

# Wednesday 5<sup>th</sup> December 2007 9.10-10.15am

## Mathematics

05.12.07

Ms Orr - class  
teacher

Year 4

More able set - 24 in set

Groupings:-

Red and Blue - most able pupils

Green and Yellow

Orange - group requiring most support

**Learning objectives:-**

**Reinforcement and practice**

- Build upon previous learning of 3D shapes in year 3
- To name 3D shapes
- To describe and visualise 3D shapes
- To describe properties in terms of faces, edges and vertices

**Introduction to nets**

- Investigate nets of shapes, particularly CUBE

**KEY VOCABULARY:-**

Polyhedron, polyhedra

Face, Edge, Vertex, Vertices, Properties

3 dimensions, Cube, cuboid, sphere, pyramid, square based pyramid, tetrahedron, prism, cone, cylinder, hemisphere

**Resources**

ActivStudio - squared paper background

Internet - buried shapes flash, nrch site, others to consider

<http://illuminations.nctm.org/ActivityDetail.aspx?ID=125>

[http://nlvm.usu.edu/en/nav/topic\\_3.html](http://nlvm.usu.edu/en/nav/topic_3.html)

[http://nlvm.usu.edu/en/nav/frames\\_asid\\_128\\_g\\_1\\_t\\_3.html?open=instructions&from=topic\\_3.html](http://nlvm.usu.edu/en/nav/frames_asid_128_g_1_t_3.html?open=instructions&from=topic_3.html)

[http://nlvm.usu.edu/en/nav/frames\\_asid\\_129\\_g\\_1\\_t\\_3.html?open=activities&from=topic\\_3.html](http://nlvm.usu.edu/en/nav/frames_asid_129_g_1_t_3.html?open=activities&from=topic_3.html)

<http://www.learner.org/interactives/geometry/platonic.html>

BBC Mathsworkshop shape.

3D Shape Millionaire Powerpoint

3D shapes

Feely Bag

Shape nets

Polydron

Plasticine

Art straws

Card squares and micropore tape

Squared and dotted paper

Laptop for small group work

Extension/challenge - shape investigations

**WALT:-We are learning to**

- Name, sort and describe 3D shapes according to their properties
- Make nets for 3D shapes

**To be successful:-we need to**

- Know names of 3D polyhedra
- Know number of faces, edges and vertices for each 3D shape
- Know how the net for a cube is constructed
- Know how to identify nets for cubes
- Know how to construct nets for cubes, cuboids, triangular pyramids (tetrahedron) and square based pyramids

**COULD**

- *I can name 3D shapes and describe their properties.*
- *I can recognise when a net will or will not make a cube.*
- *I can make different nets for tetrahedra and square based pyramids.*

**SHOULD**

- *I can name 3D shapes and describe their properties.*
- *I can describe 3D shapes using mathematical vocabulary vertices, faces and edges, in particular cube, cuboid, tetrahedron (triangular based pyramid) and square based pyramid.*

**MUST**

- *I can name 3D shapes and describe their properties.*
- *I can make a cube net.*
- *I can work out when a net will make and will not make a cube using practical resources.*

