

Light and dark

Teacher's Guide CD

Key to interactive features

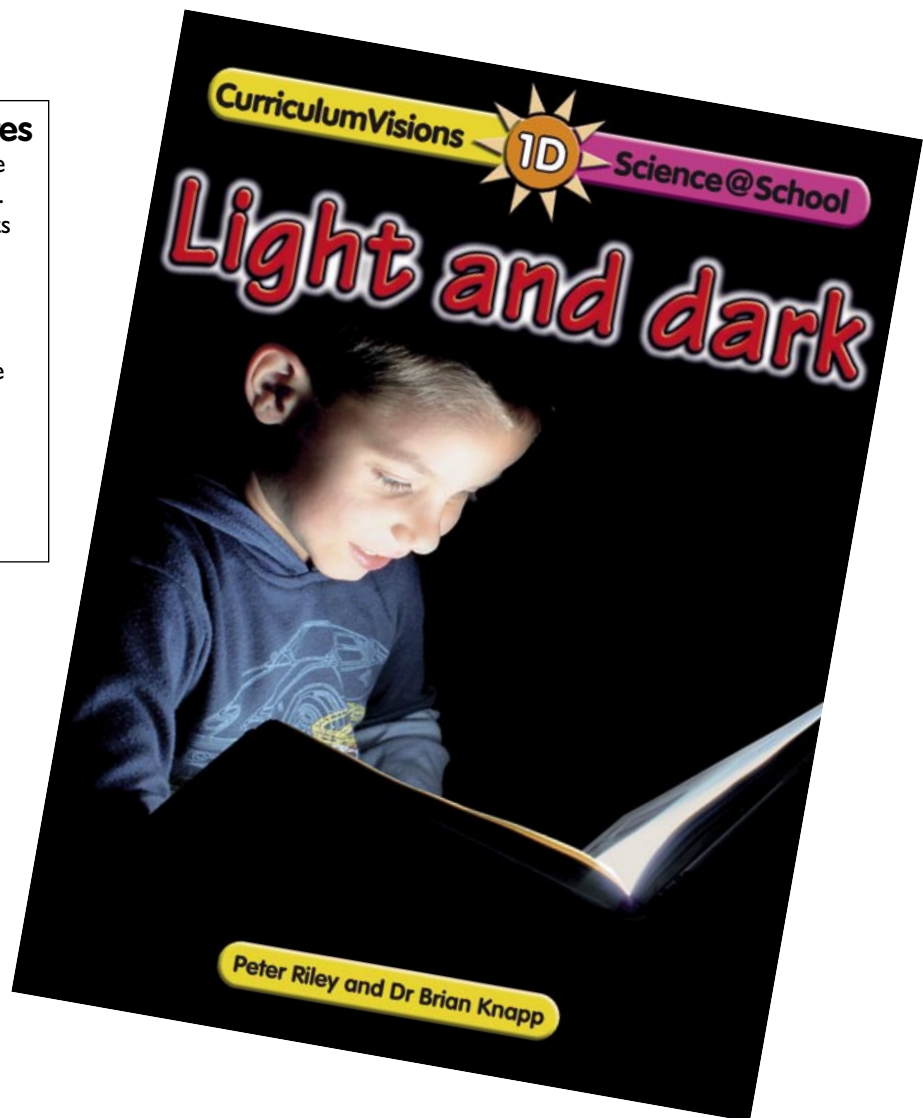
Click on Teacher's Guide CD title above to go straight to Contents. Click on any item in the Contents to go to that page.

You will also find yellow arrows throughout that allow you to:

◀ go back to previous page

▶ go forward to next page

1A go back to contents



Peter Riley

Curriculum Visions

A CVP Teacher's Guide

Copyright © Earthscape 2008

The right of Peter Riley to be identified as the author of this work has been asserted by him in accordance with the Copyright, Designs and Patents Act 1988.

Curriculum Visions' publications are protected by international copyright. The copyright of all materials in this publication remains the property of the publisher. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without prior permission of the copyright holder.

Curriculum Visions does permit the purchasing school to make as many photocopies as they require of the assessment sheets at the back of this publication for educational use, providing that these copies are made and used within the confines of that purchasing school only.

ISBN 978 1 86214 268 8

Author

Peter Riley, BSc, C Biol, MI Biol, PGCE

Senior Designer

Adele Humphries, BA, PGCE

Editor

Gillian Gatehouse

Illustrations

David Woodroffe

Picture credits

All pictures are from the Earthscape and Shutterstock collections

Designed and produced by

EARTHSCAPE

Contents



Introduction	4
1: Light and dark	6
Pictures	8
2: Sources of light	10
Pictures	12
3: Light and burning	14
Pictures	16
4: Dim and bright	18
Pictures	20
5: Dawn and dusk	24
Pictures	27
6: Light and shapes	30
Pictures	32
7: Shiny objects	34
Pictures	37
8: Mirrors	40
Pictures	43
9: Keeping safe	46
Pictures	48
Assessment sheets	
Sources of light/Light and burning ...	51
Dawn and dusk	53
Light and dark	55

Introduction



The pupil's book

The Key stage 1 Science@School series is a series of twelve books. Each one addresses one of the QCA units in the Key Stage 1 science curriculum.

Each spread in the book addresses one or more objectives in a QCA unit by providing photographs, simple text and questions to stimulate discussion.

Each book has an illustrated glossary and a simple index for finding information.

The teacher's guide

It may be that you already have a scheme of work and wish to use the books to support it. Alternatively you could use the books, this CD ROM and the **CurriculumVisions.com** web site, which provides support material in the form of extra text (with audio option), pictures, captions, activities and demonstration videos to build a new scheme. Whichever way you choose, the notes in this teacher's guide have been set out as if you were using each page or spread as the basis for a lesson. You may follow each set of notes in their entirety to build up your lesson or take parts of the notes to fit into your scheme.

The teacher's notes contain information about practical work. You should check your school policies on practical science work and only select activities for which you are confident to take responsibility.

The book *Be Safe!* published by the ASE (ISBN 978-0-86357-324-8) provides useful guidance on carrying out science activities.

The structure of the notes

The notes for each page or spread follow the same structure, which is outlined here.

Objectives

These may be linked to the QCA objectives or build on them to enrich the topic.

Resources and preparation

Suggestions may be made for building on the visual display of the books with posters and models.

There are also pictures (aka flashcards) at the end of the notes to each lesson, which may be printed off and used as triggers to start the lesson or used in the plenary as revision. When the pictures have been used they could be displayed on a wall and others added as the subsequent lessons are completed. This will make a colourful summary of the work which could be used as a final revision resource when the book is completed.

If you are using the **CurriculumVisions.com** web site log in, go to Science, Year 1, Unit 1D Light and dark.

There may be some suggestions for building practical work into the use of the pages in the book and these include a list of requirements (simple, readily available materials) and advice on preparing the requirements for use in the lesson.

Introduction



Starting the lesson

Each lesson begins with a short activity, which helps settle the children and focus them on the work ahead.

Activities with the page

These may be reading activities, observing and discussing the pictures or answering a question. There may also be practical activities which are designed to develop a range of practical science skills from making observations to carrying out fair tests.

Differentiation

There are suggestions for providing help and activities for children of different abilities.

Assessment

There are suggestions for assessing the children's work. There are three assessments for you to print off at the end of this guide. These are for use with lesson 2 (page 51), lesson 5 (page 53) and after completing all the lessons (page 55), or you could use all three together as an end of unit test. Guidance for the answers is given in the assessment section of the lesson notes.

Plenary

The work done in the lesson is reviewed in this section and there may be a further activity to help secure the children's knowledge.

Outcomes

These may be linked to the QCA objectives or build on them to enrich the topic.



Light and dark

Objectives

- To know that light is needed to see.

