

3B

学科·英语整合课程

# Light Up 科学 Science

教师用书

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# Scope and Sequence

Unit	Lesson	Science
		Key Concepts
1. Measurement (4 class hours)	1. Measuring Mass 2. Measuring Area 3. Measuring Volume	<ul style="list-style-type: none"> <li>● Mass is what makes you heavy. I can use scales to measure mass. If an object changes its shape, it has the same mass.</li> <li>● An area is how much space a shape covers. I can count squares to measure area. Longer shoes often make larger footprints.</li> <li>● Volume is how much space an object takes up. I can use measuring cylinders or measuring jugs to measure volume.</li> </ul>
2. Habitats (4 class hours)	1. Where Do Animals Live? 2. Different Habitats 3. Migration and Hibernation	<ul style="list-style-type: none"> <li>● Every animal needs a place to live. These places are called “habitats”. Different animals live in different habitats.</li> <li>● Different habitats have different animals. Habitats have food for animals.</li> <li>● Some animals migrate. Some animals hibernate.</li> </ul>
3. Electricity (4 class hours)	1. Circuits 2. Switches 3. Conductors and Insulators	<ul style="list-style-type: none"> <li>● Electricity can only go through a complete circuit. A complete circuit has no gaps.</li> <li>● I can use a switch to turn circuits on and off.</li> <li>● Metals conduct electricity. They are called “conductors”. Some materials do not conduct electricity. They are called “insulators”.</li> </ul>
4. Making a Lighthouse (4 class hours)	1. Make It 2. Test It 3. Think Again	<ul style="list-style-type: none"> <li>● We can make a simple lighthouse.</li> <li>● We improve technology by designing, making and testing.</li> </ul>

Science		Language	
Inquiry and Design Process Skills	Attitudes and Values	Key Words	Sentence Structures
<ul style="list-style-type: none"> <li>● Observe</li> <li>● Measure</li> <li>● Compare</li> <li>● Conduct simple experiments</li> </ul>	<ul style="list-style-type: none"> <li>● Be keen to do experiments</li> <li>● Appreciate that precise measurement is important</li> </ul>	area, gram, mass, measure, millilitre, scales, square, square centimetre, volume	<ul style="list-style-type: none"> <li>● The (mass/area/volume) is 80 (g/cm<sup>2</sup>/ml).</li> </ul>
<ul style="list-style-type: none"> <li>● Observe</li> <li>● Classify</li> </ul>	<ul style="list-style-type: none"> <li>● Care for animals and the environment</li> <li>● Appreciate that humans have a responsibility to preserve habitats</li> </ul>	desert, food, forest, grassland, habitat, hibernation, migration, sea	<ul style="list-style-type: none"> <li>● (Birds/Camels) live in the (forest/desert).</li> <li>● The (shrimp/frog) is food for the (fish/snake).</li> <li>● (Wild geese/Mice) (migrate/hibernate).</li> </ul>
<ul style="list-style-type: none"> <li>● Observe</li> <li>● Compare</li> <li>● Conduct simple experiments</li> </ul>	<ul style="list-style-type: none"> <li>● Be keen to do experiments</li> <li>● Gain confidence in handling simple electrical components</li> </ul>	battery, bulb, complete circuit, conduct, conductor, electricity, insulator, switch, turn off, turn on, wire	<ul style="list-style-type: none"> <li>● (Metals/Wood) (conduct/does not conduct) electricity.</li> <li>● The bulb (lights/does not light).</li> </ul>
<ul style="list-style-type: none"> <li>● Design and make</li> <li>● Test and evaluate</li> <li>● Rethink and improve</li> </ul>	<ul style="list-style-type: none"> <li>● Be creative</li> <li>● Be keen to use materials in different ways</li> <li>● Be willing to share ideas</li> </ul>	circuit, lighthouse, tower	<ul style="list-style-type: none"> <li>● I can turn my light (on/off).</li> </ul>

## UNIT 4

# MAKING A LIGHTHOUSE

### SCIENCE OBJECTIVES

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

- Make a simple model lighthouse.
- Assess their designs and suggest changes for improvement.

