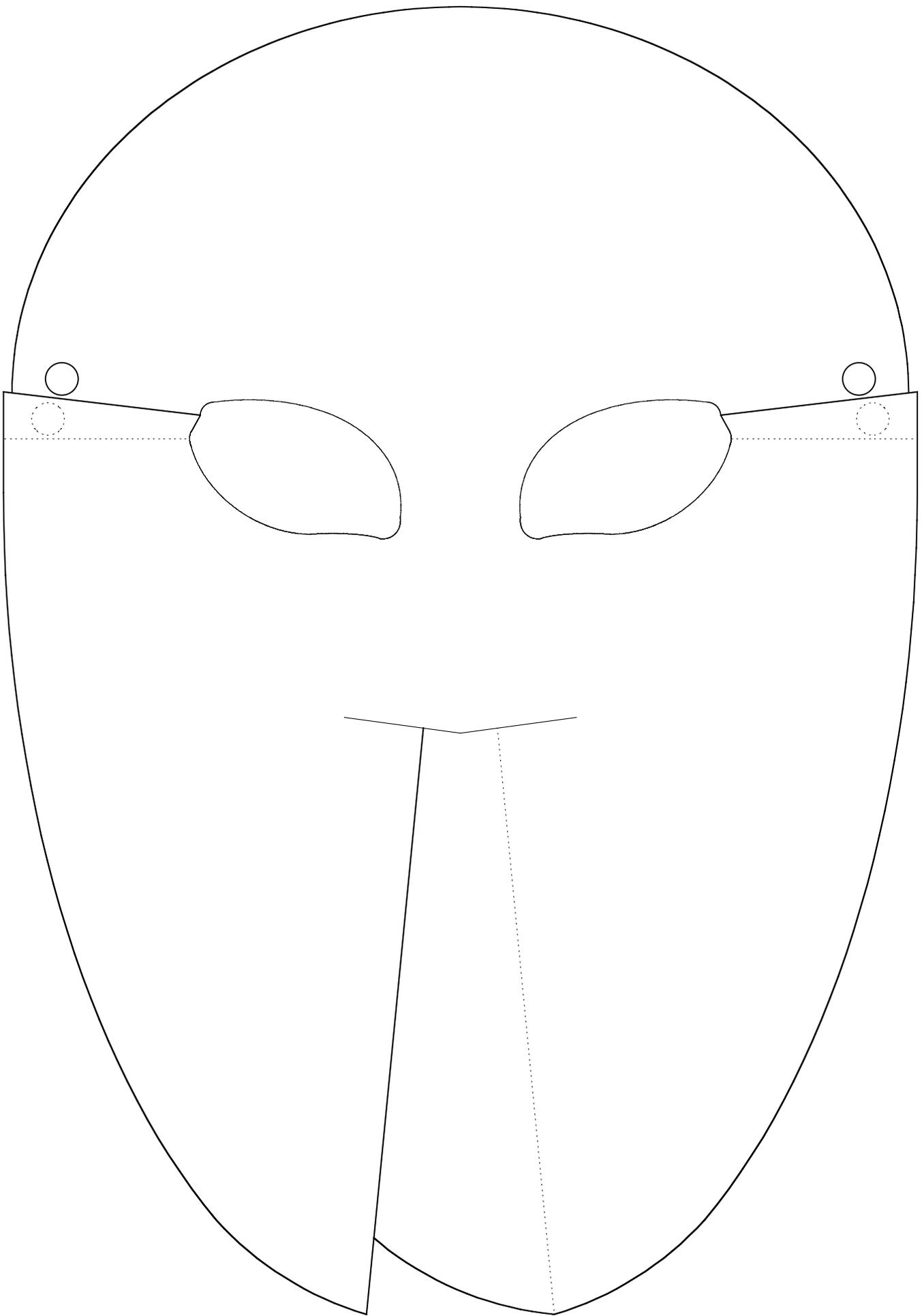


1 qm Wald

1m² of Forest – The Future We Want
A Workbook on “Learning to See”



Forest spirit mask

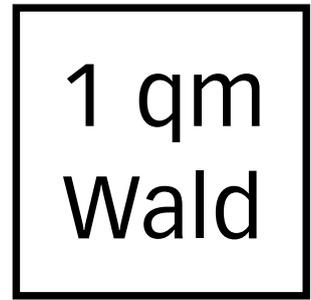
Name _____



Contents

ONE SQUARE METRE OF FOREST

- 02 – What is a forest? – An introduction
- 03 – I spy with my little eye
- 04 / 05 – Forest inhabitants
- 06 / 07 – Trees and their leaves
- 08 – How much forest is there on our planet?
- 09 – What is a forest for you?



1m² of Forest – The Future We Want
A Workbook on "Learning to See"

LEARNING TO SEE

- 10 / 11 – Learning to see – An introduction
- 12 / 13 – Colours
- 14 / 15 – Structures, patterns and ornaments
- 16 / 17 – Shapes
- 18 / 19 – Geometry
- 20 / 21 – Strategies and functions

THE VALUE OF FORESTS

- 22 / 23 – Preparing for the forest visit
- 24 / 25 – Visiting the forest
 - 26 – How valuable is the forest?
 - 27 – The forest as a home

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One Square Metre of Forest

Rediscover the forest and its beauty. Experience the diversity of living creatures and observe the minutest of details. This workbook will accompany you on this exploration tour.

Let us begin with a little guessing game:

What is pictured below?

Can you guess what is shown in the three circles?
Do they remind you of anything?
Make a note of what you notice!



1. What is a forest?

In the first part of this workbook, you will learn all about forests. There are lots of different types of forests. These are home to countless different species of trees and are spread all across our planet. What's more, there is far more to discover in these forests than just trees.

2. Take a closer look!

The second part of the workbook contains a number of practical exercises to help hone your senses. We will consider countless fascinating aspects of the question of beauty in nature and take a closer look at the many different colours, shapes, structures and patterns that can be found in the forest.

3. The value of forests

Now that you are fully prepared and know what to look out for, the third part of the project will involve a trip to a forest. We have created a handy toolkit for your exploration tour. Because you will need to examine items in the forest very closely, the kit also contains a special magnifying lens for your smartphone.

Select a forest find to take with you to examine in greater detail.

After gaining countless new impressions in the forest, we will consider the question of how valuable the forest is to us.

4. Countless impressions – one exhibition

During this final practical part of the project, you will make an exhibition box to display your favourite forest find. You will then also be able to upload your favourite picture to an online photo gallery. During the "Zoom focus" workshop, you can recreate one specific feature of your favourite find, and in the "Spirit Mask" workshop, you will have the opportunity to reflect on what impressed you the most during the project.

You will then be able to present all that you have experienced, learned, found and created in a group exhibition.

**I spy
with my
little eye**

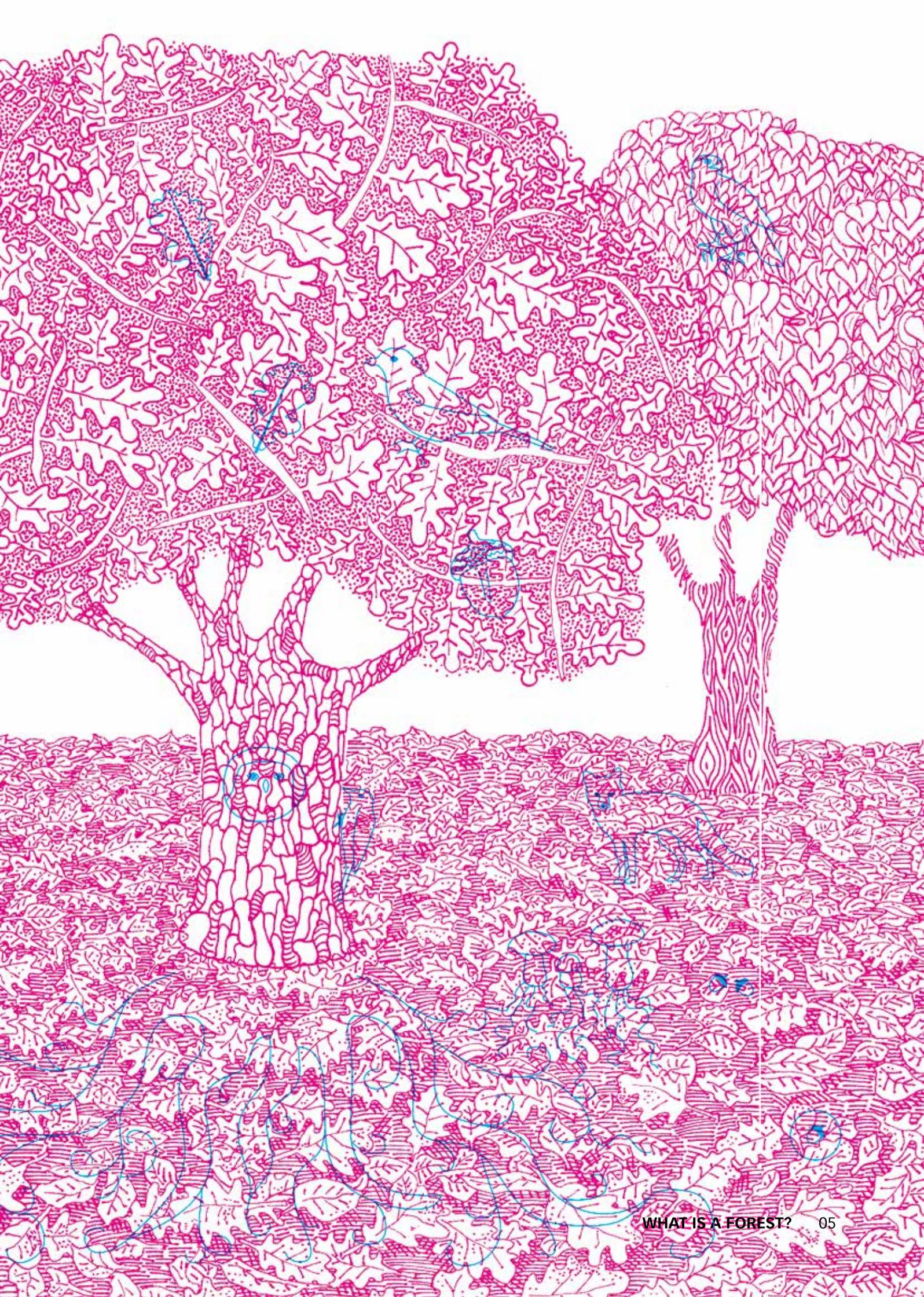
**"Write what
you can't
see in these
circles."**



