OUTDOOR MATHS

Who are these resources for? Natural Connections resources are aimed at teachers who are new to outdoor learning and are intended as an initial helping hand to get started. Teachers with more experience in taking lessons outside will be able to adapt them and take them to the next level. Resources are available to cover all subjects of the KS1 and KS2 new national curriculum.

Why were they produced? These resources were produced in response to teachers' feedback via the Natural Connections Demonstration Project.<hyperlink to landing page> The 3 ½ year project aims to increase learning in natural environments across in schools across the south west, and draws valuable learning from evaluation of the delivery model and the diverse benefits of using local green spaces for education across the curriculum. Many of the teachers involved in the project were new to taking learning outdoors, and requested some simple lesson ideas to help build their confidence and to link outdoor learning to the curriculum. These resources have been produced by Plymouth University's Institute of Education, and have been trialled in Natural Connections schools.

Can I get involved with Natural Connections? The Demonstration Project element of Natural Connections concludes in March 2016 but a number of legacy initiatives are under development. Natural Connections has been working with over 120 schools since 2012 in the South West and we are now able to offer our service to all schools.

The Natural Connections Team can support all aspects of outdoor learning in primary, secondary and special schools throughout the UK and overseas. We are an experienced group of experts in curriculum development and outdoor learning practice across all curriculum topics. We draw on a range of specialists to tailor our services to the particular needs of each school. Our service to schools includes:

- Specialist professional development & training for teaching staff, governors and volunteers
- Bespoke Curriculum design to integrate outdoor learning into learning, teaching and Improvement Plans
- Practical outdoor learning activities and ideas to support lessons that engage pupils, develop skills, enhance attainment and offer creative lesson ideas
- A comprehensive set of resources for schools to build exciting lessons
- Advice on funding and partnership development
- Local support and access to a range of outdoor education providers who can help enhance your lessons
- An evaluation and research package to suit each school setting, based on many years' experience
- Access to the wider Natural Connections network, conferences, research papers, contacts and offers to support you in the long-term

Whatever the scale of your plans and whatever stage you are at with outdoor learning, please return to our home page and contact us to discuss how the Natural Connections Team can help.

What will children learn from this activity?

MATHS MEASURING COMPARING RESULTS TALKING AND LISTENING

Year 1/2 | **Year 3/4** | **Year 5/6**

NATURAL CURRICULUM OBJECTIVE(S): MEASUREMENT

- Compare, describe and solve practical problems for lengths and heights (e.g. long/short, double/half)
- Measure and begin to record lengths and heights

LEARNING OBJECTIVE(S):

- I can use natural materials to measure length and height.
- I understand why it's important to use standardised measurements.

TIMESCALE:
1 lesson (1 hour)

ACTIVITY:
Children are encouraged to explore the outdoor environment and collect natural materials, using only the natural objects (sticks, leaves, pine cone, etc.) the children will be asked to measure various body parts then compare and contrast their findings with each other.
For example, how many leaves long are your arms? How many sticks does it take to measure your leg?
Record answers via. cameras, written work.
Do they get the same results as other people? Why not?

Explain the importance of standardised measurements.

EAL/SEN:
A very active, practical lesson. Lots of opportunities to work alongside peers and adults. Opportunities for speaking and listening for EAL. Appealing for SEN due to lots of touching and feeling of resources and the practical element.

DIFFERENTIATION:
Aim open ended questions towards the children of high mathematical ability. Why when your arms are similar length does this arm have the length of 12 leaves and this arm 20 leaves long? Does it matter what size the leaves are? Does it make a difference to our results?

Cross Curricular: Some geographical and scientific language when describing the natural materials.

Possible Resources: cameras, notebooks, outdoor clothing (wellies/coats)

PREPARATION: **(Things to do before the lesson)**	**LINK:** **(Bringing back into the classroom)**
Measurement with a ruler in the classroom.	What have children realised about measurement? Why is it important we all measure things with the same equipment? Now move on from cm's to m's.

What will children learn from this activity?

MATHEMATICAL SKILL TEAMWORK TURN TAKING PROBLEM SOLVING

Year 1/2 **Year 3/4** **Year 5/6**

Natural Curriculum Objective(s): Subtraction

- Subtract one-digit and two-digit numbers to 20
- Solve one step problems that involve subtraction, using concrete objects

Learning Objective(s): I can subtract 1 or 2 away from a 2 digit number.