### LANGUAGE OBJECTIVES

In this unit, students will have opportunities to use:

- Words relating to making a circuit and a model lighthouse.
- The sentence structure “I can turn my light (on/off).” to describe how their model works.

### UNIT OVERVIEW

In this unit, students use their knowledge to make a model lighthouse. The process involves thinking and talking about the purpose of a lighthouse, the materials which might be used, and the ways in which an electric circuit might be integrated into students’ designs. The unit helps students to see an application for their earlier understanding of electric circuits, covered in Unit 3. You can situate the lighthouse in the context of the island on which Susan and Tom find themselves. This gives students a reason for making the model lighthouse.

The unit cover page reminds students of the island context and introduces the idea of a flashing light. In Part 1, students design and make a lighthouse from simple materials, one step at a time. In Part 2, the lighthouse is tested in a dark room or a long corridor. In Part 3, students are encouraged to reflect on their experiences and improve their designs.

# Part 1 Make It

## Objectives

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

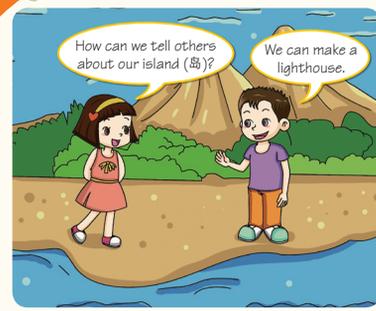
- Select an appropriate object for the tower of the lighthouse.
- Add a simple complete circuit to the tower.
- Make an island for the lighthouse.

## Overview

In this part, students make their lighthouses. As they do so, they revise and review previous work on simple circuits. You might want to have a model lighthouse on show, or some images of lighthouses from the Internet.

## Stimulus Activity

The cartoon shows Susan and Tom talking about how they might tell others about the island. To direct thinking, you might invite students to respond to questions such as: Have you seen a lighthouse? Is a lighthouse tall or short? Where can we find a lighthouse? Try to elicit the purpose of a lighthouse by asking questions such as: What is a lighthouse for? Why do we need a lighthouse? You might like to invite students to draw some preliminary lighthouse designs of their own, and share their designs with each other.



**Key Words**

circuit (电路)

lighthouse (灯塔)

tower (塔身)

## Step 1 Make a tower.

You need



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Cut off (剪掉) the bottom (底部) of the bottle (瓶子).



Wrap (用……包) paper round (围绕) the bottle.



Draw on the paper. Make it look like a lighthouse.



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## Step 1

In this step, students make a tower. Ask students to think of an object that can be used as a model tower. Provide some images of real lighthouses for students. The tower-like shape seen in images should help students to select a suitable object for the main tower.

We show a plastic bottle as a suggestion for a tower. A plastic bottle will make a good tower. You could ask students to cut the bottom of the bottle so that the wires could be put inside the bottle. If the sharp scissors are too dangerous for students, the wires can be taped to the outside of the bottle to avoid the need to cut it. Students could also use a cardboard tube or a long box for the tower. String or elastic bands could be used as well or in place of sticky tape.

You might ask questions such as: Is the

tower a particular colour or a particular shape? Will the tower be able to stand up on its own? What makes this a good choice for a model tower?

## Step 2

In this step, students use tape to stick their circuit to the tower. The bulb should be at the top and clearly visible. The switch needs to be accessible to turn the bulb on and off. The wires connecting to the bulb need to be long enough to allow the bulb to sit at the top of the tower.

You need to provide each group of students with enough materials for them to make a simple circuit: a battery, a switch, a bulb and three connecting wires. Ensure that all students are engaged in making the circuit. It can be disconnected and reassembled by different students so that everyone has some experience of connecting the components together. The key ideas are that the circuit must be “complete” (i.e. that there is a complete path for the electricity) and that the switch can control the flow of electricity through this complete path.