Forest inhabitants

What happens when trees are cut down?
Take a look through the red sheet to see what you
could not see in the forest at first glance.





Trees and their leaves

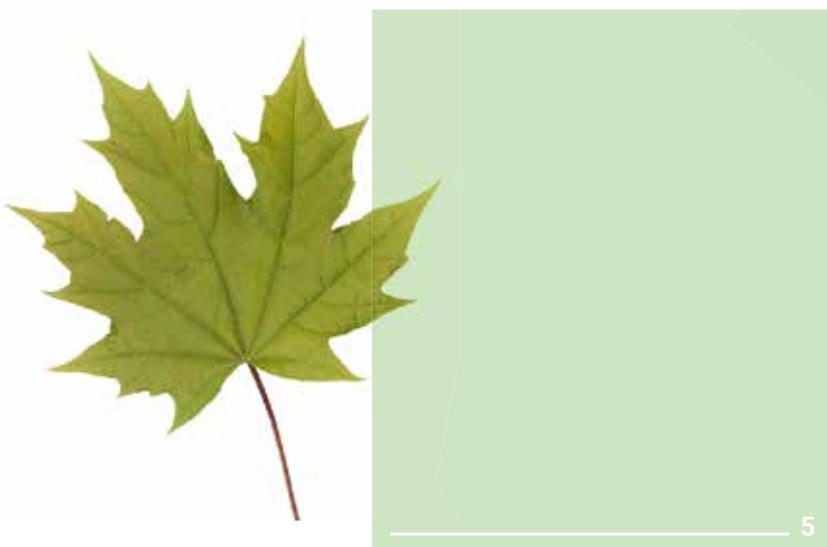
What types of trees do you know?



Explore the many different leaf shapes!

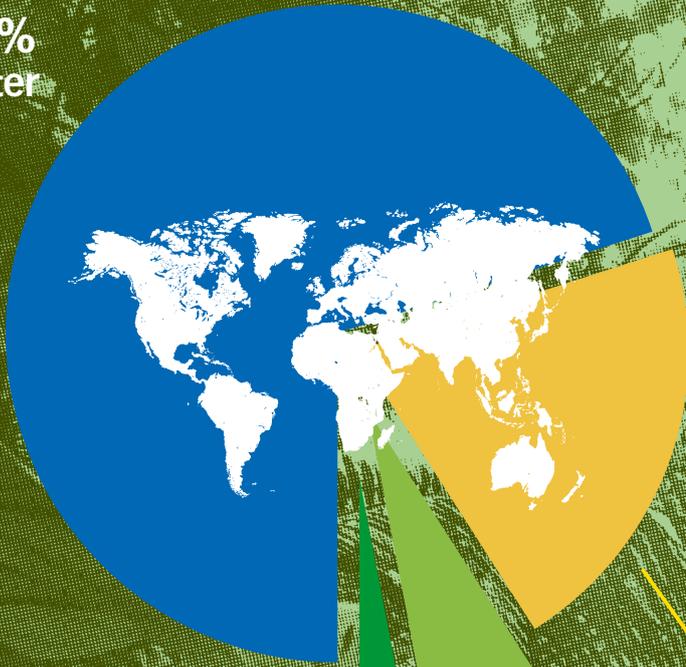
Countless different leaf shapes exist in nature. Can you work out which trees these leaves are from? Copy their outlines into the boxes.

Now use www.leaf-id.com to identify the different leaves and write the names of the trees in the spaces provided.



Planet Earth

70%
water



21%
land

Diversity of species

3%
tropical
rainforests

6%
forests

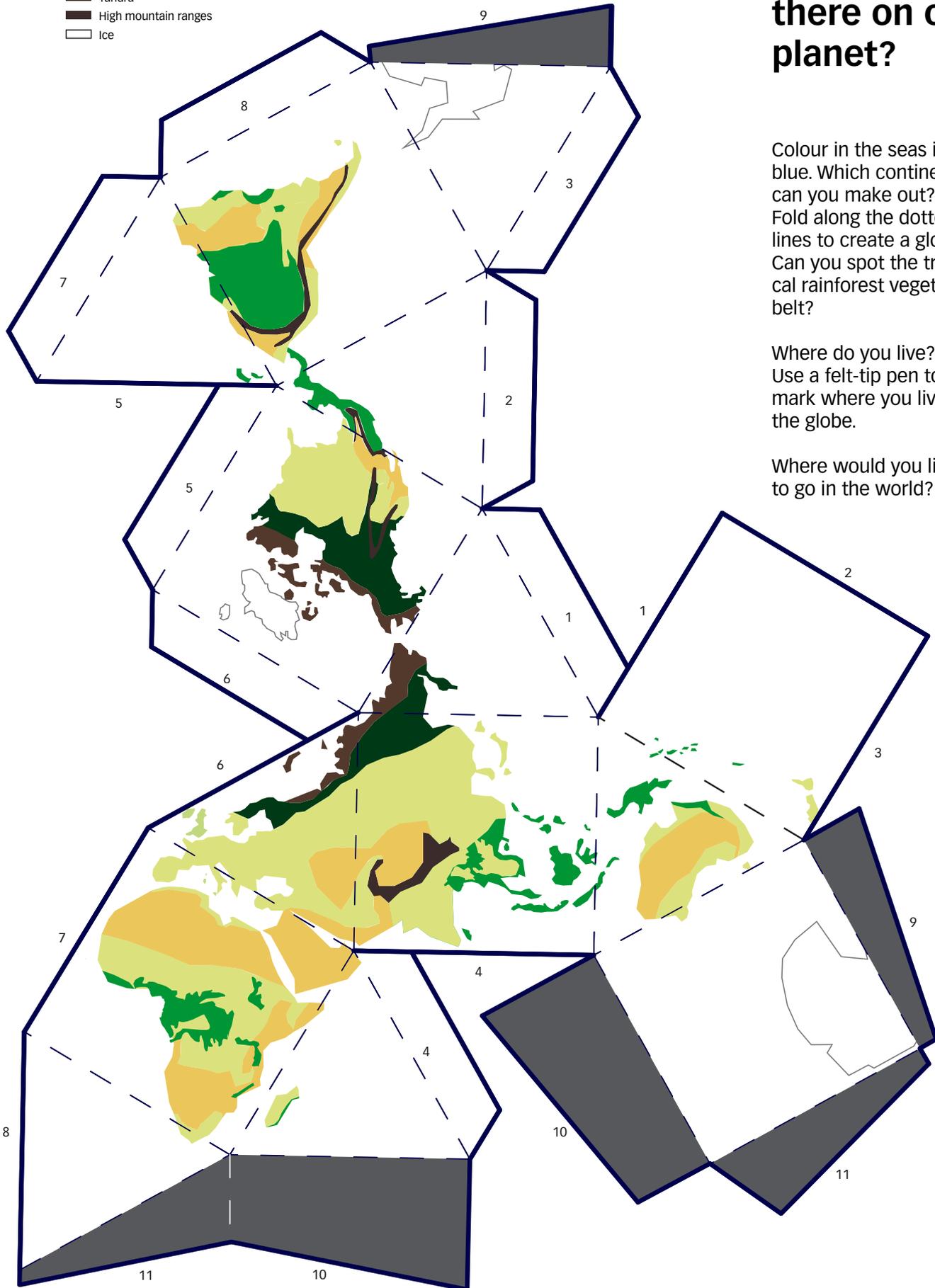
10%
on land and in forest

90%

in the tropical rainforests

- Tropical rainforest
- Coniferous forest
- Savannah/desert
- Grasslands/mixed woodland/green spaces
- Tundra
- High mountain ranges
- Ice

- Cut
- Fold



How much forest is there on our planet?