Resources and preparation

A large cardboard box painted black inside with an eye hole in one of the short sides and a slit about 2 cm wide across the top of the box and covered in a translucent material such as tissue paper or greaseproof paper. Some pale coloured objects and some dark coloured objects. A cover such as a towel to put over the top of the box and the head of the viewer to make conditions as dark as possible for looking in the box. Put a pale coloured object in the box before you start the lesson. After the session to start the lesson ask a helper to secretly put a dark coloured object in the box while you perform the first three activities with the book. A selection of objects in pale and dark colours.

Starting the lesson

Ask the children what time of day it is when it is dark. Look for an answer about night and then ask about what can be seen when it is dark. The children may talk about things they can see with the aid of a street lamp or a torch so tell them that you have made a place where it is really, really dark. And there is something hiding in the dark. Show the children the box and explain how it is covered with a towel to keep the light

out and that the head has to be covered when looking through the eye hole to keep everything really dark. Ask for a volunteer to look into the box and say what can be seen. They should not be able to see anything except blackness. Tell them that you are slowly going to let some light into the box by removing the towel slowly at the other end so light can shine through the slit. Ask the children to tell you when they can see something but not to say what it is. When the object has been spotted replace the towel and let another volunteer have a look. When everyone has had a look, ask them what they saw and then remove the object to check their observation.

Activities with pages 4 and 5

- Read the introductory sentence and remind the children that they could not see into the box when there was no light shining into it.
- Read the first paragraph and then look at the photograph on the left and read the caption with the children. Ask the children to tell you what a canoe is then let them check the answer by looking it up in the glossary on page 22.
- Ask the children about the colours they can see and about the shape of the canoes.



Teacher's sheet



- Read the second paragraph and look at the picture on the right and read the caption with the children. Ask them how the view of the canoes has changed.
- Tell the children that there is a new object in the box and ask for volunteers to have a look. When all have looked ask them if they needed more or less light to see its colours and look for an answer about them needing more light to see the colours.
- Move on to page 5 and look at the left photograph and caption. Ask the children to describe the trees and look for an answer about them being green, having long straight, grey–brown trunks with many branches, having pointed tops and growing on land covered in bright green plants.
- Ask the children to cover the left photograph with their hand and look at the right photograph. Read the caption with them. Ask them to imagine that they had just arrived on the lake in a canoe and were looking at the bank. Ask them to tell you about the trees now and look for an answer about them having pointed tops.

Differentiation

You could let the children look at other objects in the dark box at other times. They could work in pairs with one child putting the objects in the box and increasing the light while the other looks through the eye hole. The pair could then swap places. Less confident learners may need help to organise themselves while more confident learners may wish to put other objects in the box from around the classroom.

Assessment

The children can be assessed on the way they worked together in pairs using the box and the objects.

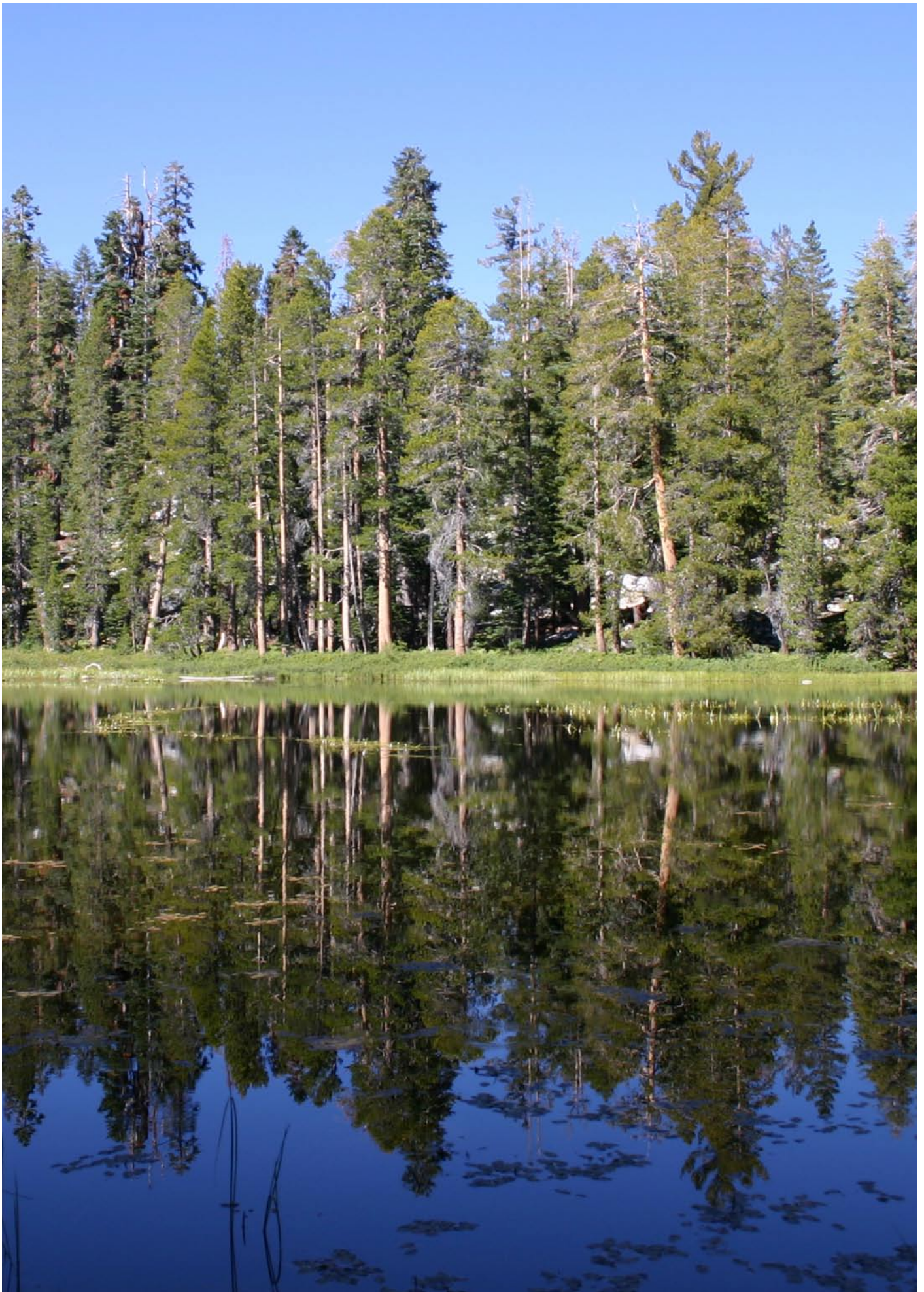
Plenary

Read the question on page 5 with the children and ask them to check the meaning of moonlight in the glossary on page 22. Look for answers about people being able to see a little but not being able to make out colours easily.

Outcomes

The children:

- Know that light is needed for things to be seen.







Sources of light

Objectives

- ▶ To know that light is provided by a source.
- ▶ To know there are different light sources.
- ▶ To know that they must never look directly at the Sun.

Resources and preparation

Close the curtains and blinds, switch off all the lights, the TV and computer to make sure that there are no sources of light in the room. You will need a table lamp with the shade removed so the bulb can be seen.

Starting the lesson

Bring the children into the darkened room. Ask them if the room brightened up with light when they came in and conclude that it did not. Tell the children that this means they do not give out light. Ask them to look round and see if any object in the room is giving out light and conclude that they are not. Ask the children how they are able to see in the room if nothing is giving out light and look for answers indicating that the Sun outside is giving out light and some of this is reaching us even when the weather is cloudy. Tell the children that something which gives out light is called a light source and quickly switch on the lamp. Move on to switch on the computer and the television and point

out that they are giving out light. Switch on the whiteboard projector and then the classroom lights then make the room ready for reading the book.