## Step 2 Add a circuit.

You need

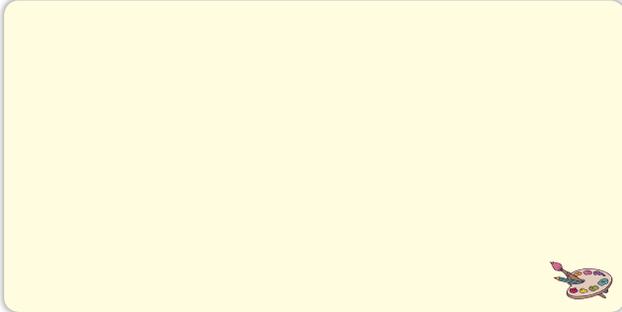


Tape (用胶带贴) the bulb on the top (顶部) of the tower.

Connect (连接) the bulb to a battery and a switch. Add a cover (罩子).



Draw a picture of your tower with the circuit.



### **Step 3 Add the lighthouse to an island.**

Make an island for your lighthouse.



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Encourage students to make a sketch of the tower. Invite them to describe what they have drawn. Some might feel confident to add labels to their drawings.

### **Step 3**

Students need materials to make a model island. Coloured card or paper can be cut into the shape of an island. Encourage students to be creative. They can make their own stone mountains or forests to stick onto the island. The lighthouse will not be to scale — it is likely to be far bigger in the model.

Capturing these models using a digital camera will allow students to make a wall display of their technology tasks and retain a sense of pride and ownership in their creative work.

## Objectives

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

- Demonstrate their lighthouses and test if they work.
- Compare their model with other models.
- Describe the best features of model lighthouses.

In this part, students test their lighthouses in a dark room or a long corridor. In the Student's Book, we have provided three criteria to help students assess their lighthouses. Once the lighthouse meets a criterion, students can colour the corresponding star. You might encourage high-achieving students to think of other criteria. Certainly you should invite students to decide how best to display and to evaluate the final models. They may wish to place the lighthouses at a distance — at the end of a large room or even outside in a playground space — and check if the lights are visible. Some real lighthouses send out a beam of light at intervals. (This is done by rotating mirrors.) Our model lighthouses can be switched on and off to give their signals.

This work leads itself to a display in the school or in the classroom. Other teachers and students might be invited to see the lighthouses in operation and to give encouragement. The display could include a few photographs of real lighthouses. Materials such as bulbs and switches are likely to be needed by other classes, so such a display might have to be temporary.



Now test your lighthouse in a dark (黑暗的) room.



Can your lighthouse do these things? Colour the stars.

Can it stand up on its own (独自地)?

Can it give out light?

Can you turn it off?





## Part 3 Think Again

What was easy to make? What was difficult (困难的)?



How can you make your lighthouse better (更好的)? Draw a picture.

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## Objectives

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

- Review the process of making their lighthouses.
- Consider ways to make their lighthouses better.

It is always important within technology classes that students can reflect on the making and designing process and in particular on their own contributions.

They need to be able to consider the work of others and also the original task or problem that was presented.

Questions to be asked could include:

Which part did you make? What is good about your model? What could be done differently next time? Allow students to respond to these questions in their own time within groups. Encourage them to listen to the ideas of others in their

group. Students are asked to draw an alternative future design. If they are interested in making another lighthouse, encourage them to make a better one after class.



## Notes

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# 第四单元 制作灯塔

## 科学目标

通过本单元的学习，学生将能够：

- 制作一个简易的灯塔模型。
- 评价他们的设计并提出改进意见。

## 语言目标

在本单元中，学生将有机会使用：

- 与制作电路和灯塔模型相关的词汇。
- 句型 “I can turn my light (on/off).” 来描述他们的模型是如何工作的。

## 单元概述

在本单元中，学生运用所学的知识制作灯塔模型。在这个过程中，学生将思考并讨论灯塔的作用、可能用到的材料，以及把电路组装到灯塔模型中的方式。学生在第三单元中对电路形成了基本的认识，本单元将帮助他们了解电路的实际应用。教师可以把情境设置在汤姆和苏珊所处的那个小岛上，这样学生就有了制作灯塔模型的理由。