Differentiation	Learning activity
<p style="text-align: center;"><b>Prior Learning</b></p> <p>The children have been using plastic mathematically correct 3D shapes and 3D shapes found in real life situations eg cereal boxes, cardboard tubes etc...</p> <p>They have worked in DT through a unit on packaging (My Treasure Box) to dismantle and reassemble shape nets and understand what a net is and how various nets are constructed. Today they are using their knowledge of nets to investigate all possibilities in making nets.</p>	
<p>Mental/Oral Starter - whole group session</p> <p>Be able to recognise 3D shapes and name them - recap on previous learning naming 3D shapes and identifying properties.</p> <p>Be able to use correct mathematical shape vocabulary.</p> <p>5 minutes</p>	<p>Flash programme 'Buried shapes' - invite children to use interactive whiteboard pen to recognise and name 3D shapes  <a href="http://www.primaryresources.co.uk/online/longshape3d.html">http://www.primaryresources.co.uk/online/longshape3d.html</a></p> <p>Recap on the key vocabulary used to describe the properties - faces, edges and vertices (vertex)</p> <p>WHAT AM I? shape feely bag activity:-</p> <p>Ms Orr to present a feely bag of 3D shapes to the children. Describe several shapes in turn and invite children to say what it is. Invite 2/3 children to do same. Introduce children to tetrahedron (triangular) and square, pentagonal, hexagonal prisms.</p>
<p>Main Part of Lesson 1 including focus group and independent work - NAMING SHAPES</p> <p>Red and Blue:-</p> <p>Be able to describe a 3D shape using as many properties and features of the shape</p> <p>Green and Yellow:- Ms Orr supporting and guiding mathematical vocabulary. How many different properties do we know? Play feely bag game with the group. Use descriptions and answers to make a group chart to record the properties. Be able to describe a 3D shape using faces, edges and vertices.</p> <p>Orange - Miss Barker focus group Reinforce names of 3D shapes by sorting according to properties. Miss Barker to assess children's knowledge of properties of 3D shapes - cube, cuboid, sphere, square based pyramid, triangular based pyramid, prism. Use correct mathematical vocabulary.</p> <p>10 minutes</p>	<ul style="list-style-type: none"> <li>• Create a 'what am I?' flip card for use in the mini-plenary. Children to choose any 3D shape and make a list of all the properties using key vocabulary and other features eg all the faces are triangular etc.. Write name and aim to draw the 3D shape inside the flip card. When finished record the number of faces, edges and vertices for the 3D shapes we have described in the opening of the lesson.</li> <li>• <i>I can name 3D shapes and describe their properties.</i></li>   <li>• Make a group chart to record the properties of 3D shapes.</li> <li>• <i>I can name 3D shapes and describe their properties.</i></li>   <li>• Using a selection of 3D shapes and BBC Maths Workshop Programme on Shape and Space assess knowledge of 3D shapes names and recognition and understanding of the key vocabulary - faces, edges and vertices. Make a simple chart as a group describing the number of faces, edges and vertices. Use BBC MATHSWORKSHOP - MEASURES - SHAPE - Properties and classification, Y4 classify shapes according to a variety of properties.</li> <li>• <i>I can name 3D shapes and describe their properties.</i></li> </ul>
<p>Mini-plenary</p> <p>Be able to name a 3D shape from a given set of properties.</p> <p>5 minutes</p>	<p>Ms Orr to invite 2/3 children to read out their 'What am I?' card from red and blue groups. Take answers from the class.</p> <p>Use chart created by green and yellow groups to cross reference and add/amend.</p>

Main Part of Lesson 2 including focus group and independent work - 2 INVESTIGATION

Be able to construct nets for a cube.

Website

[http://nrich.maths.org/public/viewer.php?obj\\_id=974](http://nrich.maths.org/public/viewer.php?obj_id=974)

Ms Orr to show children a cube made out of polydron. Recap on properties - made from 6 square faces etc...

Make simple code for a cube.

Dismantle the cube to show how it is constructed. Present children with their first 'net' of a cube. Explain that 'a pattern or template' for making a 3D shape is called a 'net'.

Children to investigate further net constructions which will result in a cube.

How many different nets can they find? Record these on squared paper.

**'Code for a cube'**

**I have 6 square faces**

**I have 8 vertices**

**I have 12 edges**

RED AND BLUE GROUPS Ms Orr teacher focus groups.

- *I can recognise when a net will or will not make a cube.*
- *I can make different nets for tetrahedra and square based pyramids.*

Ms Orr to work with group to look at different nets for a cube. Each child to use squares of card and micropore tape to make cubes nets. How many different ones can we find? Is there a pattern? How can we tell if a net will make a cube? (as long as there are 2 squares on either side of the group of squares then a cube will be formed).

