How will your beast open its mouth?
seven and a half hours work

SECTION ONE
learning context

SECTION TWO
tasks for learning

SECTION THREE
children’s decisions

SECTION FOUR
teaching the unit

SECTION FIVE
resources and links

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Children are interested in animals. Trips to the zoo are often remembered by adults as a highlight of their childhood. Many films and animated cartoons made for children feature animals: sometimes as friendly creatures (Free Willy), sometimes as fierce monsters (Jurassic Park). Fierce or friendly they fascinate children and provide the intrinsic attractiveness of this unit. The context of the activity is that of designing a set of moving animals that can be used to promote interest in animals in a variety of situations – on farms, in the wild, in zoos and at home. At the end of the task each child will have made a model animal with a moving mouth and the whole class can put on a parade of “action mouths”. This could be linked to the work of local animal welfare organisations or to the wider issue of endangered species.

In this unit children will learn:

- to draw simple animal forms; (Session 1)
- to observe and record both movement and shape; (Session 2)
- to cut materials to length accurately; (Session 3)
- to draw shapes and nets accurately; (Session 3)
- to construct 3D shapes from nets; (Session 3)
- to produce decorative effects on card; (Session 3)
- to understand simple mechanisms; (Session 3)
- to make simple mechanical components. (Session 4)
the small tasks
the focused practical tasks

1. Drawing animals  
   30 minutes
2. Drawing a comic strip to show mouth movement  
   60 minutes
3. Exploring animal shape and colour  
   60 minutes
4. Exploring ways to make movement  
   60 minutes

the big task
the design and make task

The big task is to design and make an animal with a moving mouth from studying their own mouth and head movements and those of animals. The mechanisms used by the children are restricted to a cam and follower, a simple crank or a crank and slider.

3 hours in 30-minute or 60-minute lessons

The evaluation  
30 minutes

Unit review  
30 minutes

the mechanism is deceptively simple. The tongue is attached by the simple process of folding over and stapling so that there is a channel to hold the wire crank quite loosely. The amount the tongue moves in and out is governed by the ‘throw’ of the crank. The point where the crank passes through the body is important. Too far forward and the crank hits the front end of the body; too far back and the tongue is pulled free of the slot it passes through.
design decisions

The children can decide on the following:

♦ the purpose of the moving animal models
  required learning in Session 1, design decision made in Session 2;

♦ the animal
  required learning in Sessions 1 and 2, design decision made in Session 5;

♦ the proportions for the box/network for the body and the legs
  required learning in Session 3, design decision made in Session 5;

♦ the additional detail for realism
  required learning in Session 3, design decision made in Session 5;

♦ the sort of movement for the head/mouth
  required learning in Session 2, design decision made in Session 5;
design decisions (continued)

- the parts needed for the head/mouth required learning in Session 2, design decision made in Session 5;

- the mechanism to achieve the required movement required learning in Session 4, design decision made in Session 5;

- the adjustments needed to get the optimum movement required learning in Session 6, design decision made in Session 6.

“Up a bit, down just a touch, over to the right”
**drawing animals**

**Teacher input**

Introduce the class to the idea that it would be a good idea to get people interested in animals but there is a problem about putting live animals on display. The animals might find the experience distressing, so another way could be to have some working, moving models that would get people’s interest. That will be the class task – to produce a collection of attractive, intriguing animal models. Explain that as it is difficult to display models that move from place to place the class will produce models that stay in one place but move in an interesting way.

**Pupil activity**

Tell the class that they will need to understand what it is about an animal that helps us recognise it as that animal – its overall shape and the shape of particular parts give particularly good clues. We can tell the difference between a dog and a cat from their shadows. Explain that doing a simple drawing of an animal is a good way to work out what makes it look the way it does. Tell the class that if they find that hard then they should try tracing the outline and adding small amounts of detail to the tracing. Give each table a selection of pictures of animals and some tracing paper. Each child then tries to draw or trace an animal to give a simple picture that is instantly recognisable as that animal.

**Teacher input**

Discuss one or two particularly successful examples with the class and put all the results on display for future reference.

**Homework**

Ask the class to discuss with each other and people at home what might be a good theme for their moving animals. Ask them to consider themes such as our pets, animals that help us, animals in danger. Tell the class that they will decide next lesson on an overall theme.