Colour in the seas in blue. Which continents can you make out? Fold along the dotted lines to create a globe. Can you spot the tropical rainforest vegetation belt?

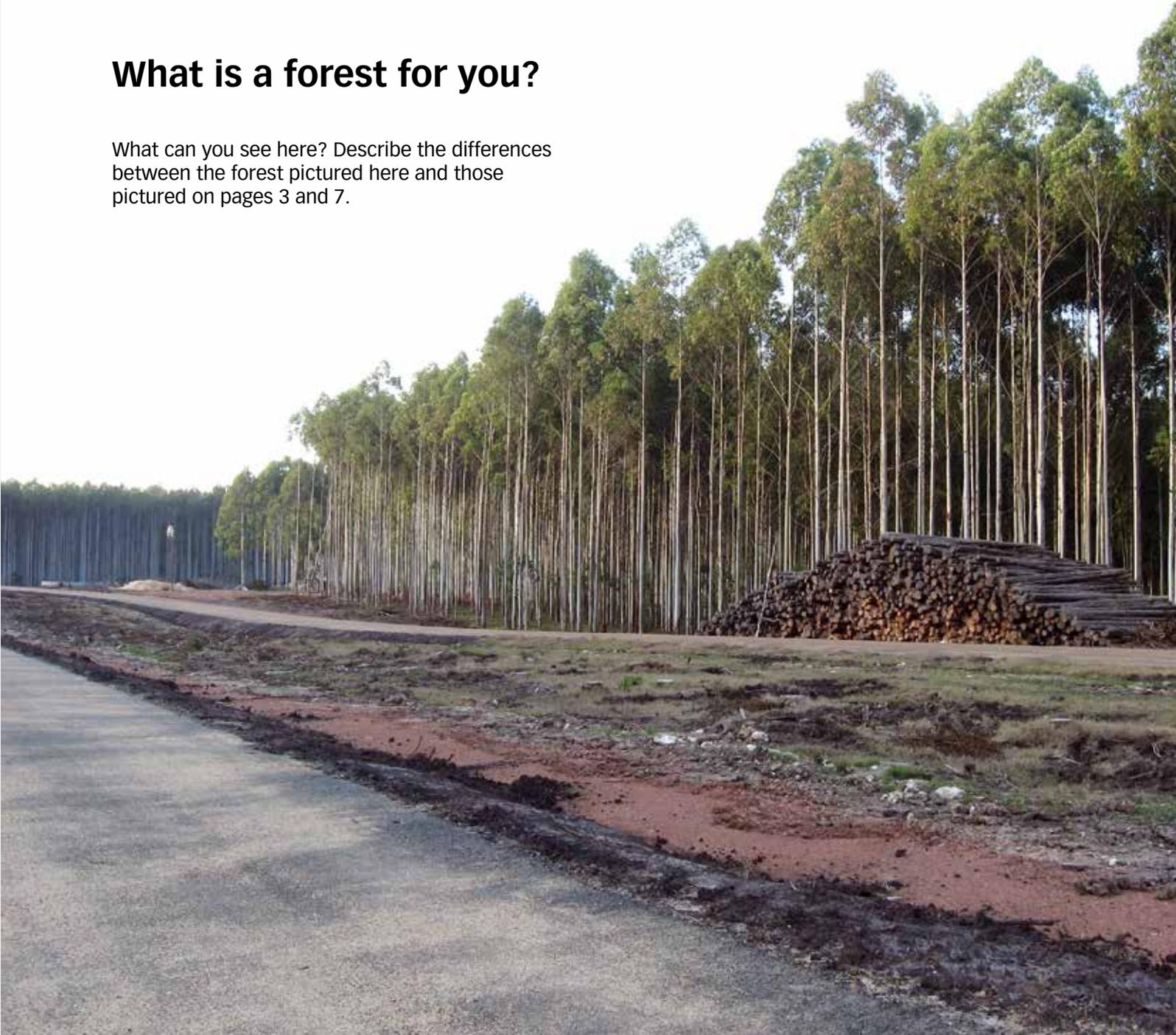
Where do you live? Use a felt-tip pen to mark where you live on the globe.

Where would you like to go in the world?



What is a forest for you?

What can you see here? Describe the differences between the forest pictured here and those pictured on pages 3 and 7.



Learning to see
– An introduction



What is beauty?

There really is absolutely no right or wrong answer to this question. It is entirely up to you what you find beautiful. Every person on our planet has their very own perception – and this can even change over time.

When people live together, they often develop common notions of beauty. The result is clothing fashions and traditional dress, unique building and city construction styles, and endless different styles in painting, music and other arts.

Shared values can be spoken of when a consensus is reached within the group on what is beautiful.

It is interesting to learn why something is considered beautiful. Art, philosophy and science all seek to identify possible formulas for beauty.

This search essentially involves observing what individual people find beautiful. It helps to consider different aspects here such as colours, patterns, shapes and functions.

It is particularly important to take a close look and to describe exactly what can be seen. There is no right or wrong, but rather only a subjective perception – and this can be trained. The following pages contain a series of exercises to help you train your sense of perception.

Colour descriptions

REFRESHING	SUNNY	POISONOUS
PALE	FROSTY	VIBRANT
SHINY	IRIDESCENT	CLOUDY
MUDDY	SOFT	SPARKLING
		

Colour shades

RED
BLUE
YELLOW
GOLD




Colours

Imagine you visit an imaginary forest. You see many fascinating things there – and then suddenly, you set eyes on an absolutely beautiful flower.

Describe the colours of this imaginary flower. Use the words on page 12 for ideas. You can also add some descriptions and colours for yourself in the empty boxes. Cut out the boxes and put them together to create combinations of words corresponding with your ideas. You can also exchange boxes for different ones.

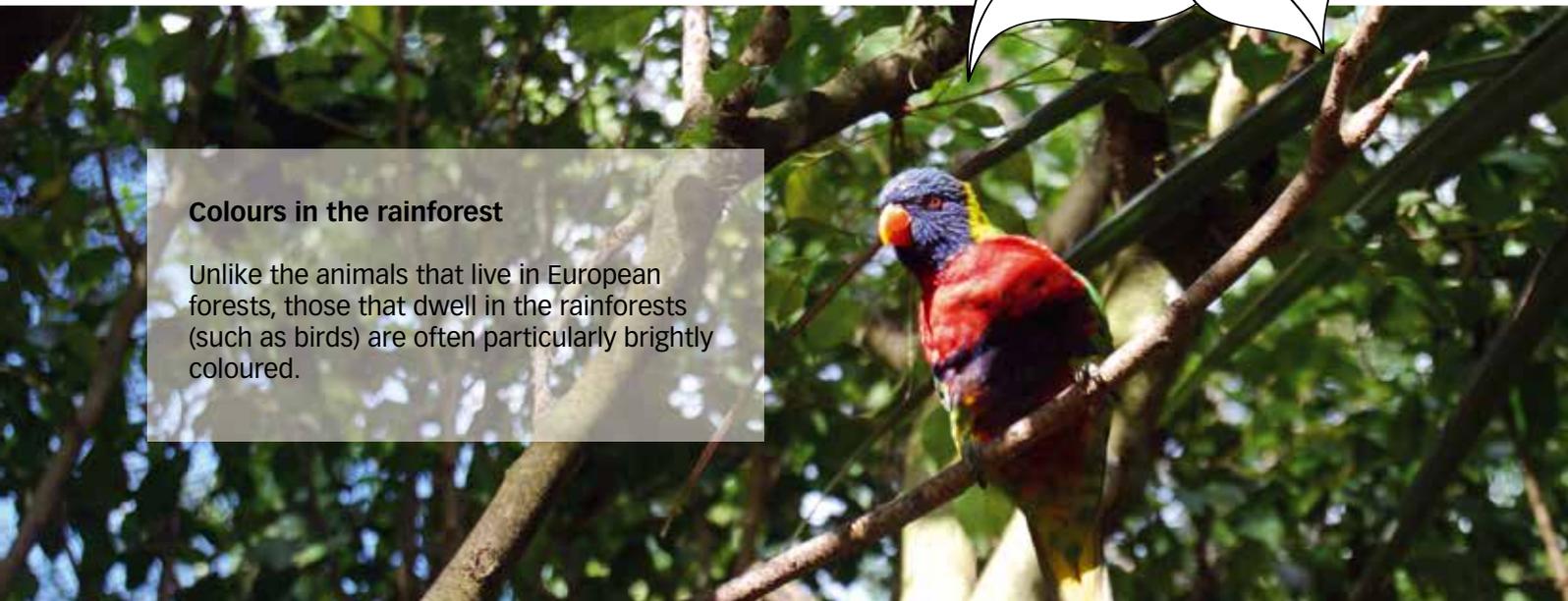
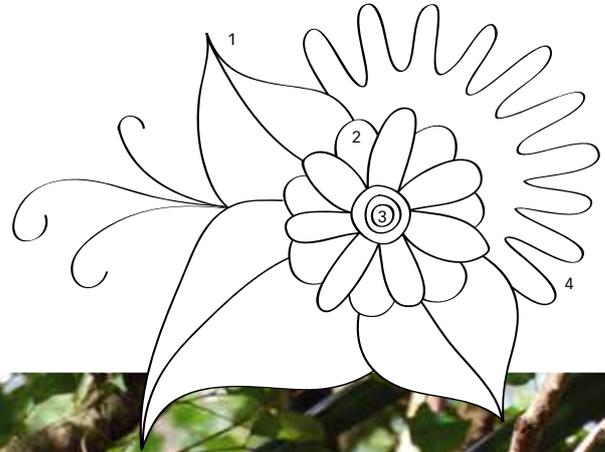
Write your favourite combinations of words above your imaginary flower. Each of you will undoubtedly have created an entirely unique flower!

