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| **DIY Paper Planters** |
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| Making biodegradable paper containers to grow plants |
| **Subject(s):** Design & Technology, Mathematics, Science**Approx time:** 35 - 50 minutes (plus extension planting activity) |  | **Key words / Topics:** * National Earth Day
* Biodegradable
* Compost
* Fold
* Net
* Plant
* Scissors
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| **Suggested Learning Outcomes**  |  |  |
| * To know about National Earth Day on 22 April
* To know what is meant by a net
* To know that 3D shapes can be constructed from nets using folds and tabs
* To be able to make a simple 3D shape from a 2D net
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| **Introduction** |  |  |
| This is one of a set of resources designed to allow learners to use seasonal themes to support the delivery of key topics within design & technology, maths and science. This resource is based on National Earth Day.This activity introduces the concept and making of nets, in the context of biodegradable planters that can be used to grow seeds. Nets can be used to make three-dimensional shapes from two-dimensional images. This could be used at Key Stage 1 or 2 to introduce nets and develop practical skills. |
| **Purpose of this activity**In this activity learners will use the theme of National Earth Day to make a biodegradable paper planter. This activity could be used as a main lesson activity, to teach learners about nets and making 3D shapes from 2D forms, contributing to learning in maths and developing skills making graphic products in design & technology. It could also be used within a wider scheme focussing on the use of science to understand the natural environment, where learners plant seeds and observe their growth. Additionally, this could be used to start a discussion on the environment, as the container is biodegradable, whilst many traditional plant pots are made from polymers (which in turn are made from non-renewable oil), which take hundreds of years to decompose.  |
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| **Activity** |  | **Teacher notes** |
| **Introduction (5 minutes)**Teacher to introduce the activity, to make a biodegradable planter that can be used to grow a seed. Teacher to explain that a 3D shape can be made from a flat piece of card called a ‘net’. **Demonstration (10-15 minutes)**Teacher to demonstrate the steps shown in the presentation to make the paper planter:* Learners to add letters A-D to each corner respectively, matching on the front and back of the A4 paper.
* Step 1 – Fold the paper in half A-B to C-D.
* Step 2 – Fold the paper in half again A to B.
* Step 3 – Fold the corner of B and flatten.
* Step 4 – Fold corner B back to D.
* Step 5 – Fold corner C and flatten.
* Step 6 – Fold corner A back to C.
* Step 7 – Fold corner A to middle.
* Step 8 – Fold corner B to middle then fold A over, to the middle.
* Step 9 – Fold B to the middle and turn the paper over.
* Step 10 – Repeat steps 7-8 and then fold the top tab down.
* Step 11 – Fold the other top tab down and then pull the tabs apart.
* Step 12 – Push the bottom flat inside the planter.

**Performing the Activity (15-25 minutes)**Learners to carry out the activity.**Plenary (5-10 minutes)**Learners could show their planters to their peers and ask what could be improved. **Extension:** **Planting the Seed (10-15 minutes)**Teacher to demonstrate the steps of how to plant the seed into the paper planter:* Fill the paper planter about 2/3 full with damp soil/compost.
* Use a pencil/stick to push a hole to a depth of 2 cm into the soil/compost and plant the seed in the hole.
* Cover the hole with soil/compost.
* Cover the soil/compost with clingfilm.
* Place the planter on a windowsill, on either a plate or a tray.

**Observation**Over the following days, learners should observe the paper planters until the plant begins to grow to a height of 10 mm. At this stage remove the cling film and transfer the plant to the garden. |  | This activity could be done as individuals or in small groups. Additional guidance for making:* Accurate folds can be started by using a ruler along the fold line.
* To make a ‘sharp’ or precise fold, the card should be fully folded over and pressed along the length of the fold.
* If needed, the folds can be scored on to the card using scissors and a ruler.

For differentiation, the teacher could use a small jam jar and A4 paper folded in half along the long edge. Wrap and roll the paper around the jam jar and use biodegradable paper tape to hold in position. (Biodegradable paper masking tape is available from several major online sites). Then remove the jam jar and fold the paper at the bottom to fill the gap, securing with more tape.For the extension (growing) activity, the seeds most commonly used are:* Beans, which typically take 8-10 days to germinate, depending upon the variety.
* Sunflowers, which take 7-10 days to germinate.
* Lettuces, which take 2-10 days to germinate depending upon the variety.