Look at the tetrahedral and squared based pyramid. What would a net look like? Can you make one from polydron? What will you need? What shape are the faces? How many faces? How many different nets can you find? Can you record them on dotted paper? Ms Orr to model how to use the dotted paper.

*I can make nets for tetrahedra, square based pyramids*

Red and blue to use polydron to construct nets of cubes. For each net found record a simple drawing of the construction on squared paper. Ms Orr teacher focus group - to investigate cube nets and nets of other 3D shapes using polydron. Ms Orr to question how many edges and vertices 3D shapes have and is there a pattern to these? Resources - card squares, micropore and polydron. (15-20 minutes)

Nets of other 3D shapes - children to continue to work independently on finding nets for tetrahedra and square based pyramids.

Ms Orr to work with green and yellow groups.

GREEN AND YELLOW GROUPS - working independently

- *I can describe 3D shapes using mathematical vocabulary vertices, faces and edges, in particular cube, cuboid, tetrahedron (triangular based pyramid) and square based pyramid.*

Ms Orr to ask the children how they would create a cuboid using art straws and plasticine. Using the 3D shapes on the table be able to create the shapes using art straws and plasticine for edges and vertices.

Compare these with the chart created at the start of the lesson.

Using art straws and plasticine to make a cube 10cm lengths for each edge.

Be able to investigate which 3D shapes can be made from a given set of vertices and edges.

Green and yellow groups to use art straws and plasticine to construct nets of cubes and cuboids and record properties in terms of mathematical vocabulary. Challenge with different number of art straws and balls of plasticine.

- Can you make the shape?
- How many balls of modelling clay and how many straws does it take to make the cube?
- How many faces does it have?
- How many edges? How many corners (**vertices**)?

(15-20 minutes)

Ms Orr input - discuss the outcomes of the work covered independently.

Miss Barker - support teacher focus group  
ORANGE GROUP

- *I can make a cube net.*
- *I can work out when a net will make and will not make a cube using practical resources.*

Miss Barker to explain that the chart shows different nets. How many will make a cube? How do you know? Which ones will not make a cube? How do you know?

Ask the children if there are any of the nets you can rule out straight away - because they definitely will not make a cube. You are looking for the answer 'ay that do not have 6 square faces' as a cube has 6 square faces. Therefore those with less than 6 square faces will never make a cube with 6 faces.

How can we prove they make a cube? Use the polydron to investigate which ones will. (10-15 minutes if needed)

EXTENSION - here is a problem. We have 6 faces on a cube. Here are some pictures of what the cube looks like when viewed from different sides. Explain this. Use polydron with different coloured sides eg red, blue, green and yellow on the vertical sides (not top and bottom) to show the relationship between the sides.

Invite the children to cut out the large faces and use the different views to make the puzzling cube.

EXTENSION/CHALLENGE

Miss Barker to work with orange group to use polydron to construct nets. The children will have 6 square pieces of polydron each. Ask them to make a cube. Deconstruct the cube to make a net. Record this on squared paper. How many different nets can you make? What do they look like? Can you record them on squared paper? ( 10-15 minutes)

Using a set of suggested nets, investigate which nets will make a cube and which will not. Be able to explain why a net does not result in a cube. Test each net out. Be able to say why a net will not make a cube.

(15 minutes)

Present the children with a problem solving activity 'A Puzzling Cube'.

Explain they can make drawings etc.. to help them solve the puzzle.

CLUE:- suggest making a small cube net to draw upon.

Mini-plenary What have we learnt today about 3D shapes? How many different nets have we found?	Invite children to recap on WALT.  Draw all the nets found for a cube on the interactive whiteboard. What other nets have we found?
HOMEWORK	How many different nets can children find for making a tetrahedron? More able to do this for triangular prism - Toblerone!!!!

Opportunities for assessment:-

- Children's responses to questions throughout the lesson
- Children's responses to lift the flap cards - naming shapes
- Plenary - reviewing key vocabulary and properties