1 _____

2 _____

3 _____

4 _____



Colours in the rainforest

Unlike the animals that live in European forests, those that dwell in the rainforests (such as birds) are often particularly brightly coloured.



Wild garlic...



...a short time later



Colours of forest finds

Page 12 also features different colour samples. Once you have found an interesting item in the forest, use these samples to compare the colours and work out which appear in your find. Stick three of these colours in the space provided on your presentation board (inside the back cover).

Colours change over time

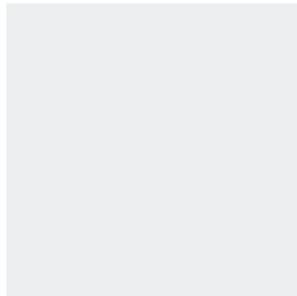
If you have collected any plants (e.g. leaves, flowers, stalks, grass), you will be able to observe how the colours change over time.

Surface structures

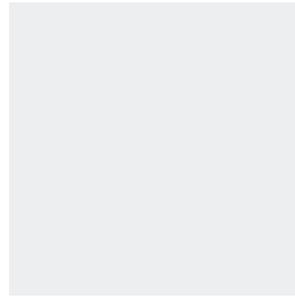
Creating rubbings

Take an A4 sheet of paper and a pencil and go find some interesting surface structures. These can be found in your school, at home, outside in nature and on the way to school. Take rubbings of these.

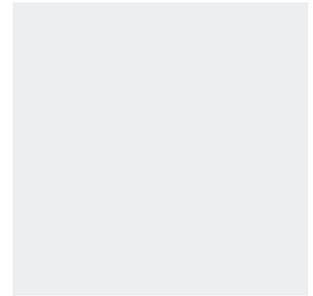
Cut out your favourite three patterns and stick them in your workbook here. Provide details of your finds.



Where found



Where found



Where found



What is it?



What is it?



What is it?



Patterns in nature

Endless different surface structures can be found in nature. Some may seem chaotic or disorganised at first glance while others resemble a pattern or ornament. Though it may seem it, patterns in nature are in fact by no means random. They all have a very specific purpose:

They serve as camouflage



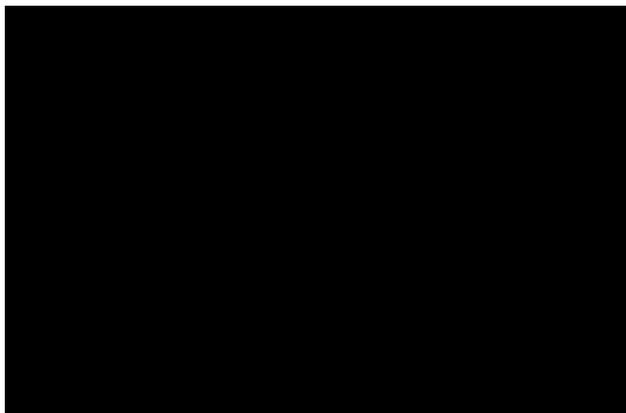
They help to attract



They stabilise



They deter



Unique

Unlike patterns created by a machine, patterns found in nature are never the same. Similar to fingerprints, they are always entirely unique.

Rub chalk on one of your fingertips, then press your finger onto the sticky surface of a piece of transparent adhesive tape. Stick this in the black space on the left here.

Compare your fingerprint with those of the other children.

Structures, patterns and ornaments

Some examples of different structures and patterns you will find in nature are pictured here.

Which elements determine the structure? Copy one element of each pattern into the fields below.

Then use these to create your own ornament. Arrange the patterns you have copied in the grid.

You can then cut out the ornament you have created and include it in your exhibition.



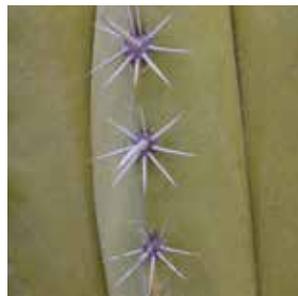
1



2



3



4



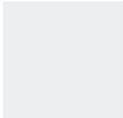
5

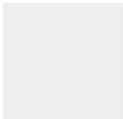


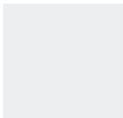
6

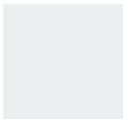
Patterns

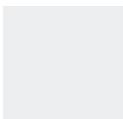
1 

2 

3 

4 

5 

6 



Shapes

Mushrooms

Imagine it is raining. What do you have with you? Wellies, a raincoat – perhaps even an umbrella? Large raindrops roll off these and drip onto the ground.

Do you recognise the umbrella shape? Have you maybe seen something that looks similar in the forest? How about a mushroom?

Lots of types of mushrooms look like little umbrellas.

The “hat” protects the spores concealed underneath that are needed to scatter and propagate the mushrooms. Mushrooms also put out a mass of very fine underground roots known as mycelium. These thread-like filaments wrap themselves around plant roots and help them to absorb water and nutrients.

Form and function

Generally speaking, every shape in nature has a function that has developed over the course of evolution.

In 1852, the American sculptor Horatio Greenough was the first to discuss how “form follows function” in nature. The American architect Louis Sullivan also considered this concept:

“Whether it be the sweeping eagle in his flight, or the open apple-blossom, the toiling workhorse, the blithe swan, the branching oak, the winding stream at its base, the drifting clouds, over all the coursing sun, form ever follows function, and this is the law. Where function does not change, form does not change.”

Sullivan, Louis H. (1896). “The Tall Office Building Artistically Considered”. *Lippincott’s Magazine* (March 1896): 403–409.



Nature as inspiration

Humans copy and use shapes found in nature. Natural phenomena are pictured below alongside origami models and architectural structures that resemble them.

Search for the keywords on YouTube to recreate the origami figures.



Snail



Naval shell origami



Stairway



Physalis



Eiffel Tower origami



Eiffel Tower



Rock crystal



Tetrahedron origami



European Central Bank

Geometry

Fibonacci

The Fibonacci sequence is a never-ending series of numbers that begins with the numbers 0, 1, 1, 2, 3, 5, 8, 13...

The principle is simple: the next number in the sequence is obtained by adding together the two previous ones.

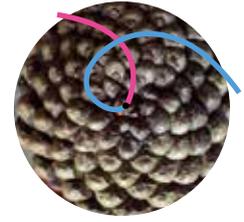
Fibonacci numbers occur in nature surprisingly often. They can be found in the spiral structure of many different plants, including sunflowers, pineapples and pine cones. If you count the number of spirals, it will (almost!) always be a Fibonacci number. There are generally two spiral systems at the same time. One goes in a clockwise direction and the other in an anticlockwise direction.

Why not try this out for yourself: join all of the blue dots and all of the pink dots to create shapes that spiral around one another from the inside to the outside. Draw around the edges of the shapes you have created that look just like flower petals and colour them in.