Activities with pages 6 and 7

- ▶ Read the introduction and ask the children about the things in the classroom which give out light.
- ▶ Read the first sentence then tell the children that people must not look directly at the Sun as it can permanently damage their eyes.
- ▶ Read the second sentence and ask them to think of a light source which is less bright than the Sun. Look for answers about the light sources in the classroom.
- ▶ Read the caption on page 6 and the caution to emphasise that they must never look directly at the Sun like they can do in the photograph. The reason they can look at the photograph is that it is not giving out light and they are looking at it with the help of a much less bright light source like the lights in the classroom.
- ▶ Move on to page 7 and look at the pictures and the captions. Ask the children to look up neon lights in the glossary to find out more about them.



Teacher's sheet



Differentiation

Ask the more confident learners to count up the number of light sources in the classroom and try and work out how many light bulbs they have in their home. Let the less confident learners make a supervised walk around the school identifying light sources on the corridor, in the office, the staffroom and outside.

Assessment

Let the children make a drawing of the light sources in a town at night. They may draw street lamps, shop windows lit up, a town hall clock lit up, lights lighting shop signs and road signs, someone using a torch, a bicycle and other vehicles with lights on. The children could be assessed on their picture but they could also be invited to talk about it and be assessed on their use of vocabulary. There is an assessment sheet at the end of this guide which can be used after lessons 2 and 3 are completed (page 51).

Assessment guidance

- a – the Sun
- b – the candle flame
- c – the car head lights and side lights
- d – the light bulb
- e – the light bulb
- f – the flames
- g – the numbers
- h – the flame

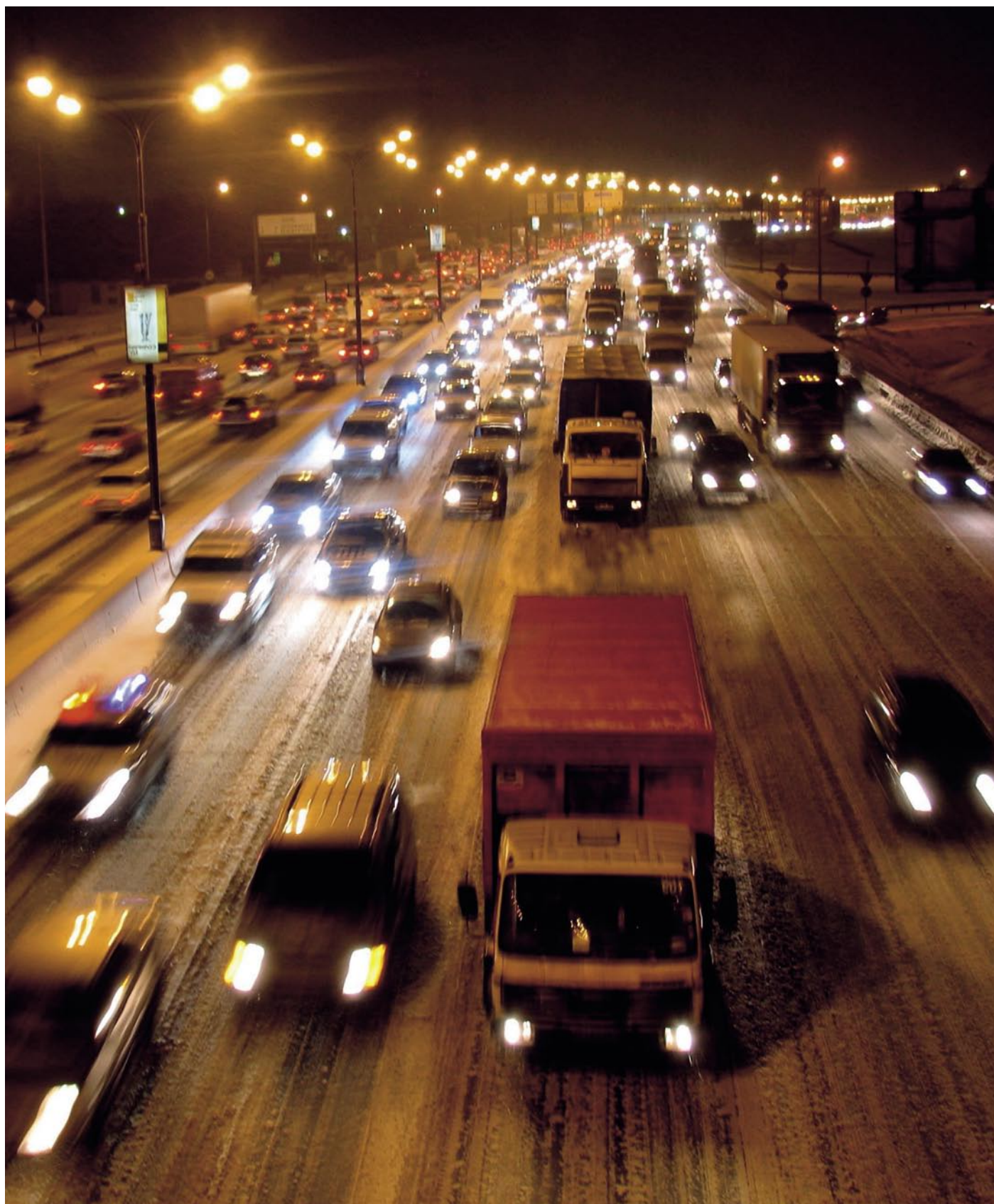
Plenary

The children could display their pictures and talk about them to the class.

Outcomes

The children:

- ▶ Know that light is provided by a source.
- ▶ Know there are different light sources.
- ▶ Know that they must never look directly at the Sun.







Light and burning

Objectives

- ▶ To know that when something burns it gives out light.
- ▶ To know burning materials give out heat which can be dangerous.
- ▶ To know that the light from burning materials can be used in celebrations.

Resources and preparation

Close the curtains and blinds, switch off all the lights, the TV and computer to make sure that there are no sources of light in the room. A tray of sand, a short candle such as a tea light, a box of matches. A selection of candles some short and fat some tall and thin. A clear plastic cup full of water.

Note – the starter in lesson 9 deals with safety around burning light sources.

Starting the lesson

Bring the children into the darkened room. Ask the children about what happened last time they came into the darkened classroom. Look for answers about light sources and let the children point to them. Ask the children what all the light sources had in common and look for an answer that they all needed switching on and used electricity. Tell the children that they are going to see two light sources which do not use electricity. Ask them to think about how the light sources may give out light. If they are finding difficulty mime striking a match

and then when they have identified your mime, strike a match and let it burn for a while before putting it out. Ask the children if they could think of something that could burn longer and give out light and look for an answer about candles. Put a candle in the centre of the sand tray and light it. Ask the children if it is as strong a light source as the table lamp you used last time. Ask the children about other things that burn and give out light. Tell them that they will now check their answers by reading about light and burning.

Activities with pages 8 and 9

- ▶ Read the introduction and then the paragraph with the children.
- ▶ Let the children look at the picture of the sparkler and read the caption. Ask the children to tell you about their experiences with sparklers. And they may tell you about making circles and waves with them.
- ▶ Look at the lower picture and read the caption with the children. Let the children talk about firework displays they have seen.
- ▶ Move on to page 9 and read about the match and the candle. Show the children your collection of candles. Tell the children that when a candle burns it uses up the wax. The wax in the wick melts and burns and heats the wax below the wick and melts it. The molten wax moves up the wick and is



Teacher's sheet



burnt and in time the candle is burnt down. Ask the children to arrange the candles in order of burning, starting with the one they think will burn the longest.