Timescale: 1 lesson

Activity:

Once children have an understanding of take away, subtraction, organise a takeaway tournament. Divide the class into small groups. Place your acorns (or whatever natural material you choose) on the ground outside between the teams. Taking it in turns children may take away 1 or 2 acorns. Then it is the other team's turn. They can also choose whether to take away 1 or 2 acorns away. The winner is the team that can take away the last acorn(s). Therefore the groups will have to work out strategies, planning and problem solving. May have to play a couple of times for them to get the hang of it. A very simple game but creates competition and therefore children become engaged and quicker at subtraction.

EAL/SEN: A very active, practical lesson. Lots of opportunities to work alongside peers and adults. Opportunities for speaking and listening for EAL. Appealing for SEN due to lots of touching and feeling of resources and the practical element. Both may need extra adult support or visual aids. Number line or number track.

Differentiation: Divide groups into equal mixed ability to make healthy competition. Encourage all children to take in turns and have a go. Encourage questions and answers; you had 21 acorns, you took away 2, how many acorns are left? Mental maths. Which children know instantly, which children are counting the remaining acorns?

Cross Curricular:

Possible Resources: camera, notebook

PREPARATION: (Things to do before the lesson)	LINK: (Bringing back into the classroom)
Make sure children have an understanding of subtraction.	Move onto subtracting larger numbers.

What will children learn from this activity?

MATHS MULTIPLICATION TALKING AND LISTENING

Year 1/2 **Year 3/4** **Year 5/6**

Natural Curriculum Objective(s): Number - multiplication

- Recall and use multiplication facts for the 3, 4 and 8 multiplication tables

Learning Objective(s): I can recall my 3 and 5 times table using leaves I have collected from our school grounds.

Timescale: 1 lesson (1 hour)

Activity: ASK CHILDREN TO COLLECT LEAVES WITH 3 LEAFLETS – AS PICTURED (IF PRACTISING THEIR 3 TIMES TABLE) OR 5 LEAFLETS (FOR THEIR 5 TIMES TABLE)
Ask children questions or provide multiplication question cards and then ask the children to arrange their leaves to answer the question. E.g. 4x 3 (trios) = 12.
Photograph to document. Keep leaves in an envelope and ask them again tomorrow. Does it help them to learn their times table?

EAL/SEN: A very active, practical lesson. Lots of opportunities to work alongside peers and adults. Opportunities for speaking and listening for EAL. Appealing for SEN due to lots of touching and feeling of resources and the practical element.

Differentiation: Aim open ended questions towards the children of high mathematical ability. Children to work independently. Children who are struggling or LA to have visual aids and reminder cards.

Cross Curricular:

Possible Resources: flashcards to help remind children who struggle with multiplication, whiteboards if you think they will be helpful.

PREPARATION: **(Things to do before the lesson)**	**LINK:** **(Bringing back into the classroom)**

An understanding of their times tables. To know their 2 and 5 x's table and have begun learning their 3's or 4's. Possible follow up lesson Encourage the children to investigate sets of numbers in the outdoor environment such as panes in windows	Progress and continue with knowledge of 3 and 4 x's tables.

What will children learn from this activity?

MATHS TEAMWORK SHAPES TALKING AND LISTENING DESIGN

'Creating 3D Shape Structures'

Year 1/2 **Year 3/4** **Year 5/6**

Natural Curriculum Objective(s): Geometry – properties of shapes

- Recognise, describe and build simple 3-D shapes, including making nets
- Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.

Learning Objective(s): I can build a 3D shape structure and identify the angles where they meet.

Timescale: 1 or 2 lessons

Activity: children work in groups to make 3d nets and structures of Shapes. Set them a challenge!
E.g. Which group can make the biggest shape with 10 pieces of bamboo? Can you make a shape with 12 angles?

EAL/SEN: A very active, practical lesson. Lots of opportunities to work alongside peers and adults. Opportunities for speaking and listening for EAL. Appealing for SEN due to lots of touching and feeling of resources and the practical element.

Differentiation: Aim open ended questions towards the children of high mathematical ability. Children to work in mixed ability/friendship groups. Children could have an envelope full of key cards and each child is responsible for answering at least one of the cards. E.g. What is the length of the longest stick? How many angles does your shape possess? Obtuse? Acute? Right-angles? Etc. Children who are struggling or LA to have visual aids and reminder cards.