篇章页将学生带入小岛的情境，并引入了信号灯。在第一部分中，学生进行灯塔设计，并用简易的材料按照步骤制作一个灯塔模型。在第二部分中，学生在黑暗的房间或者长的走廊里测试灯塔模型。在第三部分中，鼓励学生反思他们的制作过程并改进他们的设计。

# 第一部分 制作灯塔

## 教学目标

通过本部分的学习，学生将能够：

- 选择合适的物体制作灯塔的塔身。
- 把一个简单的闭合回路添加到塔身上。
- 为灯塔制作一个小岛。

## 概述

在本部分中，学生将制作灯塔模型，复习并改进先前学习的简单电路。教师可以展示一个灯塔模型或者一些网上找来的灯塔图片。

## 导入活动

导入活动的卡通图片展示了汤姆和苏珊正在讨论如何告知别人他们所在的小岛。教师可以通过提出以下问题引导学生思考，比如：你见过灯塔吗？灯塔是高还是矮？在哪里可以找到灯塔？教师可以尝试通过以下问题引出灯塔的用途：灯塔是用来干什么的？为什么我们需要灯塔？教师可以请学生画出初步的灯塔设计图，并请学生相互交流他们的设计。

## 步骤一

在本步骤中，学生将制作一个塔身。让学生思考哪些物体能用来做塔身模型。教师可为学生提供一些真实灯塔的图片，图片中塔身的外形能帮助学生选择合适的物体作为塔身主体。

在学生用书中，我们以塑料瓶为例制作塔身。塑料瓶是做塔身的好材料。教师可以让学生剪去瓶底，这样导线就可以置于瓶子内部。如果锋利的剪刀对学生来说太危险，学生可以把导线粘到瓶身外面，这样就不用去剪瓶底了。学生也可以用卷筒芯或长盒子作为塔身，用细绳或橡皮筋来代替胶带。教师可以提出以下问题，比如：塔身有特定的颜色或形状吗？塔身能独自站住吗？哪些特性决定了这种材料适合做塔身？

## 步骤二

在本步骤中，学生用胶带把电路粘到塔身上。灯泡要位于塔身顶部清晰可见的地方。开关要装在易于使用的地方，方便控制灯泡。连接灯泡的导线要足够长，确保灯泡能够位于塔身的顶部。

教师要给每组学生提供足够的材料来制作简单电路，包括一个电池、一个开关、一个灯泡和三根连接用的导线，确保所有学生都参与到制作电路的过程中。可以让不同的学生不断地将电路拆开、重新组装，以便每个学生都获得组装电路元件的体验。关键是要让学生明白他们制作的电路必须是一个“闭合回路”（也就是说有完整的通路让电通过），并且开关要能够控制完整通路中电的流动。

鼓励学生画出塔身的草图，请学生描述他们画好的图。有些学生可能会自信地在草图上加上标签。

## 步骤三

学生需要用材料制作小岛模型，他们可以用彩色卡片或纸张剪出小岛的形状。鼓励学生发挥创造力。学生可以制作石山或森林，然后粘到小岛上。灯塔与小岛的大小不必按照真实的比例，模型中的灯塔很可能比小岛大得多。教师可以用数码相机把学生制作的模型拍下来，然后将学生的技术成果放在展示墙上，这种做法会让学生享有对自己创意作品的自豪感。

# 第二部分 测试灯塔

## 教学目标

通过本部分的学习，学生将能够：

- 展示他们的灯塔，并测试灯塔能否工作。
- 将他们的模型与其他模型进行比较。
- 描述灯塔模型的最佳特征。

## 教学建议

在本部分中，学生将在黑暗的房间或者长的走廊里测试他们的灯塔。在学生用书中，

我们提供了三条标准帮助学生评价他们的灯塔。灯塔每符合一条标准，学生就可以把相应的星星涂上颜色。教师可以鼓励表现优秀的学生思考其他评价标准。当然，教师应该请学生决定如何更好地展示和评价最终的模型。学生可能希望把灯塔放得远一些，比如一个大房间的尽头甚至是教室外的操场上，然后测试灯光能否看得见。现实生活中有些灯塔会利用旋转镜子间歇性地发出亮光。学生可以通过控制灯塔模型的开关发送信号。