- Light the candle again and put some cards (or some of the children's hands) around the tray but not close enough to feel the heat. Let the children look at their hands and see that they are only dimly lit. Tell the children that in the past people used to put a glass ball filled with water next to a candle. Put the plastic cup filled with water near the candle but not close enough to become warm. See if the children can see how the cup and water concentrate the light into a beam and light up some of their hands. Move the cup around the candle so everyone's hands or cards are illuminated. Tell the children people could use a glass bowl to help them write at night or mend clothes with needle and thread. Move on to look at the picture of the wood fire and the caption. Let the children talk about campfires they might have seen and talk about the dangers associated with fire.

Differentiation

Less confident learners may need help in comparing the candles and may need to feel their weight. More confident learners could look at pictures of firework displays and write down the different colours that they see.

Assessment

The children could make a drawing called burning and light. They can be assessed on the number of examples of burning they feature. More confident learners could label their drawings. There is an assessment sheet at the end of this guide, which can be used after lessons 2 and 3 are completed (page 51).

Assessment guidance

- a the Sun
- b the candle flame
- c the car head lights and side lights
- d the light bulb
- e the light bulb
- f the flames
- g the numbers
- h the flame

Plenary

Read the question on page 9 with the children and ask them to answer it. Look for answers connected with birthdays and religious festivals and celebrations at the beginning of a new year and the gunpowder plot.

Outcomes

The children:

- Know that when something burns it gives out light.
- Know burning materials give out heat which can be dangerous.
- Know that the light from burning materials can be used in celebrations.







Dim and bright

Objectives

- ▶ To know the difference between dim and bright.
- ▶ To know how weather affects light conditions.
- ▶ To carry out a fair test.

Resources and preparation

A selection of torches with batteries already in place (they may have been in use for some time), some new batteries to put in the torches, a sheet of white paper, a ruler, a pencil.

Starting the lesson

Put on all the lights in the classroom and ask the children to describe what it is like. Look for an answer about it being bright. Now turn off all the lights and ask them to describe what it is like again. Look for an answer about it being dim. You may like to put on the light for the whiteboard projector and say that this is a bright light, then turn on a torch which has batteries that are almost used up and describe its light as dim.

Activities with page 10 and 11

- ▶ Read the opening line and ask the children when it was dim in the classroom a few moments ago. Look for an answer about the lights being turned off.
- ▶ Read the next two lines and then look at the pictures on the page and read their captions. Ask the children if they think the photographs were taken in winter or summer and look for an answer about winter. The children could use snow as evidence of it being winter and also the trees being without leaves.
- ▶ Read the last sentence and use it to confirm what the children have just said about it being dim in the classroom when the lights are off.
- ▶ Move on to page 11, look at the two photographs and read their captions with the children. Ask the children if they have been in a wood when it is dim or know a story about someone travelling through a dim woodland. Look for words describing it as a scary place.
- ▶ Ask the children the question on page 11 and look for an answer about there being cloud or fog blocking out the sunlight. You can talk about the left picture where there is blue sky and the Sun can shine down through the trees.
- ▶ Return to the right picture and say what would it be like when the Sun went down and look for an answer about it going dark. Ask the children how they could find their way in a dark place and look for an answer about using a torch.



Teacher's sheet



- Show the children the selection of torches and shine them at them. Ask them how they could do an experiment to see which torch was brightest and which torch was dimmest. Structure the following experiment from your discussion. Some pencil writing should be made on a piece of white paper and each torch shone on the paper in turn. The brightest torch lets you read the words most easily and the dimmest torch makes reading the words most difficult. Before the children write on the paper, hold up a piece and shine a torch at different distances from the paper. The children should realise that the paper is more brightly lit when the torch is near than when it is further away. Encourage them to decide that a fair test needs to be set up with each torch at the same distance.
- Let the children write on the paper, measure out a distance from which to shine the torch and make their comparisons.

Differentiation

Less confident learners may need help in measuring out a distance between the torch and the paper. They may need help in ranking their torches from brightest to dimmest. More confident learners may use large writing and small writing on the paper to help them make a greater comparison.

Assessment

The children could make a drawing of their experiment and label it. They could be assessed on this record of their work and on the way they rank the torches from brightest to dimmest.

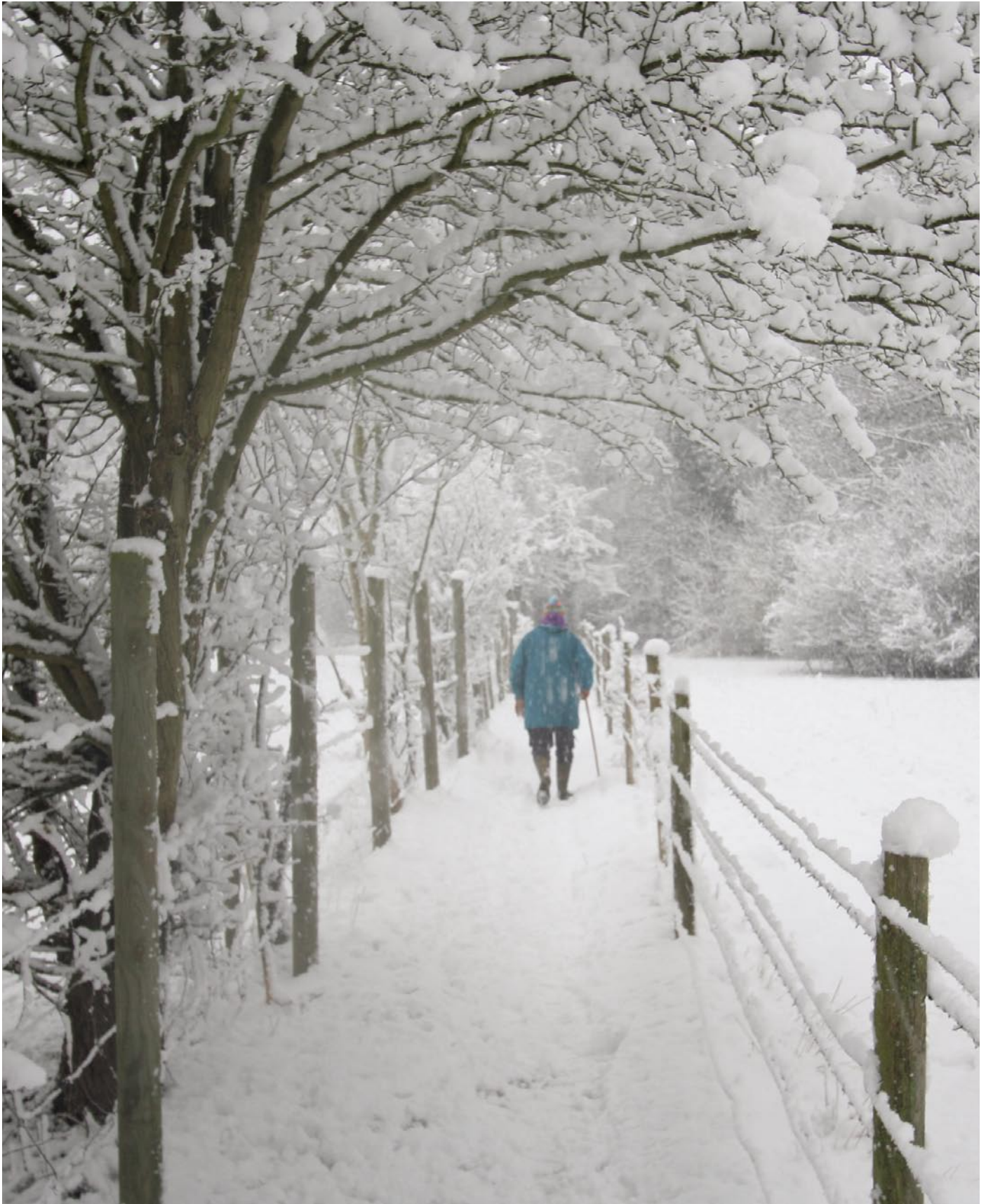
Plenary

Ask the children why they think that some torches are dimmer than others. Encourage them to think of what happens when they switch the torch on (the lamp starts to glow) and what is inside the torch to give it power to light the lamp (the batteries). Move them on to think that the dim torches have been in use for a long time and the power in their batteries is almost used up. Ask them how they could perhaps make the torches brighter and look for an answer about putting in new batteries. Let the children put in new batteries (make sure they put them in with all the plus signs on the batteries pointing in the same direction) and test the torches. They should find the dim torches are now bright and perhaps the brightest in the collection.