Cross Curricular: Design & Technology

Possible Resources: Bamboo, sticks, measuring equipment (tape measures/meter sticks), tape,

string, cameras, cutting equipment (pliers/small saw – to be supervised with).

PREPARATION: (Things to do before the lesson)	LINK: (Bringing back into the classroom)
Quite a tricky task to make these nets, may work better if children have prior experience of attaching sticks together. Do a simpler version with lollipop sticks and tape or Dowling lengths and rubber bands.	Compare and classify the 3D geometric shapes – discuss properties, sizes, unknown angles, dimensions, etc.

What will children learn from this activity?

MATHS TEAMWORK DATA PROBLEM SOLVING GRAPHS

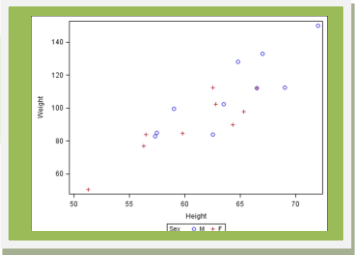
'Student Scattergraphs'

Year 1/2 **Year 3/4** **Year 5/6**

Natural Curriculum Objective(s): Statistics

- Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs.
- Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs.

Learning Objective(s): I can identify a correlation between two variables



Timescale: 1 lessons

Activity: Children work as a whole class, set out the playground as a Graph, using chalk to draw the graph and number the axis.
Then set the children a challenge!
(Look at the picture – instead of using pen and paper and plotting with a pen, the dots can be represented by the children standing in the right plot.)
E.g. Height vs. Age in months – any correlation?
Shoesize and hand span?

EAL/SEN: A very active, practical lesson. Lots of opportunities to work alongside peers and adults. Opportunities for speaking and listening for EAL. Appealing for SEN due to the practical element. Children may require help for retaining instructions or measuring height, hand span, etc?

Differentiation: All children to participate, easily accessible for all. Aim HA children to answer questions on correlation? What do the results show us? What does this mean?
Children who are struggling or LA to have visual aids and reminder cards.

Cross Curricular: Maths – measuring: The children could be asked a series of questions the day before to prepare for the student scattergraph.

Possible Resources: chalk, meter stick rulers, camera

PREPARATION: **(Things to do before the lesson)**	**LINK:** **(Bringing back into the classroom)**
Children have knowledge of scatter graphs before having to be in one! Teacher provide examples.	Children should have a better understanding of how to create a scatter graph independently on paper.

What will children learn from this activity?

MATHS TEAMWORK COORDINATES PROBLEM SOLVING PREDICITNG

'Archaeological Dig'

Year 1/2	Year 3/4	Year 5/6

Natural Curriculum Objective(s): Geometry – position and direction

- Describe positions on the full coordinate grid (all four quadrants), including the use of negative numbers
- Draw and translate simple shapes on the coordinate plane, and reflect them in the axes

Learning Objective(s): I can locate a co-ordinate on a practical coordinate grid.

Timescale: 2 or more lessons (groups to do it one at a time)

Activity: in a school flower bed or an area of the playground (if field/grass/mud) mark out with tape/string or wire a coordinate grid. Bury fossil or bone replicas. Have the children work in teams:
Either give them precise coordinates to find the correct item buried or ask them to complete an archaeological dig and list the coordinates when they found something. Children will rely on their mathematical knowledge to measure and count their finds and their geometry to discover the coordinates on the site grid when things are found.
The beauty of doing the dig in a flower bed means you can divide the soil into layers, different textures and colours to extend the children's scientific knowledge.

EAL/SEN: A very active, practical lesson. Lots of opportunities to work alongside peers and adults. Opportunities for speaking and listening for EAL. Appealing for SEN due to the practical element, lots of touching and feeling.

Differentiation: All children to participate, easily accessible for all. Aim HA children to answer questions on what they are looking for, e.g. if the bone you've discovered at A2 finishes at F9, how long do you expect it to be?

Cross Curricular: History and Science. English – instructional or imaginative writing

Possible Resources: flower bed/outside space (permitted) wood to box out the space, string/wire,

measuring equipment, digging equipment, camera, overalls for the children

PREPARATION: (Things to do before the lesson)	LINK: (Bringing back into the classroom)
Interest the children in archaeology. Explain in History. Also, make sure all children are aware of how to use coordinates correctly on a grid via pen and paper before moving onto the practical activity.	What did they find out? Did all children/groups get the same findings? Make a graph out of their results.