**Resources**

**Stimulus:** pictures of animals;  
**Consumables:** paper, tracing paper;  
**Tools:** pencils, rulers and rubbers.

**Health and safety check**

Discuss the hazards and risks involved in asking others for their views and how these risks can be controlled by polite behaviour and being considerate.
Drawing a Comic Strip to Show Mouth Movement

Teacher Input

Introduce the class to the idea of looking closely at the way we, and other animals, move our heads and mouths especially when we are eating. Tell them that this is in preparation for making a working model of an animal with an “action mouth” that they will use to get people interested in animals. Write the following words on the board:

roaring    chewing    pecking    gawping    licking

Ask different members of the class to demonstrate these head and mouth movements.

Pupil Activity

Now ask the class to work in pairs and carry out the following task. Choose two movements they want to describe.

One child carries out a movement while their partner draws a series of sketches to describe the movement of the head and mouth. Observation should take place from the side and the front.

Then the pair changes roles and produces a series of sketches to describe the other movement. The work of each pair can be pinned up to provide a visual reference for moving mouths during the rest of the unit.

Teacher Input

At the end of the session ask the class possible themes for the moving model animals. Use a short class discussion to decide on an overall theme.

Resources

- Consumables: paper
- Tools: pencils, rubbers

Health and Safety Check

Discuss the hazards and risks involved in working as a group and how these risks can be controlled by the way the children behave and treat one another.
Teacher Input

Remind the class of the drawing they did in Session 1 and tell them that their task now is to capture the essence of an animal in 3D. Show the class a display with coloured pictures of a wide range of animals. It should be a rich and varied display along the following lines.

<table>
<thead>
<tr>
<th>Domestic animals</th>
<th>Farm animals</th>
<th>Wild animals</th>
</tr>
</thead>
<tbody>
<tr>
<td>♦ cats</td>
<td>♦ pigs</td>
<td>♦ lion</td>
</tr>
<tr>
<td>♦ dogs</td>
<td>♦ cows</td>
<td>♦ tiger</td>
</tr>
<tr>
<td>♦ guinea pigs</td>
<td>♦ sheep</td>
<td>♦ hippopotamus</td>
</tr>
<tr>
<td>♦ goldfish</td>
<td>♦ chickens</td>
<td>♦ elephant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>♦ birds of paradise</td>
</tr>
<tr>
<td></td>
<td></td>
<td>♦ crocodile</td>
</tr>
<tr>
<td></td>
<td></td>
<td>♦ coral reef fish</td>
</tr>
</tbody>
</table>

Tell the class to look at individual animals and ask someone to describe what one of the animals looks like. Elicit words that describe the form and surface pattern – for tiger this might be long, thin, striped. Write the words on the board. Repeat this to establish the idea of describing using a set of simple words.

Now explain to the class that they are going to use simple boxes, card shapes, straws and wooden strip to produce “herds” of different animals. There is a ready-to-copy net that you can use.

Show the class how to produce the following example.

**Domestic animals**
- cats
- dogs
- guinea pigs
- goldfish

**Farm animals**
- pigs
- cows
- sheep
- chickens

**Wild animals**
- lion
- tiger
- hippopotamus
- elephant
- birds of paradise
- crocodile
- coral reef fish

**Long thin body with four short legs, long thin tail, flat face, orange and black stripes.**

Choose a box with the right proportions and carefully cut off the bottom of the box. OR draw out a net with the right proportions, cut out and assemble. Indicate the use of squared card here.

Carefully cut four legs to the correct length from either jumbo straws or thin wooden strip.

Draw the shape of a tiger face, cut it out and colour it in so that it looks like a tiger.

Stick the legs in place.

Write this description of a tiger on the board.
exploring animal shape and colour (continued)

Pupil activity

Divide the class into five groups of six. Each group is to choose a favourite animal from the display. They can take a vote if they wish. Their job is to make six models of the animal. They can make them different sizes – grown-ups and babies – but not different proportions.

If a group has chosen an animal without legs e.g. a fish, then the models can either sit directly on the floor or, preferably, each model can be attached to a small pedestal of varying height as shown below.

Homework suggestion

Tell each group to find out the name of a group of their favourite animals – e.g. a pride of lions, or herd of cows – and six interesting facts – one for each member of the group. The group should produce an information card to accompany their set of models.