Outcomes

The children:

- Know the difference between dim and bright.
- Know that weather conditions cause the day to be bright or dim.
- Can carry out a fair test.
- Can make comparisons.











Dawn and dusk

Objectives

- ▶ To know that people should never look directly at the Sun as it can permanently damage their eyes.
- ▶ To know that the Sun provides us with light in the day.
- ▶ To know the difference between dawn and dusk.
- ▶ To know the Sun seems to move across the sky during the day.

Resources and preparation

Pictures of birds such as sparrows, blackbirds and thrushes (for birds singing in the morning), pictures of a hedgehog, slug, owl, bat, moth, snail (for animals coming out at dusk). A globe, a large yellow ball.

Starting the lesson

Ask the children to name the brightest source of light in their world. If they are having trouble thinking about sources of light remind them of the content of lesson 2 and bring them to the conclusion that the Sun is the brightest light source. Ask them what they know about the Sun and if they do not mention it, tell them about never looking at the Sun directly as it can permanently damage their eyes. Ask the children to draw a Sun on a piece of paper and colour it in. Let them hold up their pictures for the class. Conclude that even though we must never look at the Sun

directly we know that it is yellow and has rays coming out of it as their pictures show. Ask the children when the Sun shines in the sky – is it in the day or at night? Tell the children they are going to learn about when the Sun starts shining in the sky and when it stops shining.

Activities with pages 12 and 13

- ▶ Read the introductory line with the children followed by the first three lines.
- ▶ Ask the children about what they might see and hear at the beginning of the day (around dawn or later depending on the time of the year). They may hear birds start to sing. There are deliveries of milk and newspapers and people set off for work.
- ▶ Look at the top picture on page 13 and read the caption. Ask the children to find out more about the horizon by looking in the glossary on page 22.
- ▶ Tell the children the Sun does not switch on like a torch bulb, it starts to rise over the sky line or horizon. On the whiteboard you could draw a Sun, similar to the type the children drew at the start of the lesson, starting to peep over the horizon. Draw it a little later as it completely clears the horizon.
- ▶ Draw more pictures of the Sun rising through the sky until it reaches its peak at midday then sinks again.



Teacher's sheet



- ▶ You can link the positions of the Sun with the children's activities such as coming to school, spending time in school, playtime and dinner time and then going home. All the time you must emphasise to the children never to look directly at the Sun and you could use the opportunity to talk about skin care and sun screen.
- ▶ Continue to draw pictures of the Sun sinking in the sky, reaching the horizon and setting. Point out that the Sun does not switch off, it just goes below the skyline.
- ▶ Read the last three sentences on page 12 and look at the pictures with the children. Tell the children that the camera was fitted with special equipment so the sunlight did not damage it or harm the photographer who was taking the pictures.
- ▶ Ask the children about what they might see and hear at the end of the day (around dusk or later depending on the time of the year). They may hear that birds stop singing and owls start to hoot and fly. Tell them that bats come out and fly about catching insects such as moths which also come out at night to feed on nectar of plants that open in the evening. You may mention that hedgehogs, slugs and snails start to move around, and feed. Slugs eat plants and hedgehogs eat slugs.
- ▶ Let the children make a picture of either dawn or dusk and feature the things you have discussed.

Differentiation

Less confident learners may need reminding of the things they discussed at either dawn or dusk and may need help drawing them. More confident learners should try and add a sunrise or sunset to their picture and colour in the sky.

Assessment

The children could be assessed on their involvement and contribution to the discussion and on the detail in their pictures. There is an assessment sheet at the end of this guide (page 53).

Assessment guidance

1. a, b, e, d, c
2. a
3. c
4. e
5. It can seriously damage your eyes.

Plenary

The children could display their pictures of dawn, talk about what happens as the Sun moves through the sky during the day and then display their pictures of dusk.

Ask them to answer the question at the bottom of page 13.

If appropriate or if one of the children asks where the Sun goes when it goes down you could tell the children that the Sun is out in space (place the ball on a table) and we live on the Earth which is close by. Show the children a globe



Teacher's sheet



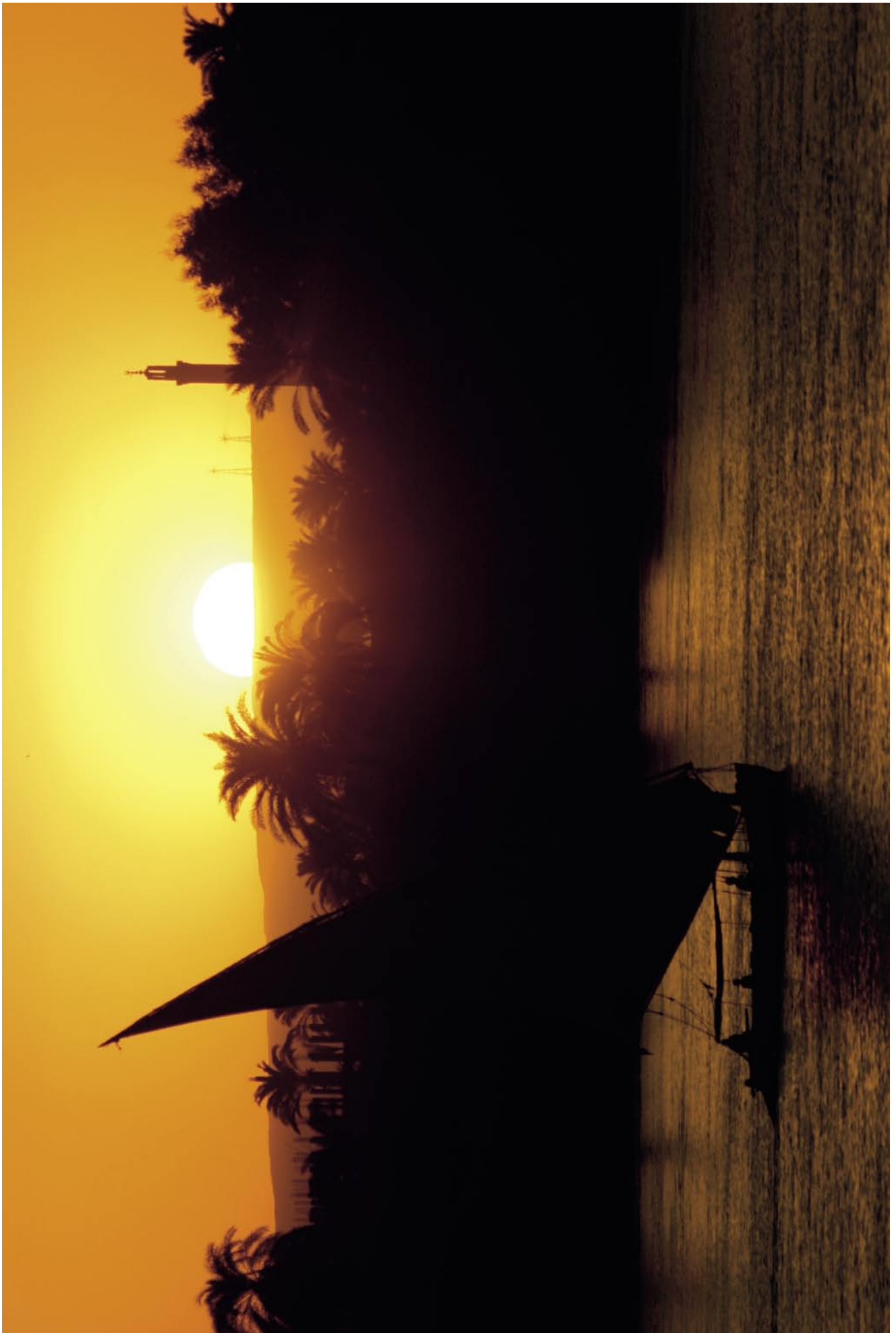
and tell them that it is a model of the Earth. Tell the children that the Earth turns round like a roundabout and turn the globe. Tell them that this means that sometimes the Sun can be seen and sometimes it cannot. You may like to remind children about their roundabout rides. About how they waved at their parents or carers when close by and then when the roundabout moved on and they could not see them they had to wait until the roundabout came round again.