Clockwise
8 spirals

Anticlockwise
5 spirals

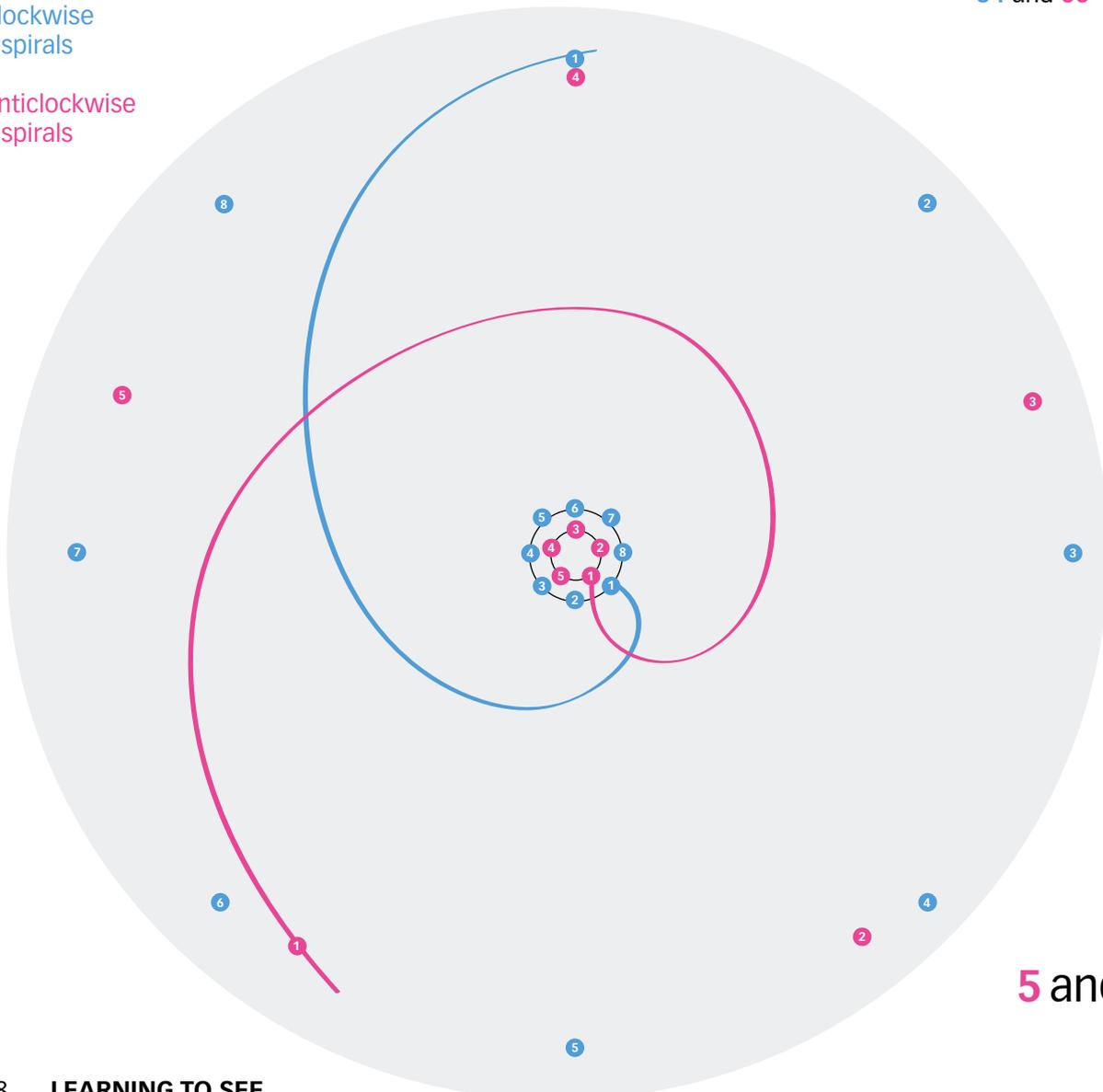
$$\begin{array}{r} \boxed{0} + \boxed{1} = \boxed{1} \\ \boxed{1} + \boxed{1} = \boxed{2} \\ \boxed{1} + \boxed{2} = \boxed{} \\ \boxed{} + \boxed{} = \boxed{} \end{array}$$



Pine cone
8 and 13



Sunflower
34 and 55



5 and 8



Enter the keywords
Spirals, Fibonacci, and Being a plant
in YouTube to watch an interesting video
about Fibonacci.

Functions and strategies

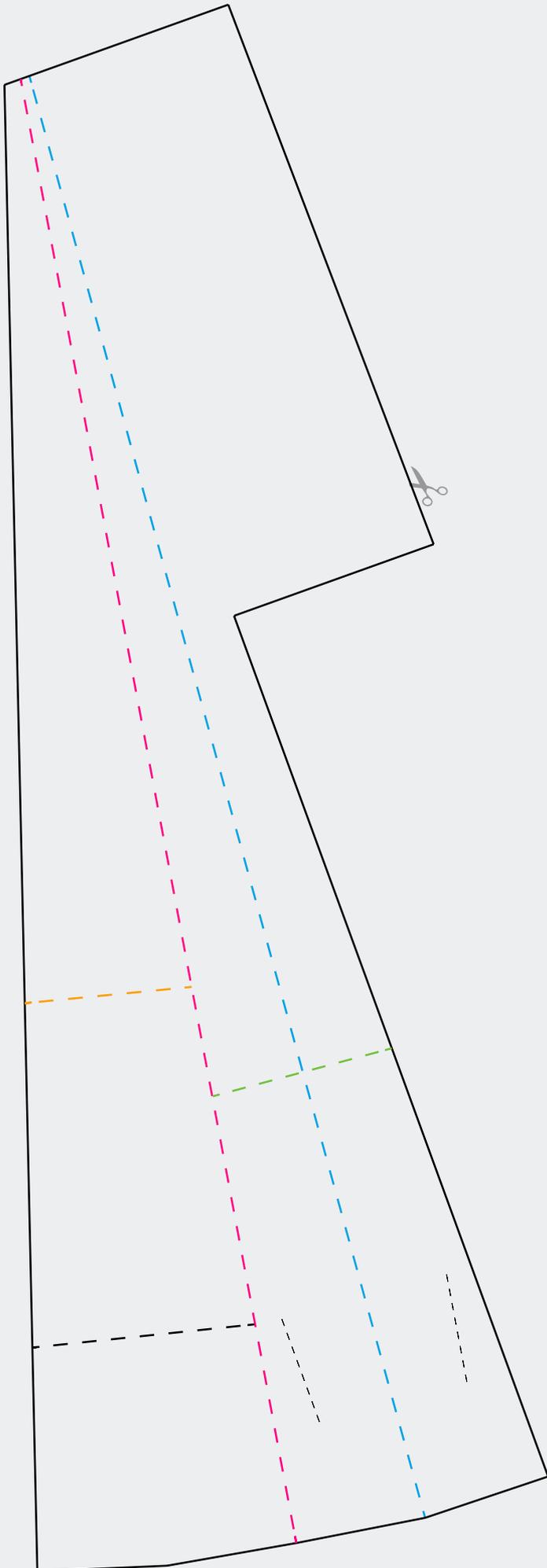
Strategies for dispersing seeds

Nature has developed countless different strategies and mechanisms to help spread seeds. If a plant grows seeds, these can be spread using a variety of different methods.

Many fruits are brightly coloured and taste sweet, which means that animals often enjoy eating them. These fruits in turn contain seeds, which are then secreted by the animals elsewhere and grow into new plants. Other seeds have appendages with barbs or hooks that attach to animals' fur and our clothing.

Some seeds have appendages that help them to fly so that they can be carried several metres by the wind and put down roots elsewhere.

You will be able to observe many of these different strategies during your visit to the forest. One extremely well-known type of flying seed are maple seeds. They belong to a group of seeds known as samaras. After a short freefall phase, they adopt a spiral or spinning motion and drop gently to the ground.



Plumed seed



Glider seed



Haired seed



Winged seed

Make a flying seed

On the left here is a template for a maple seed. Cut this out and follow the instructions below to fold it up. Use adhesive tape to stick the lower edge together.

Have a think what the best shape might be for the wing. How should this look to ensure it stays in the air for as long as possible and can be carried as far as possible by the wind? You can then test out how well your seed model flies. Which wing shape stayed in the air the longest?

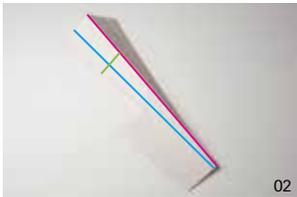
Nature has essentially developed over several million years what you have been able to work out in just a short time by experimenting! Countless different types of seeds with optimal flight and dispersal properties have developed. This is how evolution works.