可以在学校或教室展示这一活动的成果，也可以邀请其他教师和学生来参观工作中的灯塔并给出鼓励。展览可以包含一些真实灯塔的照片。其他班级可能也需要灯泡和开关这样的材料，所以这样的展览可能只是临时的。

## 第三部分 再想一想

### 教学目标

通过本部分的学习，学生将能够：

- 回顾制作灯塔的过程。
- 思考改进灯塔的办法。

### 教学建议

学生能在技术课上反思制作和设计的过程，尤其是反思自己的贡献，这点很重要。他们要能够评价别人的作品，反思最初的任务或问题。教师可以提出以下问题：你做了灯塔的哪一部分？你的模型的优点是什么？下次哪些地方可以做得不同？教师要给学生时间，允许他们在组内讨论这些问题，并鼓励他们倾听组内其他学生的想法。请学生再画一张新的灯塔设计图。如果学生对再制作一个灯塔很感兴趣，鼓励他们在课下做一个更好的灯塔。

### 教学反思

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## Lesson 3 Conductors and Insulators

Which are conductors? Tick (✓).



## Practise the Words!

Write the numbers.

- 1 complete circuit
- 2 switch
- 3 conductor
- 4 electricity

1. Electricity can go through only a 1.

2. This spoon conducts 4.  
It is a(n) 3.

3. I can use a 2 to turn the circuit on and off.

## A Light Bulb



Possible answer:  
Yes, it is a good thing.  
The bulb uses less energy  
if it is not hot.

Look at this old light bulb. Electricity travels through a thin wire. The wire gets very hot and becomes bright (明亮的). Modern bulbs are bright but not hot.  
Is this a good thing? Why?

## UNIT 4 MAKING A LIGHTHOUSE



## Practise the Words!

Write the numbers.

- 1 light
- 2 lighthouse
- 3 tower

This is a 2. It has a 3 and a light. I can use a switch to turn the 1 on and off.



# Lighthouses



Possible answer:  
The lighthouse uses a foghorn. The foghorn makes a loud noise to warn ships.

A lighthouse warns (警告) ships about danger (危险). People can see the light from far away. Sometimes (有时) there is fog (雾), so people cannot see the light. Then, the lighthouse uses something (某种东西) else (其他的) to warn ships. Do you know what?

## Notes

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## Notes

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# A bright future with

## Light Up Science

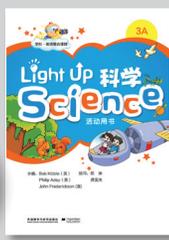


- 吸纳先进理念** 学科·英语整合学习, 创设真实情境, 用英语学科学, 同时自然习得英语。
- 整合三重目标** 培养科学素养, 发展英语语言运用能力, 加速认知发展。
- 选材中西合璧** 既符合中国科学和英语课程标准, 又融入国际化视角。
- 内容贴近生活** 围绕核心概念, 联系现实生活, 关注问题解决和实践创新。
- 语言简单地道** 使用原汁原味的英语, 穿插生动有趣的歌曲歌谣, 培养英语思维方式。

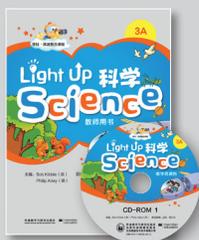
### Level 3 包括



3A学生用书  
(配光盘)



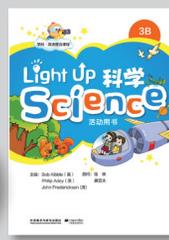
3A活动用书



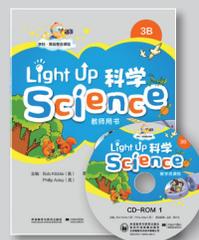
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