Outcomes

The children:

- ▶ Know they should never look directly at the Sun as it can permanently damage their eyes.
- ▶ Know that the Sun provides us with light in the day.
- ▶ Know the difference between dawn and dusk.
- ▶ Know the Sun seems to move across the sky during the day.









Light and shapes

Objectives

- ▶ To know how a silhouette forms.
- ▶ To know how a shadow forms.
- ▶ To discover some relationships between the position of a light source and the position and size of the shadow.

Resources and preparation

A torch, a transparent plastic bottle, a small cereal packet. Each group of children will need a torch, a domino-sized opaque wooden or plastic block, a piece of white paper.

Starting the lesson

Turn to page 5 with the children and let them look at the right picture. Point out how the black shapes of the trees stand out in front of the light of the Moon. Move on to pages 12 and 13 and look at the four pictures running across the bottom of the pages. Point out that they can see the dark shapes of objects in front of the light from the Sun. Tell the children that they are going to look more closely at dark shapes formed in this way.

Activities with pages 14 and 15

- ▶ Read the introductory sentence with the children. Remind them of the pictures they have just looked at on the other pages. Then read the first

paragraph, look at the picture and read the caption.

- ▶ Move on to page 15 and read the question with the children. Start at the top right corner and move clockwise round the page. The silhouettes are a lobster, deer, ballet dancers, a crab, a man with a shopping trolley and a woman with a pram, a kangaroo, a flamingo, someone walking with an umbrella, a pair of sharks, someone riding a horse, and a dolphin.
- ▶ Ask the children if they know about any other black shapes that appear when an object is lit by a strong light. If the word 'shadow' does not come easily look at the photograph on page 14 with the children and point to the two bags on wheels in front of the aeroplane. Ask the children to look at the floor in front of the bags and help them to realise that these black shapes are shadows.
- ▶ If it is a sunny day take the children into the playground and ask them to look at their shadows. Ask them to make themselves small by rolling up in a ball and look at their shadow. Ask them to stand tall and wave their arms about. Ask them to jump on their shadow (they can't) or run away from their shadow (they can't). Return to the classroom and discuss what the children may have discovered.



Teacher's sheet



- Show the children the transparent plastic bottle. If they have studied materials remind them of the last time they saw it. Remind them that transparent materials let light through and shine a torch at it. Point out that there is a faint grey area which is the shape of the bottle and say that some of the light has not passed through. This area which is lacking in light is called the shadow. Ask the children what would happen if light was shone on an object that did not let the light through. Look for an answer about a darker shadow forming then replace the bottle with a small cereal packet and shine the light on it. Let the children see the shadow.
- Issue the torches and dominoes and white paper. Let the children place their domino in the centre of the white paper and shine the light at it from different directions and from different heights.

Differentiation

Less confident learners may need help in positioning the torch and looking at the direction and size of the shadow. More confident learners could draw around the shadow and on the other side of the block put an arrow showing the direction the light was shining. Very confident learners may wish to note when the torch was high or low.

Assessment

The children could be assessed on the way they reported back about their shadow investigations in the playground or the thoroughness of their investigations with the torch and wooden block.

Plenary

The children should report their discoveries using the torch, block and paper. They should find that a shadow forms on the side of the object which is away from the light source. They should find that when the light source is low down the shadow is long and when it is high up the shadow is short. You may like to return to the picture on page 14 and point out that a silhouette is the same size as the object making it but the shadow can be larger or smaller as can be seen by the shadows on the airport floor.

Outcomes

The children:

- Know how a silhouette forms.
- Know how a shadow forms.
- Discover some relationships between the position of a light source and the position and size of the shadow.







Shiny objects

Objectives

- ▶ To know that a shiny surface has to be smooth.
- ▶ To know that a shiny surface is not a light source.

Resources and preparation

A pair of muddy or dirty shoes, a shoe brush, shoe polish, a cloth and duster. A piece of cut glass which sparkles, a shiny toy car in a box, a magazine with a glossy cover, some pebbles in a tray and a jug of water, a pearl necklace, a piece of satin fabric, the cardboard box and a cover from lesson 1. Each group of children will need a piece of brick, a piece of wood, sandpaper, a shiny plastic object, a shiny metal object such as a coin, a piece of shiny paper, a piece of cloth.

Starting the lesson

Show the children the pair of dirty shoes. Ask how they may have got so dirty and look for an answer about playing in mud or in the park. Ask the children how you could get the mud off and guide them into you brushing the mud off one shoe. Use the cloth to apply polish to the shoe and then finish off with a duster to produce a shiny finish. Ask the children to compare the pair of shoes and look at their surfaces. They should see that the dirty shoe is covered in pieces of soil and lumps of mud and is not smooth. They

should see that the polished shoe has a smooth surface.

Activities with pages 16 and 17

- ▶ Read the introduction with the children then look at the shoe you have polished and identify its bright areas.
- ▶ Read the first sentence and begin the second but stop to illustrate each of the alternative words for shiny that is given. After reading about 'sparkling' show the children the cut glass object (but don't let them handle it). You could invite them to shine their torches at it to see it sparkle.
- ▶ After reading about 'gleaming' show the children the new toy car in its packaging and tell them that when new objects are made they are cleaned and polished to make them gleam and look attractive.
- ▶ After reading about 'glossy' show the children a magazine with a glossy cover and say that magazines of this type are known as glossy magazines. Let the children shine their torches at it.
- ▶ After reading about 'polishing' remind the children of your pair of shoes and move to the picture of the boots for comparison. Read the caption about the boots.



Teacher's sheet



- ▶ Return to read the word 'glistening' then present the children with the tray of pebbles. Ask a child to pour some water from the jug over half the pebbles and then ask the children to compare the two sets of pebbles. They should say that the pebbles that are wet are shinier than those that are dry and say that the word glistening is used to describe wet objects which shine.
- ▶ Read about pearls and show the children a pearl necklace. Invite them to shine their torches on it and see the pearls shine.
- ▶ Read about satin and show the children a piece of satin fabric. Tell them it is used for decorative clothes such as bridesmaid dresses.
- ▶ Move on to page 17, look at the top picture and read the caption. Ask the children when they may see paper as shiny as this and look for an answer about presents.
- ▶ Look at the picture of the pearls and read the caption. Compare them with your pearl necklace.
- ▶ Look at the picture of the gold and read the caption. Ask the children about people in the past who had a treasure chest and expect an answer about pirates.
- ▶ Show the children a piece of aluminium foil. Let them see both sides and shine their torches on it. Ask them if the two sides are the same and look for an answer about one being shinier than the other

and that the difference is due to the shinier side being smoother than the duller side.