Instructions

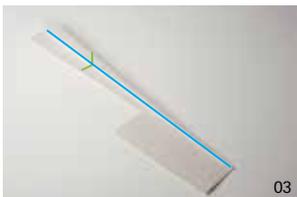
Cut out the template on page 20, then follow these instructions to fold it up:



01



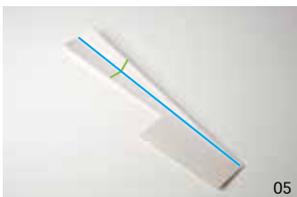
02



03



04



05



06



07



08



09



10



11



12



13



14



15



16



17



18



19

Can you remember what the shape of a maple seed wing looks like?

Cut a wing shape that you think will help your model remain airborne the longest.

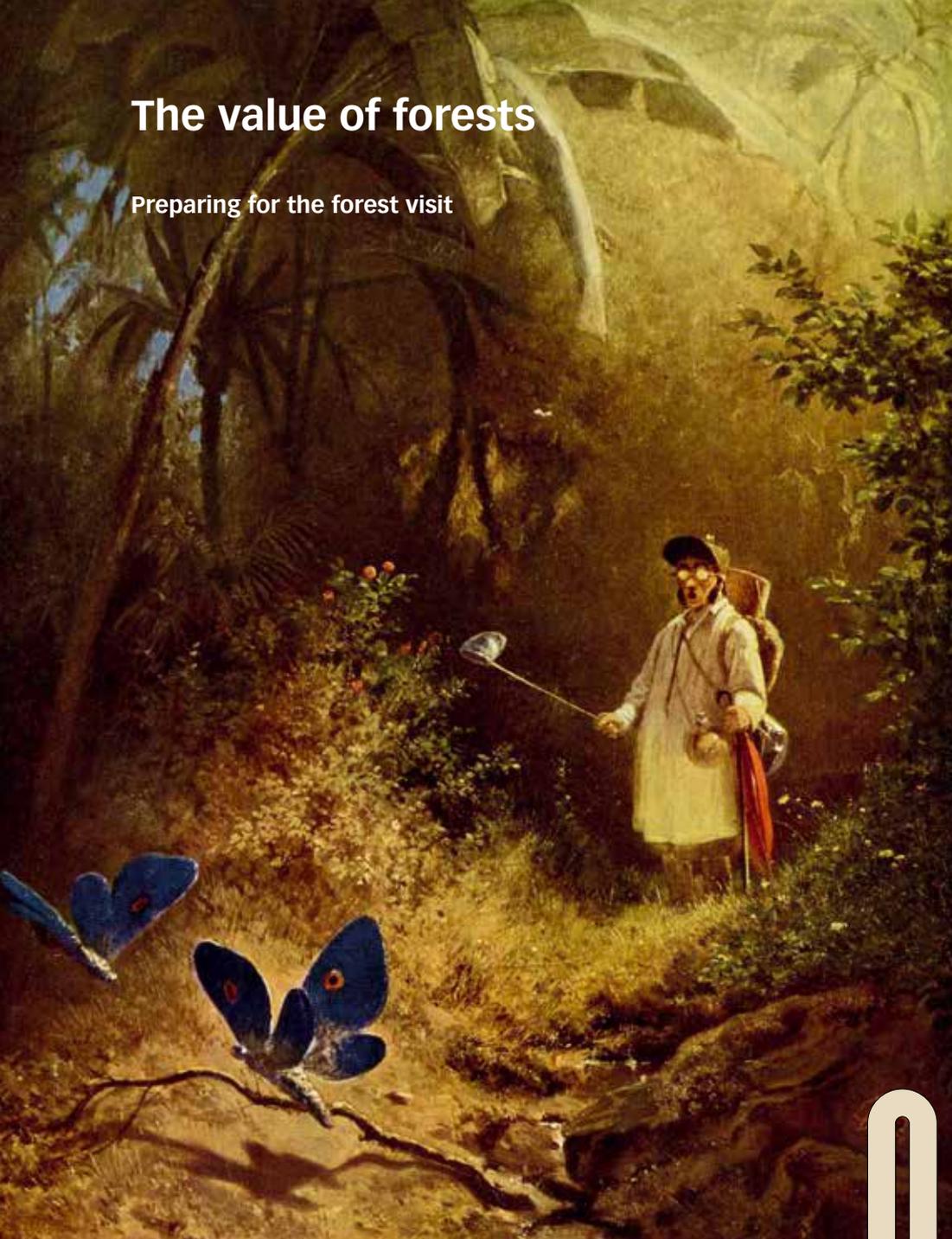
Throw your maple seed model up into the air at the same time as the other children. Which model floats through the air the longest?

A good throwing technique is shown below.



The value of forests

Preparing for the forest visit



The Butterfly Catcher

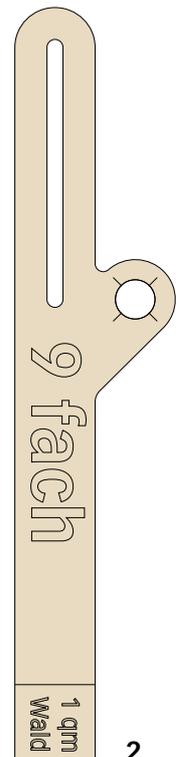
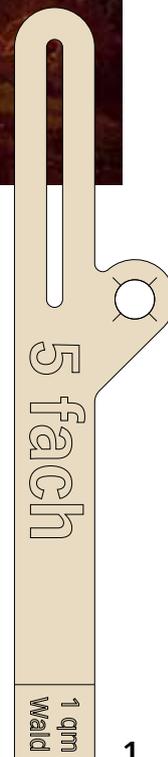
Painted by Carl Spitzweg
in 1840

The Butterfly Catcher

Once upon a time a long, long time ago,
the butterfly catcher wandered through an
enchanted forest.

Today, more than 175 years later, you no longer
have a net to take with you but rather a magnifying
lens for your smartphone. This is included in the
toolkit.

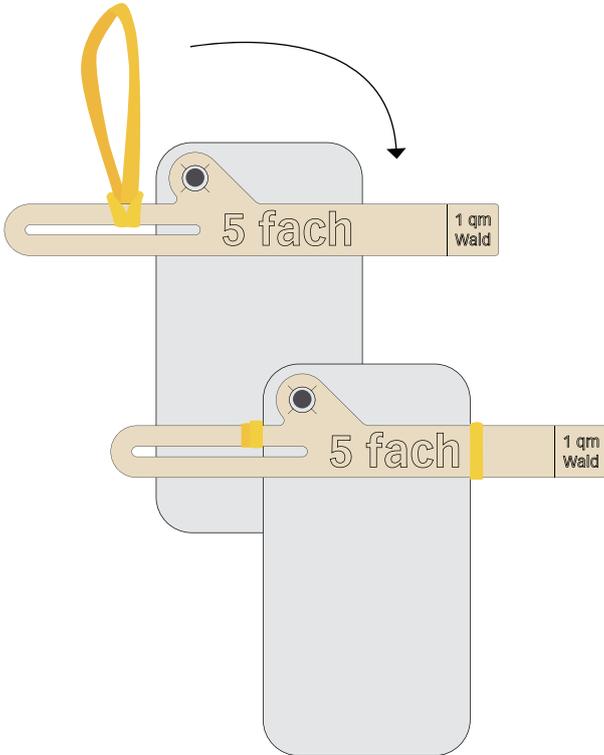
- 1 Magnifying lens with 5 x magnification
- 2 Magnifying lens with 9 x magnification



Forest rules

Instructions

Use the elastic band to attach the magnifying lens over your smartphone, exactly in front of the camera lens.



Practice focusing

Try to make out the secret message on the back of the beetle pictured here! You will need to take a photo for this – hold the magnifying lens and camera very close to the picture!



1

**Avoid making any loud noises.
This may startle the animals.**

2

Wherever possible, stick to the paths.

3

**Take care to not disturb any
animals during your visit.**

4

**Do not pick any plants needlessly.
If you do pick anything,
then pick as few as possible.**

5

**Do not collect any
endangered species.**

6

**Handle any creatures you catch
(e.g. insects, spiders, worms, etc.)
with care. They should only be kept
in the insect trap or Petri dish
for a short time for observation.
You should then set them free again
where you found them.**

7

**If you turn over any stones or dead wood
to search for small creatures,
be sure to turn them back over again.**



Observing the exploration site

What do you notice? What can you hear? What can you smell? What do you feel? What else can you observe?

Describe your exploration site.

Visiting the forest

- 1 Before you set off for the forest, cut out the exhibition notes on the left of this page.
- 2 Find a suitable place with a tree. Stand in a semicircle with the others for five minutes. Keep quiet and observe the site. What do you notice? What can you hear? What can you smell? What do you feel? What else can you observe?
- 3 Jot down a few preliminary observations about the exploration site in your exhibition notes.
- 4 Collect sticks to mark out the area.
- 5 Attach the string to the tree trunk and set up the sticks around the tree like in the picture on page 25.
- 6 After marking out the exploration site, begin having a careful look around you. What can you find there? Pay close attention to the smallest of details. It is often possible to discover a whole wealth of details by taking a closer look.
- 7 Select two items that particularly interest you. They should be no bigger than half a walnut. Please return larger finds or creatures once you have taken a picture.
- 8 Complete the exhibition notes.