Carrot seeds can take three weeks to germinate, so may be best grown spanning a holiday period (if additional watering is possible, where required).When putting soil/compost in the paper planter, this should allow some space for the plant to start to grow. Check that the soil is not pushed up against the cling film as this would inhibit growth.Standing the planter on a plate or tray will protect the surfaces in case the paper disintegrates.When the plant is 10 mm high transfer the compostable paper planter into the ground. |
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| **Differentiation** |  |  |
| **Basic** |  | **Extension** |
| * Make a circular planter using a jam jar or similar cylindrical object – fold the A4 paper in half on the long edge and wrap it round the shape, holding it in pace with a small piece of biodegradable tape. Fold over the bottom and secure with more paper tape.
* The nets could be pre-cut to size.
* An exemplar could be used to illustrate what the folded net should look like.
 |  | * Discuss the process of planting a seed and how to care for the plant. What are the key ingredients to help a seed grow?
* Watch **BBC Bitesize** – What does a plant need to grow: <https://www.bbc.co.uk/bitesize/topics/zpxnyrd/articles/zxxsyrd>
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| **Resources** |  | **Required files** icon-docicon-pdficon-ppt |
| * A4 paper

For differentiation: * Small jam jars or similar cylindrical objects
* Biodegradable paper tape (available online)

For planting:* Soil/Compost
* Pack of seeds, e.g. beans, sunflower or lettuce
* Clingfilm
* Water
 |  |  DIY paper planters presentation  |
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| **Additional websites** |  |  |
| * **YouTube** – Earth Day for kids: https://www.youtube.com/watch?v=yl3zgcL0Tv8
* The earth day website: earthday.org
* **BBC Bitesize** – What does a plant need to grow: <https://www.bbc.co.uk/bitesize/topics/zpxnyrd/articles/zxxsyrd>
* Index page on nets at technologystudent.com – useful to provide teachers with a thorough understanding of nets and also includes printable worksheets <http://www.technologystudent.com/despro_flsh/graphics_dev1.html>
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| **Related activities (to build a full lesson)** |  |  |
| **Starters** (Options) * Watch the earth day for kids clip on you tube: https://www.youtube.com/watch?v=yl3zgcL0Tv8
* Discuss National Earth Day and the importance of plants to the natural environment.
* Product analysis – show a box used for packaging and ask how pupils think it is made.
 | **Extension** (Options)* Discuss the process of planting a seed and how to care for the plant. What are the key ingredients to help a seed grow?
* Watch **BBC Bitesize** – What does a plant need to grow: <https://www.bbc.co.uk/bitesize/topics/zpxnyrd/articles/zxxsyrd>

**Plenary*** Peer review of the completed planters.
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| **The Engineering Context** film |
| * Nets are used to make almost all forms of card packaging, ranging from simple cereal boxes to display boxes with clear polymer ‘windows’, to display stands. A large supermarket may contain hundreds of thousands of different nets!
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| **Curriculum links**  |
| **England: National Curriculum**Design & Technology Key Stage 1Make* select from and use a range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing]

MathematicsKS2 Geometry* recognise, describe, and build simple 3-D shapes, including making nets.

ScienceKS1 Plants:* identify and name a variety of common wild and garden plants, including deciduous and evergreen trees

identify and describe the basic structure of a variety of common flowering plants, including trees | **Northern Ireland Curriculum**The Arts / Art and Design Key Stage 1use modelling and construction techniques to make three-dimensional work, for example, experiment with cutting, folding and joining methods to make a model building from thick paper or thin card.KS2 – Mathematics and NumeracyShape and Spacebuild and make models with 3D shapes; create pictures and patterns with 2D shapes.KS2 – The world around usInterdependence:* how do living things survive.
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| **Scotland: Curriculum for Excellence**Craft, Design, Engineering and GraphicsDesign and construct models/products* TCH1-09a I can design and construct models and explain my solutions

Representing ideas, concepts and products through a variety of graphic media* TCH 2-11a I can use a range of graphic techniques, manually and digitally, to communicate ideas, concepts or products, experimenting with the use of shape, colour and texture to enhance my work.

Application of Engineering* TCH1-12a I explore and discover engineering disciplines and can create solutions.

Numeracy and MathematicsShape, position and movementProperties of 2D shapes and 3D objects* MTH 2-16 Through practical activities, I can show my understanding of the relationship between 3D objects and their nets.
* MTH 2-16b Through practical activities, I can show my understanding of the relationship between 3D objects and their nets.

SciencesBiodiversity and interdependence:* SCN 0-03a
 | **Wales: National Curriculum** MathematicsKS2 – Using geometry skills* construct solids from given nets.

Design and Technology Key Stage 2Making* 1. work to their specification/recipe to make products
* 3. measure, mark out, cut, shape, join, weigh and mix a range of materials and ingredients, using appropriate tools/utensils, equipment and techniques

Range* tasks in which they explore and investigate simple products in order to acquire technological knowledge and understanding that can be applied in their designing and making
* tasks in which they develop and practise particular skills and techniques that can be applied in their designing and making

ScienceKS2 – Interdependence of organismsthe environmental factors that affect what grows and lives in those two environments, e.g. sunlight, water availability, temperature. |
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| **Assessment opportunities** |
| * Informal formative assessment of the making activity, summative review of the completed compostable pots.
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