- ▶ Ask the children if a shiny object gives out light and whether there is agreement or not ask them how they could make sure. Look for an answer about putting the shiny object in the dark and if it gives out light it will be seen straight away. Ask the children how this might be done. If the children need prompting present them with the box they used in lesson 1.
- ▶ Put a piece of foil in the box with its shiny side facing the eye hole. Let the children look at the foil in the box when the lid is completely covered. Ask them what might happen when you let some light into the box and look for an answer about the foil being seen. Try this with the children to confirm their prediction.
- ▶ Give the children their collection of objects and ask them to sort them into shiny objects and dull objects. And to make a drawing of their two groups.
- ▶ Ask them to think of other shiny and dull objects.

Differentiation

Less confident learners may need help in distinguishing some shiny and dull objects. They may need help with their drawings and thinking of other shiny and dull objects. More confident learners could write down the name of the objects on their drawings.



Teacher's sheet



Assessment

The children could be assessed on their involvement with their torches and on their performance in sorting out the objects.

Plenary

Read the question on page 17 with the children. If they are having difficulty you may begin by asking them to look for shiny objects around the classroom. They may notice that the windows, computer screen and TV screen are shiny. The plastic cases of some pens may be shiny and some pots holding plants may also be shiny.

Outcomes

The children:

- ▶ Know that a shiny surface has to be smooth.
- ▶ Know that a shiny surface is not a light source.
- ▶ Can sort objects into dull and shiny objects.
- ▶ Know a range of words which describe objects which shine.









Mirrors

Objectives

- ▶ To know that reflections can be seen in very smooth surfaces.
- ▶ To know that a mirror is an object in which reflections can be seen.
- ▶ To observe reflections in a range of smooth surfaces.

Resources and preparation

For the starter you should set up four black plastic trays (as used to supply sliced meat) filled with water and attended by a classroom assistant. Each group of children will need a piece of aluminium foil, two plastic mirrors (only issue one initially), a small toy plastic figure such as knight or a dinosaur (for the plenary), a large spoon in which reflections can be seen on both sides.

Starting the lesson

Ask the children what they can see in a puddle. Some children may say dirt or leaves and stones but some may say they can see the sky or themselves. Tell the children that you have set up four artificial puddles around the room and they are to go and look in them one by one. Let each child have a look in the puddle and if they are not seeing their reflection let them shine a torch onto their face. Once they have seen their reflection they must put a finger in the water and wiggle it, look in the water and then come away. The water

settles very quickly for the next child to investigate. When all the children have looked into the water ask them about their experience. They should say that they could see their face, more clearly when light was shining on it, and when they wiggled their finger they could not see their reflection any more. Tell the children that they can only see a reflection when the surface is very, very smooth.

Activities with pages 18 and 19

- ▶ Read the introduction and ask the children how many of them have a mirror in their room.
- ▶ Read the first and second sentences. Move across to the picture on the right on page 19 and read the caption. Then ask the children to look up reflection in the glossary to find out more about it.
- ▶ Give out a plastic mirror and the piece of aluminium foil. Ask the children to look for reflections in both and tell you what they find. They should find they can see a reflection in the mirror but not in the aluminium foil.
- ▶ Ask the children why there is this difference and look for an answer about the mirror having a much smoother surface than the foil.
- ▶ Look at the picture of the car mirror with the children and read the caption. Say that the mirror is on the outside of the car and ask where



Teacher's sheet



else there might be a mirror. Look for an answer about inside between the driver and front passenger and also in the sun visor. Ask the children where they may see a mirror inside a bus and look for an answer about the driver having a mirror to see back inside the bus.

- ▶ Ask the children when people use mirrors in the home and look for answers connected with appearance such as combing hair, putting on make up and shaving.
- ▶ Move back to page 18 and read the fifth sentence about the water surface. Remind the children of the activity at the start of the lesson then move on to page 19 and look at the top left hand picture and read the caption and label. Ask the children what will happen when the wind blows on the water surface and look for an answer about waves being made, the surface becoming rough and no reflections being seen.
- ▶ Move back to page 18 and read the third and fourth sentences about the spoon. Look at the picture and read the caption and label. Ask the children how the reflection of the child in the spoon is different from the reflection of the child in the mirror on page 19. Look for an answer about the child's head being bent to one side in the reflection in the spoon and the top of the head being stretched.
- ▶ Ask the children to answer the question on page 19. They could make a drawing of themselves.

- ▶ Issue the spoons and ask the children to look at themselves in the part of the spoon that curves out. They could make a second drawing of themselves.
- ▶ Now let the children look at themselves in the part of the spoon that curves inwards. They should find that their reflection is upside down.

Differentiation

Less confident learners may need help to see their reflection in water. They could report orally on what they see when they look at themselves in the mirror and the spoon. More confident learners could label the parts of their face on their drawings.

Assessment

The children could be assessed on the way they investigated the water surface and on their reports about their reflections in the mirror and the spoon. Some children may point out that when they looked in the mirror they saw their face the "wrong way round".

Plenary

Issue the plastic toy and ask the children to put it in front of the mirror and look at its reflection. Ask the children what would happen if they used two mirrors. Make a note of their suggestions on the board and then issue the second mirror.



Teacher's sheet



Let the children experiment with the mirrors but make sure that they put the mirrors at a right angle with the toy between them, or one mirror facing the other with the toy between them while they look in one mirror over the top of the other. Let the children compare their observations with their predictions.

Outcomes

The children:

- ▶ Know that reflections can be seen in very smooth surfaces.
- ▶ Know that a mirror is an object in which reflections can be seen.
- ▶ Can observe reflection in a range of smooth surfaces and report on what they see.
- ▶ Can make predictions and compare them with their observations.









Keeping safe

Objectives

- ▶ To know about keeping safe near burning light sources.
- ▶ To know about the use of lights and safety on the road.
- ▶ To know that reflective strips help people see the wearer in the dark.

Resources and preparation

Access to the school car park and a demonstration of the lights on a car, teacher assistants. A collection of materials – some reflective and some not. These could include aluminium foil, satin fabric, glossy paper, rough brown paper, strips of dark wool, glue or sticky paper. Torches.

Starting the lesson

Turn to pages 8 and 9 with the children and remind them about their lesson on light and burning. Ask them what they must do to keep safe when burning light sources are present. Look for answers about not going too near them or they will get burnt. Mention that people with long hair must be especially careful. For example they must keep their hair away from candles on birthday cakes. Mention that sparklers can be handled if there is an adult present to supervise but fireworks must not be handled by children and people should not go back and pick up a firework that has not worked. Mention that children must not play with matches as they can burn themselves or set other

things alight and that everyone must stand back from bonfires to avoid getting burnt, especially if there is a wind that changes direction.

Activities with pages 20 and 21

- ▶ Remind the children that in lesson 2 they began by looking at light sources that did not burn. They were powered by electricity and most light sources we use need electricity to make them work.
- ▶ Turn to page 20 and read the introductory sentence. Ask the children to look up reflector in the glossary to find out more about it.
- ▶ Move on to the next two sentences and then look at the top photograph and read the caption with the children. Ask the children if they have noticed that there are two kinds of light on the front of the car. Talk about the sidelights helping people to see the car coming in dim and gloomy conditions and the headlights used by the driver to see the road ahead when it is dark.
- ▶ Move to the top of page 21, look at the reflector on the back of the bicycle and read the caption. Ask the children about the reflectors on their bicycles. Some may have reflectors on their wheels.
- ▶ If appropriate take the children out into the car park where you have arranged with someone to show the



Teacher's sheet



children the sidelights, headlights, back lights and indicator lights on a car. They should also look at the reflectors and note that they do not light up when the back lights come on.

- ▶ Return to the classroom and remind the children that cars are very dangerous and we must all take care walking along the pavement and crossing the road. Look at the third sentence, about reflecting safety strips and look at the photograph across the bottom of pages 20 and 21. Read the caption with the children.
- ▶ Ask the children to draw a large picture of a person wearing a jacket. Let them colour in the jacket and select material to reflect light from the collection of materials and stick them on the picture of the jacket.
- ▶ Move back to page 21 and look at the picture of the traffic light and read the caption. Ask the children if they know the sequence of colours of the traffic light and go through them. Remind the children that they should look for the wait sign and the picture of the person in red or green to tell them when it is unsafe and safe to cross a road.