Back in school

- 1 Take a picture of the items you have found.
- 2 Upload your favourite picture to the following website:

<http://1qm-wald.klimabuendnis.eu/upload>

- 3 Your teacher will then print the picture out for you.
- 4 Stick the picture in the space provided on the exhibition notes.

Need help uploading your picture?
Instructions are available on
<http://1qmwald01.u-x.de>

My favourite find

What have you found?

How big is your find? _____ mm

Date/season _____

Time _____

Weather _____

Temperature _____

Location _____

Your favourite picture

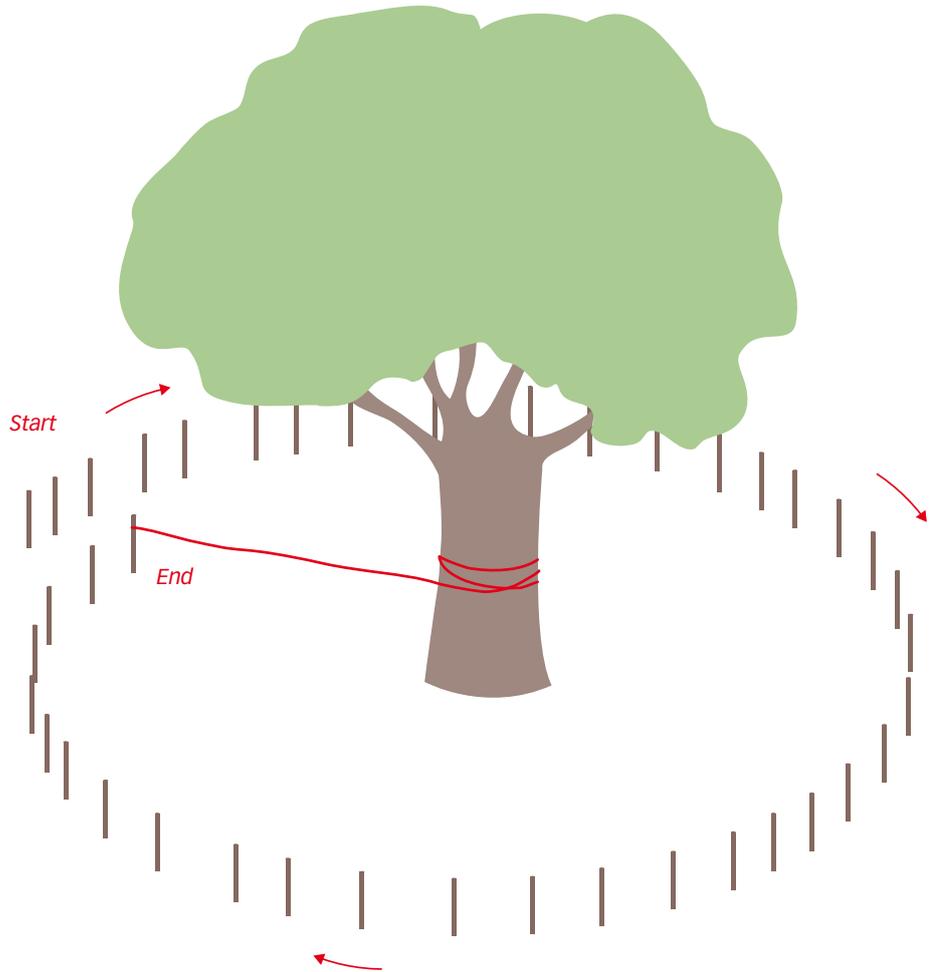


In the forest

Mark out the exploration site

Attach the string to the tree trunk and use the end of the string to mark a circle around the tree.

Put a stick in the ground approx. every 30 cm around this circle. This will create a spiral with an "entrance".

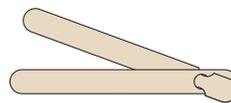
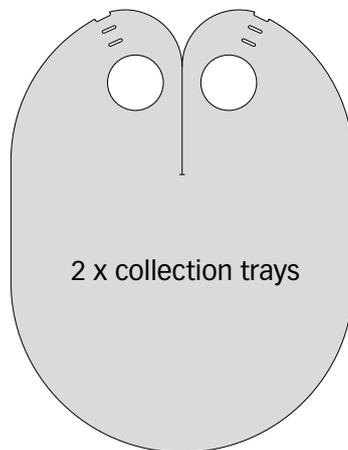


TOOLKIT

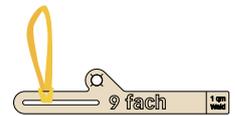
Each group will be provided with the following materials:



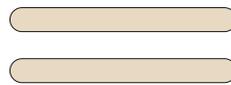
2 x metal collection pots



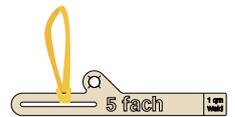
2 x wooden tweezers



1 x 9 magnifying lens (9 x magnification)



2 x exploration sticks



1 x 5 magnifying lens (5 x magnification)

The groups will need to share the following materials:



6 m string



1 x glass Petri dish



1 x Snapy insect trap

How valuable is the forest?

What did you like best about your visit to the forest? What do you like about forests?

Think of some reasons why forests are valuable.



**Here's
where
we live!**

What might this sentence mean?

What does it look like where you live?

What is "home" for you?

Why do so many people live in the city?

Where would you prefer to live and why?

Could you imagine living in the forest? What would you like to ask the girls pictured here?

The forest as a home

Nancy, Hilda, Brita and Lucia are doing each other's hair here. They are using a plant called achiote to colour it red. They live in the rainforest in a village called Masaramu, which is in Ecuador.



