

TEACHING NOTES

How to Find a Rainbow

Title

How to Find a Rainbow

Author

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Illustrator

Sarthak Sinha

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Category

Picture book

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PLOT

A vibrantly illustrated tale about finding light even in the gloomiest of times, *How to Find a Rainbow* will warm your heart — and give you a handy guide to making your own rainbow, too!

When Rekha spots a rainbow, she rushes indoors to tell her sister about it.

Reena will want to paint it, for sure!

But when the sisters go outside to find it, the rainbow disappears. Where could it have gone?



Reena hates rainy days. She hates the way the dark clouds make everything look so dull.

THEMES

Backyard science

Natural world

Red pandas

Sisters

Accepting difference

Colour spectrum

Holistic learning

Rekha loves rainy days. She loves the way the rain makes the earth smell.

ABOUT THE CREATORS



Alom Shaha

(author) was born in Bangladesh but grew up in London. A parent, teacher, science writer, and filmmaker, he has spent most of his professional

life trying to share his passion for science and education with the public. Alom has produced, directed, and appeared in a number of television programmes for broadcasters such as the BBC, and has received fellowships from the National Endowment for Science, Technology, and the Arts (NESTA) and the Nuffield Foundation. He has represented his community as an elected politician and volunteered at a range of charitable organizations. He teaches at a comprehensive school in London and writes for a number of print and online publications, including *The Guardian*.



Sarthak Sinha

(illustrator) is an artist and educator from India. His love for nature and exploring has taken him from the tropical rainforests to the high Himalayas. He

has happily taught kindergarten children for the last 4 years.



DISCUSSION & ACTIVITIES

BEFORE READING

- * Look at the title and the illustration on the cover. Do you know where to find rainbows? Can you take a guess?
- * On the cover, you can see Reena and Rekha. Do you know what kind of animal they are?
- * This book is all about finding rainbows. What are the colours in the rainbow? Which one is your favourite?



AFTER READING

- * Reena doesn't like the rain, but she still makes it outside to look for rainbows in this book! What is something you do sometimes that you don't always like, because there's something special waiting for you at the end?
- * Reena and Rekha are very different, and they don't always agree on things. In the end though, they find a way to both go out into the rain together and apologise when they've been rude. Are there any times when you've done something for someone else, just because you thought they would like it?
- * In the illustrations, Sarthak Sinha has used the colour white to represent the water, the clouds, and even the wind. What could you use white for in your own drawings?

ACTIVITIES

BACKYARD SCIENCE: MAKE YOUR OWN RAINBOW!

At the end of the book, there's an information page about how to make rainbows. Follow the instructions and see if you can make your very own rainbow!



WORKSHEET:

NAME:

**DRAW YOUR OWN ANIMAL
FAMILY**

Reena and Rekha are red pandas living in the Himalayas. Do you know where that is? What do you know about red pandas? Now think about your own family. What kind of animal would you be? Draw a picture of your animal family here.

EXPERIMENT: THE RE-APPEARING RAINBOW

In *How to Find a Rainbow*, Reena and Rekha discover that you can only see a rainbow if the sun is shining behind you and it's raining in front of you.

In this activity, you'll make a 're-appearing rainbow' that makes use of the same science that explains how rainbows form!

You will need:

- A clear plastic (polythene) bag – 'ziploc' or clear plastic document wallets work well.
- The rainbow template below
- Coloured felt tips (ideally all seven colours of the rainbow)
- Black permanent marker (or a felt-tip that is not water soluble)
- Large clear bowl of water
- Scissors



What to do:

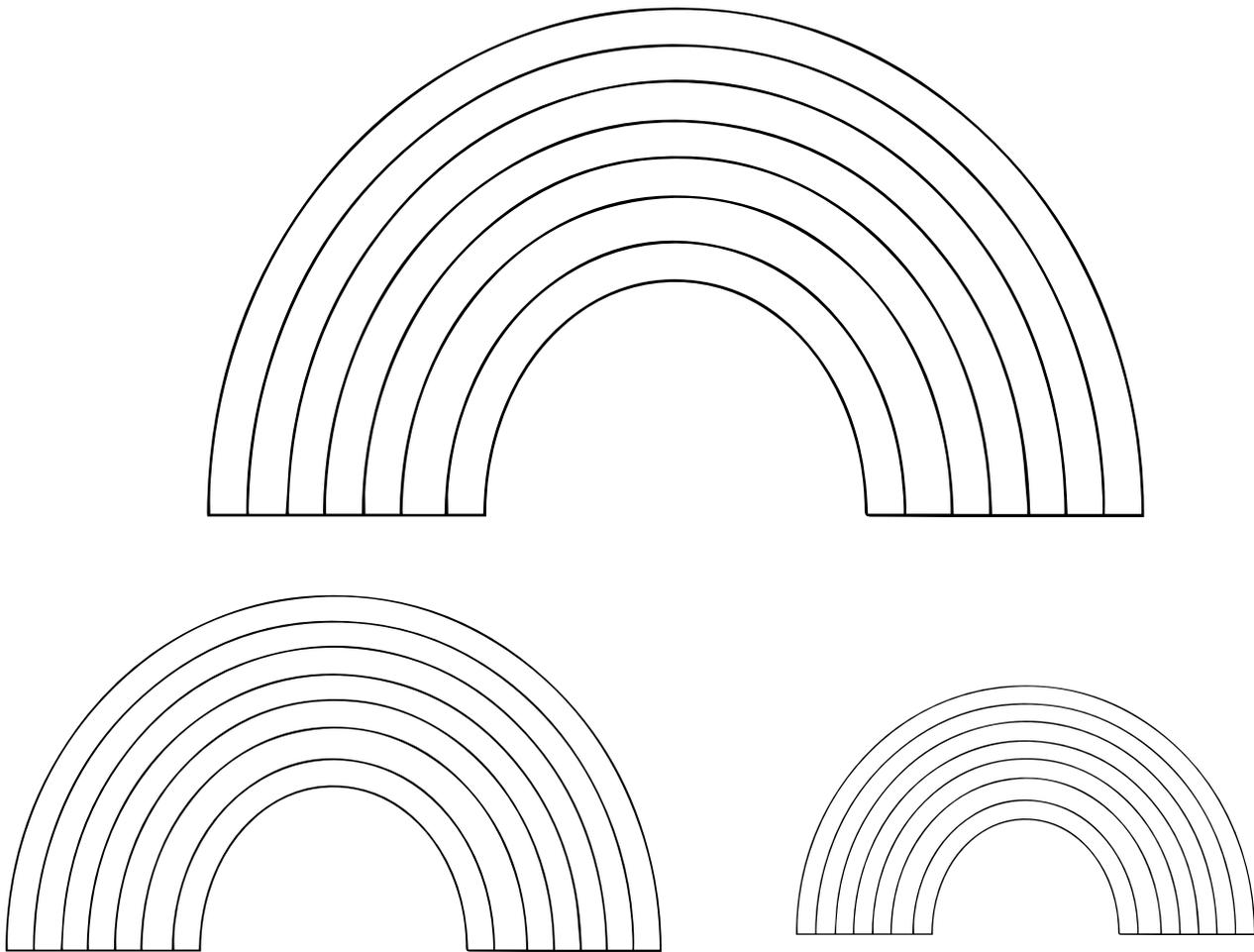
Step 1: Colour in the rainbow! Can you remember the order of the colours from the story? An easy way to remember the correct order from top to bottom is to use the acronym ROY G BIV, which stands for Red, Orange, Yellow, Green, Blue, Indigo, Violet.

Step 2: Cut out the box with the rainbow and put the rectangle of paper into the bottom of your plastic bag. If your plastic bag is too small for this, just draw your own rainbow onto a piece of white paper that fits your bag.

Step 3: Use the black permanent marker to trace over the black lines separating the colours of the rainbow. Wait a moment or two to make sure the ink is dry.