Differentiation

Less confident learners may need help in sticking their chosen materials on their jackets. More confident learners may like to draw out the sequence of colours used at traffic lights.

Assessment

The children can be assessed on their knowledge of safety and the design of

their jackets. There is an assessment sheet at the end of this guide which can be used when the children have completed the book (page 55).

Answer guidance

1. dark
2. dim
3. bright
4. wrapping paper, metal
5. In a mirror, in still water.
6. light

Plenary

Remind the children about the dangers of burning light sources and then move on to light sources on the road and review the car lights including indicators. Have the children's jacket designs displayed on a wall and darken the room as much as possible and let the children shine their torches on the display and decide which jackets are easiest to see and safest to wear. Read the question at the bottom of page 21 with the children and let them show you where the reflective strips are on their coats.

Outcomes

The children:

- ▶ Know about keeping safe near burning light sources.
- ▶ Know about the use of lights and safety on the road.
- ▶ Can design a jacket which can be seen when light shines on it in the dark.
- ▶ Know that reflective strips help people see the wearer in the dark.







Assessment

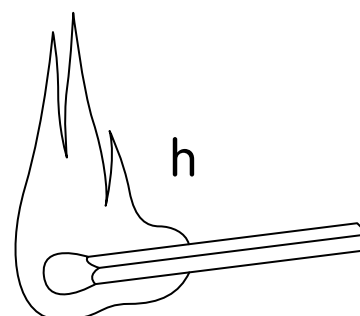
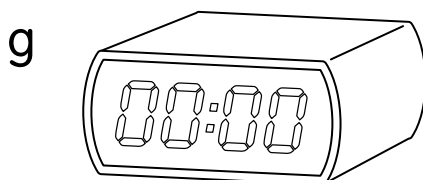
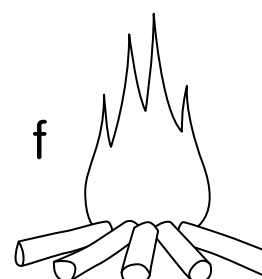
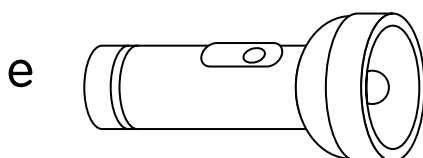
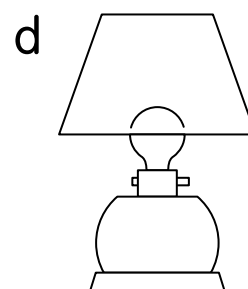
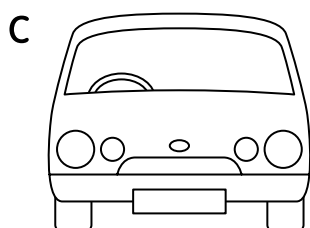
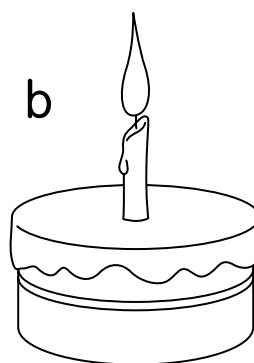
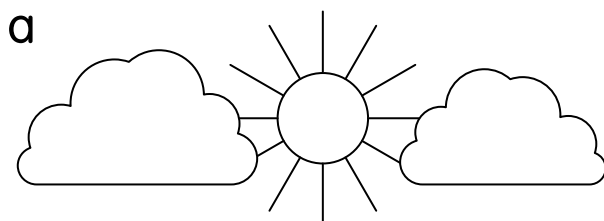


Name:



Sources of light/ Light and burning

Colour in orange the parts that give out light.





Assessment

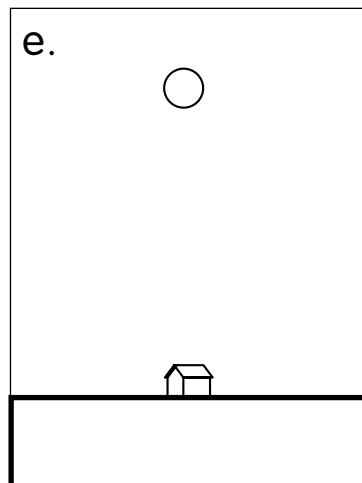
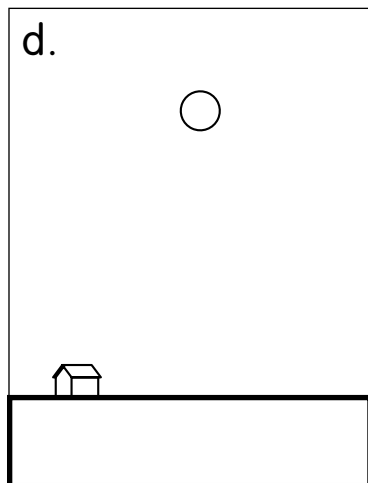
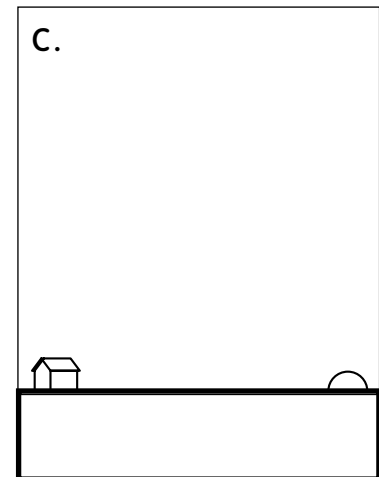
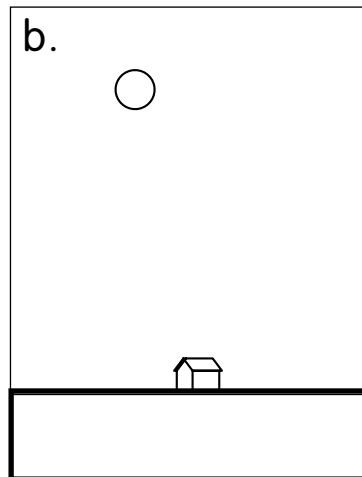
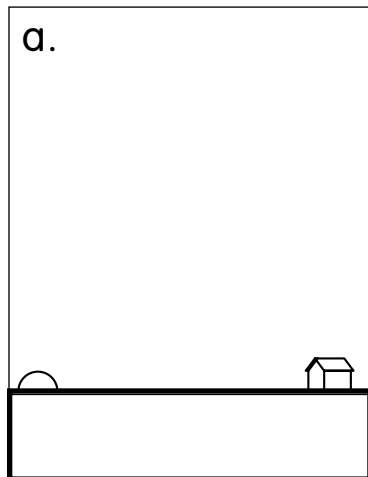


Name:



Dawn and dusk

1. Cut out these pictures and put them in order to show how the Sun moves across the sky.



2. Which picture shows sunrise? Write it in the space.
3. Which picture shows sunset? Write it in the space.
4. Which picture shows midday? Write it in the space.
5. Why must you never look at the Sun?

.....



Assessment



Name:



Light and dark

1. If there is no light, is it

bright ☐ dark ☐ dim ☐ ?

2. If there is a little light, is it

bright ☐ dark ☐ dim ☐ ?

3. If there is a lot of light, is it

bright ☐ dark ☐ dim ☐ ?

4. Which of these materials are shiny?

wood ☐ wrapping paper ☐ wool ☐ metal ☐

5. Where do you see a reflection?

in a cupboard ☐ in a mirror ☐ in still water ☐

6. What do shiny objects need to make them shine?

wind ☐ light ☐ dark ☐