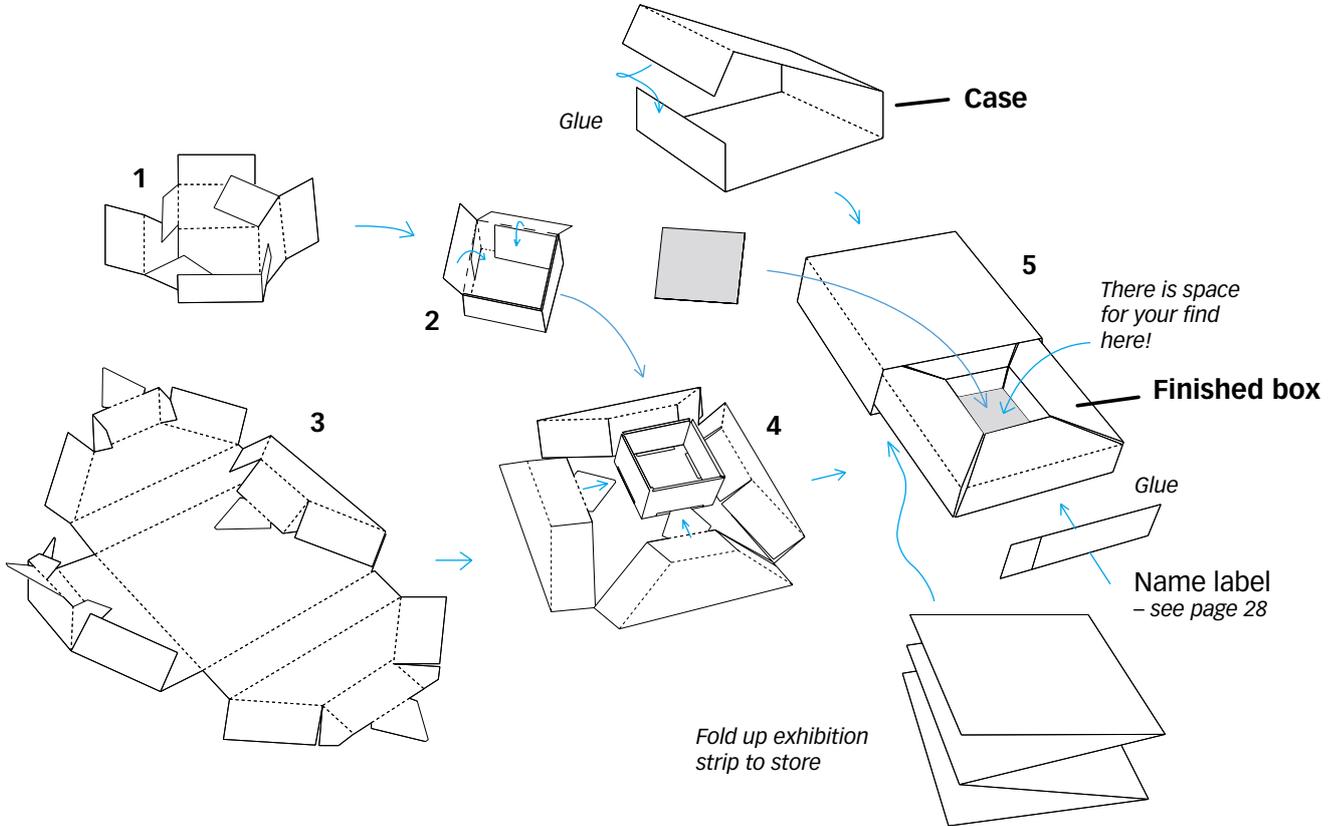
1 qm
Wald

Name _____

What is it? _____

Exhibition

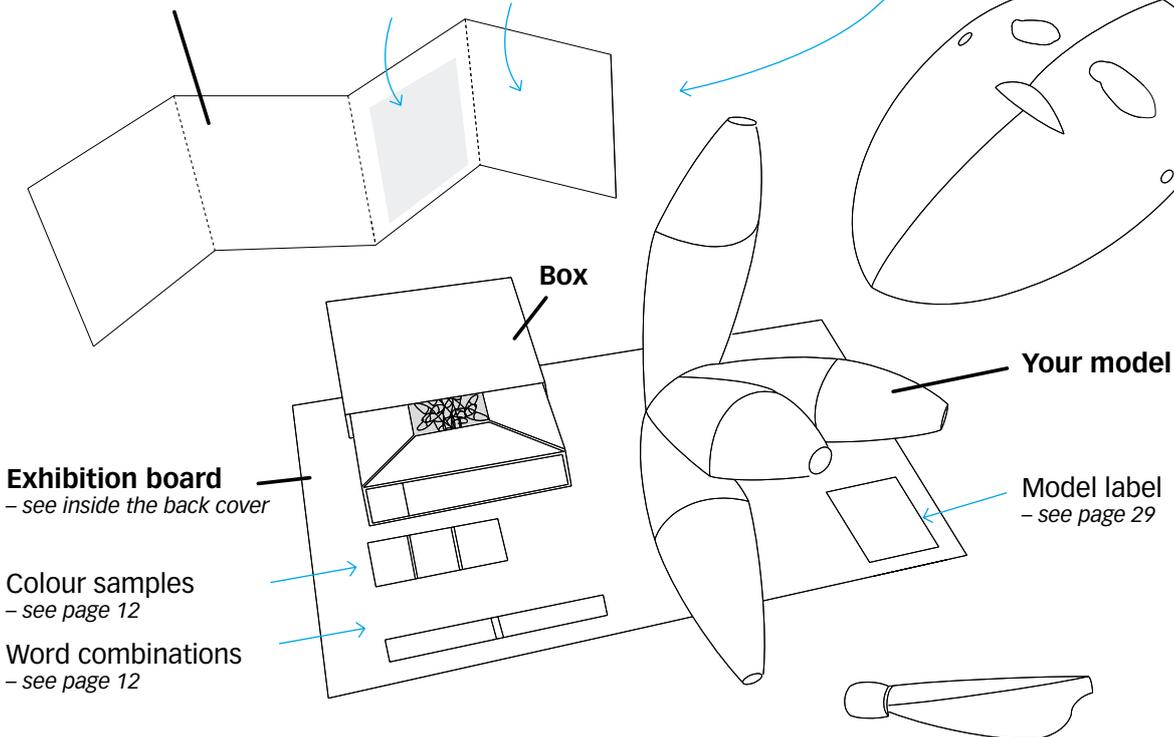
This page shows how to make an exhibition box and set up your exhibition.



Your exhibition notes
- see page 24

Your favourite picture
Ornament - see page 15

Forest spirit mask
- see inside the front cover



Zoom focus

We will now explain how you can build a large-scale model. You should not recreate the whole object you have found but rather just one interesting detail.

At the bottom of this page are two templates. Cut these out and stick them together to create three viewing windows of different sizes. When you now hold this over your find, you will see sections of different sizes. The smaller the viewing window, the larger the zoom factor.

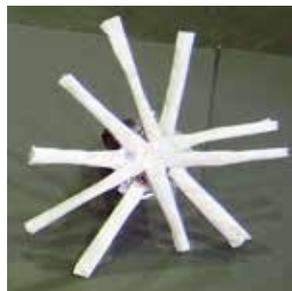
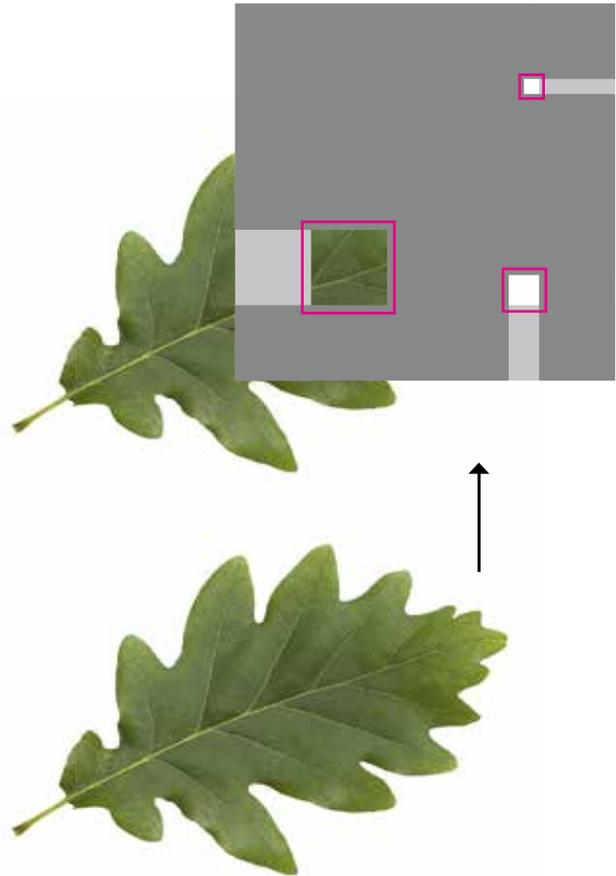
Take a close look at your find through the individual viewing windows and decide which detail looks particularly interesting.

Use newspaper, masking tape and coloured transparent paper to make a model.

Ideally, crumple up some newspaper to create a rough shape and fix the structure with masking tape. You can then add several layers of transparent paper and decorate the surface as appropriate.

For a detailed description of how to make a model, please watch this video:

<http://1qmWald03.u-x.de>



✂

+

✂

Model

What is your model of?

Size _____ mm

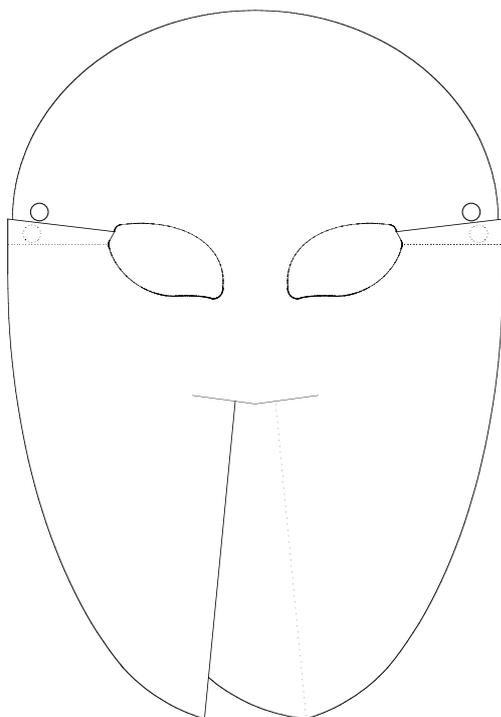
Scale _____ : 1



Forest spirits

Forests are shrouded in myths. They are often the setting of fairy tales and legends that tell of forest spirits both good and bad, such as elves, hobgoblins and pixies. They are said to be associated with different elements, such as plants, streams or rocks.

You now have the opportunity to make up your very own forest spirit and to create a mask to represent them. You will find a template for your forest spirit mask on the inside of the front cover.



Masks

How would you like to design your mask? Should it perhaps be enchanting and attract others, or should it be frightening and scare them away? Use the colours, shapes and patterns you explored in the "Learning to see" section and observed in nature.

A variety of different masks are pictured here. What effect do each of them have?

Instructions

Have a think what impact different colours, shapes and ornaments have and decorate your mask accordingly.

Create your very own forest spirit.

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Space for your exhibition box

Space for your model

Colour sample 01	Colour sample 02	Colour sample 03
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Description	Colour
Description	Colour
Description	Colour

Name _____

Model label



