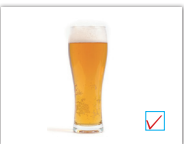
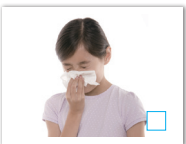
Which is fastest?

(Possible answer)
 Sound is fastest. Compared with the runners or the other things, it travels the farthest distance in one hour.

UNIT 3 **MICROBES**

Lesson 1 **Kinds of Microbes**

Which microbes are good? Tick (✓).


	
	
	

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Unit 3

Lesson 2 Yeast


Put balloons over the three tubes. What can you see after 30 minutes? Draw pictures.

- 

cold water + sugar + yeast → (Student's own drawing.)

The balloon will stay deflated.
- 

warm water + sugar + yeast → (Student's own drawing.)

The gas will inflate the balloon.
- 

warm water + yeast → (Student's own drawing.)

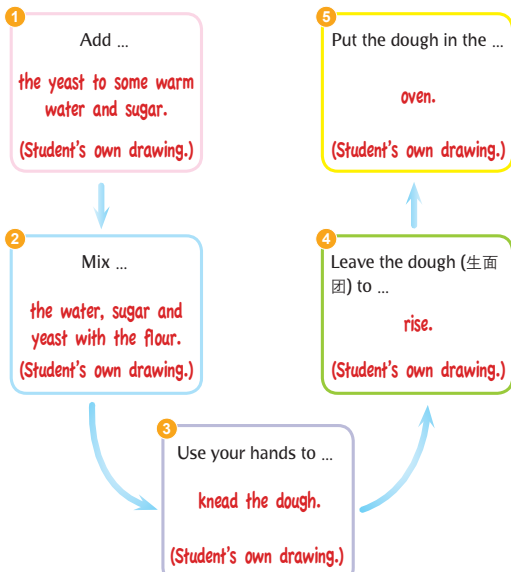
The balloon will stay deflated.

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Lesson 3 Microbes and Food

How can you make bread? Draw pictures.

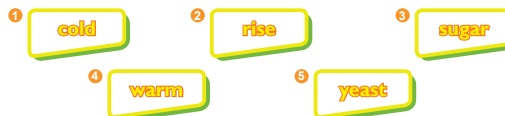



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Practise the Words!



Write the numbers.



1. When we make bread, we add dry  5.

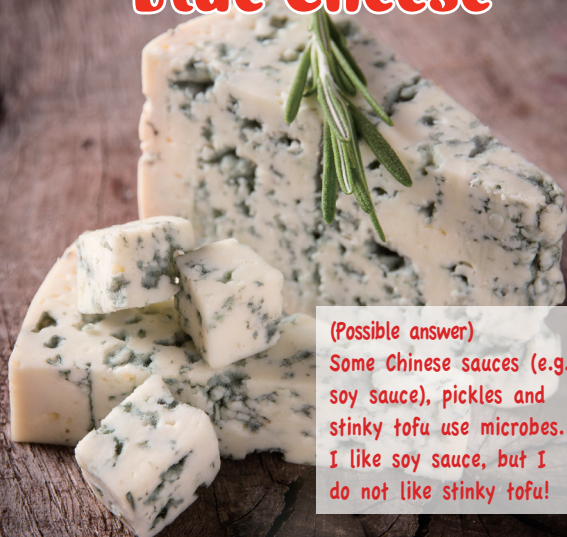
2. Yeast is a microbe. Yeast uses  3
and 4 water to grow. Yeast will not grow well in
1 water.

3. When yeast grows, it makes a gas. The gas helps the
bread to 2.



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Blue Cheese



(Possible answer)
Some Chinese sauces (e.g.
soy sauce), pickles and
stinky tofu use microbes.
I like soy sauce, but I
do not like stinky tofu!

Look at this cheese (奶酪). Some of it is blue or
green. Why? It has microbes in it! But people still
like to eat it. It has a strong, salty (咸的) taste.
What Chinese foods use microbes? Do you like
them?

UNIT 4 EARTH, MOON AND SUN



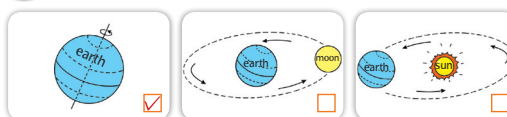
Lesson 1 A Day and a Year



Where is the sun? Tick (✓).



Which one is a day? Tick (✓).



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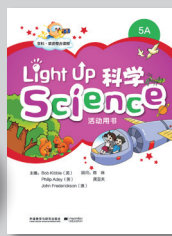
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Level 5 包括



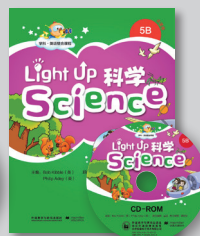
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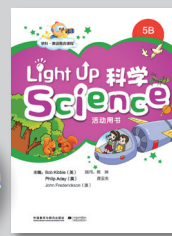
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