Step 4: To make your rainbow disappear, slowly lower the plastic bag into the water, while you are looking down at it from the top. You may have to experiment a bit by angling the paper slightly towards you when you do this to see the effect, but once you've got it you'll be able to do it again easily.

Step 5: To make the rainbow re-appear, simply take the bag out of the water again!



The science:

White light from the sun is actually a mixture of colours known as the spectrum – red, orange, yellow, green, blue, indigo, and violet.

Scientists use the word ‘dispersion’ to describe the splitting up of white light into the different colours of the spectrum.

When a beam of white light passes through a raindrop, it bends, and bounces in a way that makes it split up into its different colours. The coloured light that emerges from the raindrop is what we see as a rainbow.

The bending of light as it goes from one substance from another, like from air into water, is called refraction. This bending of light is why things look distorted if you look at them through a glass of water or a magnifying glass.

This bending of light is also why you can’t see the colours of the rainbow when you put your paper rainbow wrapped in a plastic bag into a bowl of water and look down at it from above. When the rainbow is outside the water, the light passes through the plastic bag, bounces off the rainbow, and into your eyes, so you can see it.

When the rainbow is under water, the light bouncing off it is bent as it travels between the air inside the plastic bag and the water. When the light meets the water’s surface at certain angles, it can’t escape the water and get into your eyes. This effect is called ‘total internal reflection’ because the light is reflected **INSIDE** the water!

Try putting your hand in the bag — can you make your fingers disappear?

Swimmers notice this same effect looking up from the bottom of a swimming pool where they can see the floor of the pool reflected on the water’s surface.

EXPERIMENT: REVERSING FISH

In *How to Find a Rainbow*, Reena and Rekha discover that you can only see a rainbow if the sun is shining behind you and it's raining in front of you.

When a beam of white light passes through a raindrop, it bends, and bounces in a way that makes it split up into its different colours. The coloured light that bounces out of the raindrop is what we see as a rainbow.

The word '**reflection**' is used to describe when light bounces off a surface. The *bending* of light as it goes from one substance from another, like from air into water, is called '**refraction**'. This bending of light is why things look distorted if you look at them through a glass of water or a magnifying glass.

In this activity, you can use refraction, the bending of light, to make a drawing of a fish change direction.

You will need:

- A clear cylindrical glass of water
- A piece of scrap card or paper
- Something to draw with

The science:

We see things because either they give out light or they reflect light and that light enters our eyes.

When we look at the fish drawn on the paper without the glass of water in the way, light from the surroundings reflects off the fish and into our eyes.

What to do:

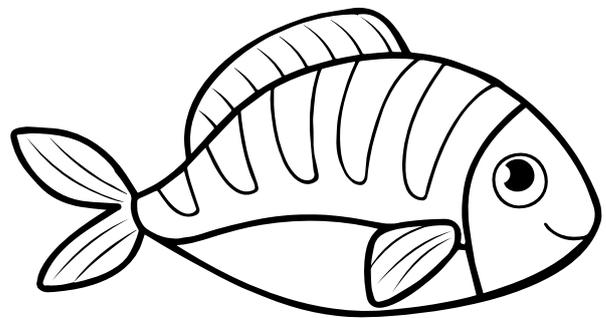
Step 1: Draw a fish on your piece of paper about a third of the width of your glass. You can copy the one below or use your own design:

Step 2: Lean your piece of card or paper against something so that it is upright.

Step 3: Put your glass of water up against the paper and slowly move it towards you until you can see the fish clearly and it is looking the opposite direction.

Step 4: Now, if you move the glass to the side and back again, you should be able to see the fish looking one way (on the paper) and then the other (through the glass).

Step 5: Try experimenting with other shapes or pictures!



When the glass of water is in the way, light reflecting off the fish bends (refracts) as it goes through the glass and water and then bends again as it comes out of the water and glass.

When the glass of water is at just the right distance away from the fish, light reflecting from the right hand side of the fish is now on the left and light from the left hand side of the fish is on the right. This makes the fish look like it's changed direction.