Design, make and evaluate

Aim of this section
To design and make a variety of products using natural materials

Curriculum links

EYFS
- Physical development
- Expressive arts and design

Key stage 1: Design Technology
- **Design**
  - design purposeful, functional, appealing products based on design criteria;
  - generate, develop, model and communicate ideas.

- **Make**
  - select from and use a range of tools and equipment to perform practical tasks;
  - select from and use a wide range of materials according to their characteristics.

- **Evaluate**
  - evaluate ideas and products against design criteria.

- **Technical knowledge**
  - build structures, exploring how they can be made stronger, stiffer and more stable.

forestry.gov.uk/gruffaloteaching
Teacher instructions

Prepare

- Select which product(s) you are going to make, from the list on the right.
- Read and understand the design criteria.
- Organise children into groups.
- Discuss the questions in pink.
- You could look at existing products and discuss how they are made.

Plan

Generate, develop and communicate ideas by discussing:

- What sort of materials are available and which are you going to use?
  In the forest, you could use sticks, stones, leaves, mud, pine cones, seeds or logs.
- Do you need to join materials? How will you do this?
  We suggest that you use string made from natural fibres, but don’t recommend providing glue or sticky tape; elastic bands can sometimes be useful for children who cannot tie knots, but please ensure that elastic bands are all taken back to the classroom with you after your visit.
- Do you need to cut materials? What tools are available and will they do the job?

Make

- Work in groups to select and collect the materials, cut them and join them to make the product.

Evaluate

- Give the children the opportunity to show their product to the rest of the group and to explain their choice of materials and method.
- Discuss whether the design criteria have been met and whether the making went according to plan? Which bits were more difficult than expected?

Improve

- How could you improve the product/make it more fit for purpose? How could you make it stronger? Are there any other designs or materials that you would like to try to use?
- Extend the work, by giving more specific design criteria if appropriate.

Choose a product to make

The same process (prepare, plan, make, evaluate, improve) is used to make the following different products from natural materials:

1. a picture frame
2. a musical instrument/sound-maker
3. a nest
4. a shelter
5. a bridge

TOP TIP FOR TEACHERS

Only use tools if you are confident with them and have done a robust risk assessment.
Product 1
Design criteria: design and make a picture frame from natural materials, for your Gruffalo picture

Prepare
What materials are picture frames usually made from?
Wood, metal, plastic.
How many other products can you think of that can be made from wood?
Where does the wood come from?

Plan and make
Measure the picture – how long and wide does the frame need to be?
What shape does it need to be?
How are you going to make it?
- sticks tied together with string to make a square or triangle?
- a shape on the ground made from leaves, mud or cones?
- sticks hanging from a branch?

Evaluate and Improve
Which frame design does The Gruffalo picture look best in and why?
If The Gruffalo / Mouse / Owl / Fox / Snake had a picture frame, what kind of picture would they like to put in it? Where would they hang it?
Try more specific design criteria:
- the frame has to stand up;
- the frame has to hang up;
- the frame has to be square.

Cross-curricular links
Key Stage 1: Mathematics
- Geometry
  - recognise and name common 2-D shapes.
- Measurements
  - measure and begin to record lengths and heights.
Product 2

Design criteria: design and make a sound maker (or percussion instrument) that Mouse can use to warn his friends and relatives that The Gruffalo is coming.

Prepare

How many musical instruments can you think of that are made of wood?
- Violin and other string instruments, drums, xylophone (comes from the Greek meaning ‘wooden sound’), piano, claves...

Where does the wood come from?

Plan and make

How are you going to make it?
- two sticks scraped or knocked together?
- a stick tapped on a tree stump?
- a bunch of leaves or pine cones tied to the end of a stick and waved around so that the leaves rustle or the cones clatter together?

This could be a fairly quick activity, so it might be as well to ask groups to come up with at least two different sound-makers.

Evaluate and improve

Which sound-maker design would be best at enabling Mouse to communicate with his friends and why?

Try more specific design criteria:
- Mouse needs to be able to change the volume on the sound-maker;
- Mouse wants to play a tune or tap out a rhythm on the sound-maker.

Cross-curricular links

Key Stage 1: Music
- Pupils should be taught to experiment with, create, select and combine sounds.
Product 3
Design criteria: design and make a nest to keep Owl’s chicks warm

Prepare
What kind of birds live in forests?
Woodpecker, blackbird, woodpigeon, jay, thrush, great tit...