Resources

Stimulus: colour pictures of animals, both domestic and wild.
Consumables: quantity of wooden strip (6 mm² cross section), tongue depressors, quantity of card, PVA glue, small boxes, jumbo straws, masking tape;
Tools: scissors, junior hacksaws, sawing boards, pencils, rubbers, felt tip pens.

Health and safety check

Discuss the hazards and risks involved in using cutting tools, glue and markers and how the risks can be controlled by taking care and using the correct procedures.
Teacher input

You will need two sets of the following models.

- A simple crank mechanism for chewing: the head (not shown) is fixed, the lower jaw moves.
- A simple cam and lever mechanism for gawping: the lower jaw (not shown) is fixed; the rest of the head moves.
- A simple cam and lever mechanism for roaring: the lower jaw (not shown) is fixed; the rest of the head moves.
- A simple crank and slider mechanism for licking: the head (not shown) is fixed; the tongue moves in and out.
- A simple cam and lever mechanism for pecking: the whole head is attached to the moving part and "pecks".

Teacher input

Divide the class into groups of three or four children. Tell the class that each group is going to look at mechanisms that could be used to make the animals’ heads and mouths move. Their task is to look closely at each of the mechanisms, to turn the handles to see how they work and then decide which mechanism is best for which sort of movement – chewing, gawping, roaring, pecking, licking.
Pupil activity
The children should spend the next 10–15 minutes exploring the models.

Teacher input
After 10 minutes call the class back together and ask the following questions.

◊ Which movement can each mechanism be used for? If there is disagreement you can take a show of hands.
◊ Exactly what happens when each handle is turned? Discuss with the class.
Use the answers to introduce or revise appropriate vocabulary: mechanical part – cam, lever, crank, shaft, slider; types of movement – rotation (round and round), reciprocation (in and out), oscillation (swinging to and fro).

Pupil activity
Now divide the class into pairs. Tell the class that each pair is going to make one of the mechanisms so that they have practice before they make the one they need for their animal. Each group will need a box, a length of thin stiff wire, a sheet of card, a pair of scissors, a pair of pliers, masking tape, Blu-Tack. Tell the class that there are some tricky bits where they will need to help each other and that’s why they are working in pairs. Show the class how to bend and cut the thin wire using pliers.

Resources
Stimulus: models from Session 3 and mechanisms described;
Consumables: paper, length of thin stiff wire, a sheet of card, masking tape, Blu-Tack;
Tools: pencils, scissors, pliers.

Health and safety check
Revisit the discussion about controlling risks when using cutting tools. Discuss the hazards and risks involved in using pliers and how the risks can be controlled by taking care and by using the correct procedures.
the big task: designing and making your moving animal

Teacher input
Tell the class that it is now time for every child to produce their own, individual moving animal. Remind them that their model should:
- be part of the class theme;
- look like a particular animal;
- move its head and mouth in a particular way;
- be attractive;
- be intriguing,

Pupil activity
Tell them that over the next two sessions they will have to:
- decide on their animal;
  (They can use displays from Sessions 1 and 3 to help make their minds up.)
- decide on the box or net for the body and if they need any legs;
- decide on the additional detail they might need to add;
- decide on surface decoration (note extension work possibility here);
  (They can use the “herd” display from Session 3 for help here.)
- decide on the movement;
  (They can use the display from Session 2 for help here.)
- decide on the mechanism to achieve this movement.
  (They can use the examples from Session 4 for help here.)
They should fill in a sheet using both words and simple line drawings to record the specification and their design decisions. There is a ready-to-copy sheet that you may wish to use with some children.

Recommend to the class that they leave surface decoration and additional detail until after they have achieved a mechanism that gives the movement they want. Those that take a long time to achieve this can then use simple decoration as learned in Session 2. Those that are successful quickly can learn to use additional decorative techniques as described in ‘Extension work’ on page 12.

It is almost certain that every child will need to spend some time adjusting their mechanism to get an optimum performance. Slight changes in the shape of a cam, the position of a shaft, folding a lever so that it is stiffer will make a considerable difference to performance. The children have some experience of this from Session 4.
Before they start the children should each produce a list of what they will do and the order in which they will do it.

**Homework**

Set the class the task of adding the following information to their plans:

- which tools they used;
- which materials they used;
- what they did with each tool.

**Extension work**

Children who finish early or who require an extra challenge might be asked to do the following.

Show these children how to use papier mâché to cover the body and feet. This gives a softer and more realistic appearance. It is important to use small pieces of paper and a minimum amount of PVA glue. Start with white paper, using appropriately coloured papers for the last few layers. Note that the model will need to dry overnight.

Alternatively you can show these children how to glue samples of fabric to cover the body and feet.

**Resources**

**Consumables:** copies of ‘My moving animal specification’, small card boxes, A3 size squared card to draw nets, A4 size card, coloured paper, thin wooden strip (tongue depressors), thin stiff wire, jumbo straws, thin wooden strip 6 mm² cross section, adhesive tape, masking tape, PVA glue, Blu-Tack, fabric (extension work).

**Tools:** thick and thin water-based felt tip pens, pencils, junior hacksaw, sawing board, scissors, pliers, bradawl.

**Health and safety check**

Revisit the discussion about controlling risks when using the tools and materials available for making their moving animal.
SECTION 4

teaching the unit

session
seven

evaluating the final product

Pupil activity
Tell the children to use these questions to evaluate their moving animal.

♦ What animal is it supposed to be?
♦ Does it look like this animal?
♦ Which movement was the animal supposed to perform – roaring, chewing, gawping, pecking, licking?
♦ Does it perform this movement?
♦ Does it perform the movement reliably?
♦ Is the model easy to operate?
♦ Is the model attractive?
♦ Is the model intriguing?

There is a ready-to-copy sheet that you may wish to use with some children.

Tell the children to work in groups of four so that they can evaluate each other’s models. They can construct a simple table to record responses.

Once they have a complete table the children should each use the table to write a summary evaluation in which they state how well it meets the original specification written in Session 5, and what they would do to improve it.

The session should end with all the groups showing the results recorded in their tables. A general discussion should be directed at identifying common responses to the evaluation questions.

Resources
Stimulus: models from previous session;
Consumables: ‘My moving animal evaluation’, or paper;
Tools: pencil.

Health and safety check
Discuss the hazards and risks involved in using model moving animals and how these risks can be controlled.
Teacher input
Explain to the class that it is important to think about how to get better at design & technology and that they can do this by discussing the following questions.

- What did you enjoy most?
- What did you find easy?
- What did you find difficult?
- What did you get better at?
- Did you help each other?
- What could have been done better?
- How could these be done better?

Pupil activity
The children should discuss the questions in groups and when they have finished you should ask each group to make a short report to the class. The class should agree a statement of improvement based on these reports for their next design & technology unit.

Resources
Consumables: paper;
Tools: pencils.

Health and safety check
Discuss whether the class used hazard recognition, risk identification and risk control to design and make safely.
### Session 1
- Outline, shape, trace, detail

### Session 2
- Expression, roar, chew, gawp, lick, peck

### Session 3
- Net, length, width, height, proportion

### Session 4
- Mechanism, crank, crank and slider, cam, shaft, cam and lever, movement, rotation, oscillation, reciprocation

### Sessions 5-8
- Specification, design decision, adjustments, evaluation, review

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### Vocabulary

<table>
<thead>
<tr>
<th>Session 1</th>
<th>Session 2</th>
<th>Session 3</th>
<th>Session 4</th>
<th>Sessions 5-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>outline, shape, trace, detail</td>
<td>expression, roar, chew, gawp, lick, peck</td>
<td>net, length, width, height, proportion</td>
<td>mechanism, crank, crank and slider, cam, shaft, cam and lever, movement, rotation, oscillation, reciprocation</td>
<td>specification, design decision, adjustments, evaluation, review</td>
</tr>
</tbody>
</table>