Where do they make their nests?
In trees or bushes; some birds make nests on the ground; woodpeckers make their nests in hollow trees; the Forestry Commission puts up nest boxes for birds in some forests.

What features make a good nest?
- Shape – eggs must not roll out;
- Shelter – under branches of a tree;
- Insulation.

Why are forests good homes for birds?
- Food (nuts, seeds, berries, insects);
- Shelter;
- Trees for nesting.

You could explore the forest looking for nests, and discussing where and how they have been made.

Please remember not to touch nests or to disturb them in any way.

Plan and make
How are you going to make it?
- sticks placed in a circular shape on the ground?
- sticks tied together with string to make a nest that can be picked up?
- bendy sticks e.g. hazel or willow could be bent into a circular shape then woven together?
- wet mud, shaped and allowed to harden?
- lined with moss or feathers for warmth?

Evaluate and Improve
Which nest design would be best at keeping Owl’s chicks warm and why?

Try more specific design criteria:
- Nest must be lined (insulated);
- Nest must be off the ground.

Cross-curricular links
Year 2: Science
- Living things and their habitats
  - identify that most living things live in habitats to which they are suited.
- Animals, including humans
  - find out about and describe the basic needs of animals, including humans, for survival (water, food, air and shelter).
Product 4
Design criteria: design and make a shelter or house for one of the characters in the story

Prepare
What kind of animals live in the forest?
- Mice, foxes, snakes, badgers, squirrels.
Where do they make their homes?
- Many are underground, some are up in trees, some live on the ground and make homes in undergrowth.
What do all animal homes have in common?
- They all need to be warm, dry and safe.
You could explore the forest looking for animal homes and discussing how and where they have been made.

Plan and make
Which animal is the shelter going to be for?
What are you going to do to make it warm, dry and safe?
How are you going to make it?
- sticks leant up against a tree?
- a pile of logs covered with fallen leaves?
- sticks and leaves placed in the fork between two branches?

Evaluate and Improve
Which shelter would be best at keeping an animal warm, dry and safe, and why?
Try more specific design criteria:
- Give the children a cuddly toy which has to be able to live in the shelter;
- Using the small shelter as a prototype, re-make it much larger, so that it is big enough for the children to get into (you can test it for ‘waterproof-ness’ by throwing water over it at the end).

Cross-curricular links
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Product 5

Design criteria: design and make a bridge that is tall enough for Mouse to walk underneath, wide enough for her to lie down under, and strong enough for her to balance on top.

Prepare

What are bridges for?
- To cross a stream or valley.

Why might there be a bridge in the forest?
- Metal, wood, stone.

Why are they made from different materials?
- It depends on where they are and what their purpose is e.g. carrying cars or people.

Why is wood a good material for a bridge in the forest?
- Cheaper and easier to work with than concrete or metal; easy to join; easy to cut; more appropriate to the surroundings; more flexible and can bend under weight without snapping.

Plan and make

How are you going to make it?
- two tree stumps or logs, with sticks laid across their tops;
- forked sticks pushed into the ground with other sticks placed in the two forks to make the top of the bridge;
- three sticks lashed together with string to make a tripod at each end, with other sticks laid across the top between the two tripods.

Evaluate and Improve

Which design allows Mouse to walk and lie down under the bridge, and balance on top of it?

Would Mouse’s bridge be suitable for Gruffalo or Fox?

Try more specific design criteria:
- Bridge must be freestanding i.e. not joined to a tree or tree stump;
- Bridge may not use sticks any thicker than a pencil;
- Mouse must be able to balance on top for at least ten seconds;
- Using the small bridge as a prototype, re-make it much larger, so that it is big enough for a child to crawl under and strong enough for them to sit on top.

Cross-curricular links

Year 1: Science
- Everyday materials
  - identify and name a variety of everyday materials.
**Conclusion**

You have made products from natural materials found in the forest.

Wood (timber) comes from trees which grow in forests, and is used to make all sorts of everyday products, including picture frames, musical instruments, bridges and homes.

You have also learned that trees and forests are really important places for animals and birds to live.

The Forestry Commission looks after lots of woods and forests in England. Trees are planted and cared for, so that they grow big enough to be cut down to make things, then more trees are planted. This means that there will always be a forest for wildlife to live in, and for people to enjoy.