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### Resources Summary

<table>
<thead>
<tr>
<th>Session</th>
<th>Stimulus Materials</th>
<th>Consumable Materials</th>
<th>Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session 1</td>
<td>animal pictures and models</td>
<td>tracing paper, paper</td>
<td>pencils, rulers, rubbers</td>
</tr>
<tr>
<td>Session 2</td>
<td></td>
<td>paper</td>
<td>pencils, rubbers</td>
</tr>
<tr>
<td>Session 3</td>
<td>colour pictures of animals, both domestic and wild</td>
<td>wooden strip (tongue depressors) and card, 6 mm² cross section, PVA glue, small boxes, jumbo straws, masking tape</td>
<td>pencils, rubbers, scissors, sawing boards, junior hacksaws</td>
</tr>
<tr>
<td>Session 4</td>
<td>models from Session 3 examples of the mechanisms described</td>
<td>paper, length of thin stiff wire a sheet of card, masking tape Blu-Tack</td>
<td>pencils, scissors, pliers</td>
</tr>
<tr>
<td>Sessions 5-6</td>
<td></td>
<td>copies of ‘My moving animal specification’, small card boxes, A3 squared card to draw nets, A4 card, coloured paper, thin stiff wire, jumbo straws, thin wooden strip 6 mm² cross section, tongue depressors, adhesive tape, masking tape, PVA glue, Blu-Tack, fabric (extension work).</td>
<td>thick and thin water-based felt tip pens, pliers, bradawl, pencils, junior hacksaw, sawing board, scissors</td>
</tr>
<tr>
<td>Session 7</td>
<td>models from previous session</td>
<td>‘My moving animal evaluation’ or paper</td>
<td>pencils</td>
</tr>
<tr>
<td>Session 8</td>
<td></td>
<td>paper</td>
<td>pencils</td>
</tr>
</tbody>
</table>


**Numeracy**
This module will provide a practical application for visualising shapes from their nets and measuring and drawing lines accurately to the nearest millimetre.

The children will also be working with simple nets to make their beasts and should be aiming to construct the models with increasing accuracy.

**Literacy**
There are opportunities for non-fiction writing in evaluating the moving animals.

**Science**
The work can lead into discussions about adaptation and how teeth are linked to diet, e.g. sharp, pointy incisors to pierce and tear.

**ICT**
There are opportunities to explore ICT by using drawing software to produce nets for animal bodies and painting software to produce decoration for the animal bodies.
Exploring animal shape and colour net

Body, cut 1

Legs, cut 4 and fold on line
**My moving animal specification**

| Name |  
|------|---

The class theme for the moving animal is __________________________

My moving animal will look like a ________________________________

It will move its head by:
- roaring [ ]
- chewing [ ]
- licking [ ]
- gawping [ ]
- pecking [ ]

It will be attractive and intriguing.

---

**My moving animal design decisions**

| Name |  
|------|---

<table>
<thead>
<tr>
<th>Body shape and legs</th>
<th>Additional details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface decoration</td>
<td>The movement</td>
</tr>
<tr>
<td>The mechanism</td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>What animal is it supposed to be?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Does it look like this animal?</td>
<td></td>
</tr>
<tr>
<td>Does it fit in with the class theme?</td>
<td></td>
</tr>
<tr>
<td>Which movement was the animal supposed to perform?</td>
<td>roaring</td>
</tr>
<tr>
<td></td>
<td>gawping</td>
</tr>
<tr>
<td>Does it perform this movement?</td>
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<td>Is the model easy to operate?</td>
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<tr>
<td>Is the model intriguing?</td>
<td></td>
</tr>
<tr>
<td>What could I do to improve my model?</td>
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</tbody>
</table>
Acknowledgements

Nuffield Curriculum Project Centre Team
David Barlex, Director Nuffield D&T Senior Lecturer Brunel University
Jane Mitra, Deputy Director and Educational Consultant
Nina Towndrow, Project Administrator

Authors and contributors
Eileen Birkenhead, Educational Consultant
Daniel Davies, Bath University
John Garvey, Brunel University
Rob Johnsey, Warwick University
Teresa Linton, Grasmere C of E Primary School
Lynne Orford, Holtspur School, Beaconsfield
Chris Purdie, Townsville Junior Grammar School, Queensland, Australia
Cy Roden, Educational Consultant
Marion Rutland, Roehampton Institute University of Surrey
Joy Simpson, Whipton Barton Middle School, Exeter
John Twyford, Exeter University

Design
Dave Mackerell, Studio Communications

Evaluation
Patricia Murphy and Marion Davidson of the Open University

Health and Safety guidance
Anna Wojtowicz and Caroline Reynolds from the Health and Safety Executive

Illustration and 2D/3D model making
Nathan Barlex

Proof reading
Joanne Jessop, Sue Byrne

The Project appreciates the efforts of all those teachers who taught trial units of work and provided valuable feedback. The Project is grateful for all the support it has received from the Advisory Services.