BOXES

PROJECT

4MATION Educational Resources

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INTRODUCTION

The ideas contained in this booklet are arranged in sub-themes. There are no suggestions concerning the organisation of the classroom, timetable or children as individual circumstances often dictate the organisational mode.

You may wish to treat this booklet as a 'lucky dip' box from which you can draw ideas every now and again. The suggestions are such that they can be used individually and do not necessarily have to form part of a full-scale project (or theme).

If you intend to undertake a lengthy project on 'boxes' it would be a good idea to draw up a plan of proposed activities and perhaps use this booklet to get you started.

You may well decide that you can improve upon or modify these ideas to suit your own requirements: your own ideas are bound to be more successful than someone else's.

We at 4MATION are always pleased to receive reports from teachers about the success of their projects. Photographs and examples of children's work are always returned upon request.

HOME AND TRAVEL BOXES

Homes are essentially boxes or collections of boxes. Vehicles are boxes on wheels.

1. Have a discussion about whether homes and vehicles really are box-like. Think of examples which are the most box-like.

2. Write poems about living and travelling in boxes.

3. Imagine you are a visitor from another world watching the early morning panic in London or Sydney as thousands upon thousands of people leave their home boxes and travel to work or school by travel box.

4. Imagine our world in the future when the density of population forces everyone to live in a box in a tower or underground.

5. Undertake a traffic survey of some sort.

Count the number of vehicles passing certain points at different times of the day.

In a town it is possible to plot the routes of vehicles by keeping records of vehicle registrations passing key points.

Keep records of the addresses on lorries (trucks) to see where they are based. Mark the bases on a map.

Keep records of vehicle registration marks (British Isles only) and plot the licensing centres on a map. For example the last 2 letters of the mark *C 420 DOD* denote that the Vehicle Licensing Office is Exeter. A list of the index marks and the issuing offices is obtainable from the Automobile Association.

Visit a railway station and find out if the trains run according to the timetable.

Plot rail journeys on a map.

6. Study the buildings in your locality. Record ages, designs, types, building materials etc.

7. Calculate how much of each day we spend inside a box.

8. See the section on *Boxes and Numbers* for ideas about car parks and building plots.

BOXES AND NUMBERS

Car Parks
Most car parks have painted boxes to mark the parking spaces.

Give groups of children identical irregularly-shaped plots (on card) and get them to design the most efficient use of space. You can tell them the scale of the plot and stipulate the maximum and minimum dimensions of a parking box or, better still, children can find out the latter for themselves by either measuring vehicles or the marked boxes in nearby car parks, or both. Remember that vehicles must be able to enter and leave the boxes easily. This may require measuring (or looking up in a handbook) the turning circles of a cross-section of vehicles. Cars could be represented by card rectangles or models. If model cars are used they must be on the same scale as the model plot.

Building Plots
In a similar manner to the car park activity children are given irregularly-shaped building plots with the object of making the most efficient use of the available space by planning houses of a given ground floor area. This will involve measuring, scale, area calculation etc.

House Plans
Children are given a figure representing the ground floor area of a house. They must design a workable plan. This will involve a great deal of discussion about the necessary dimensions of different rooms and their position in relation to one another — no-one wants to go through the bathroom to get to the kitchen.

Once their house is 'built' (either a model or a plan) they can order furniture and fittings from catalogues and brochures. The items can be represented by pieces of card cut to scale. Each group has a fixed amount of money to spend and once the items have been 'purchased' they must be fitted into the new home. Children may well find that they will have to return some items if they have not taken careful measurements of available space before going shopping. Some children may like to create an artist's impression of the furnished rooms — not an easy task.

At a later stage children could exchange houses and find out for themselves the problems of fitting old furniture into a new home.

Clocks
Sand clocks, water clocks or even dried lentil clocks can be constructed very easily. The simplest clock is a box with a hole out through which the timing medium flows. Imagination can be used to make improved versions which, for example, don't spill sand over the floor and can be used to time intervals of more than a couple of seconds. There could be a competition for the most accurate clock or the one which requires the least amount of 'winding'.

Grids and Maps and Plans
Most maps are covered with boxes to allow points on the map to be co-ordinated. Give children a reason for using co-ordinates, not just as an exercise in itself. For example you could design a car rally, a treasure hunt, a rescue operation or a police hunt requiring children to both read and write co-ordinates.

Maps also contain boxes in their keys or legends. Allow children to create and map their own islands with symbols and scale of their choosing.

Box Measurements
Let children discover for themselves methods of determining whether a long, thin box is bigger than a short, fat one. They may want to fill them with sand or even use that 'height x width x depth' calculation that they vaguely remember seeing in a text book once.

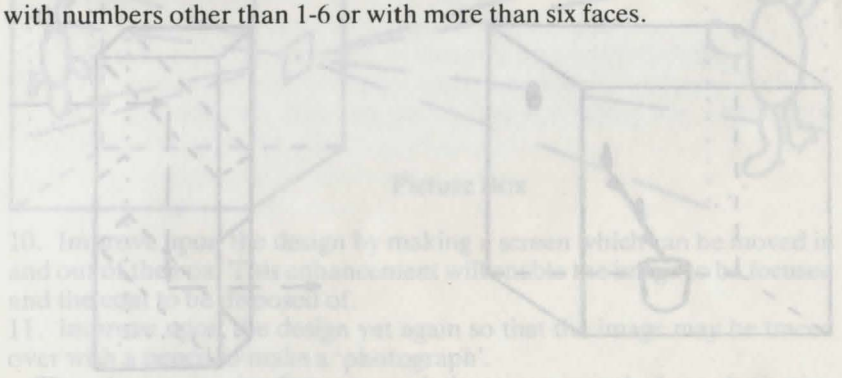
Give them the task of calculating how many potato crisps boxes could be fitted into the warehouse (which could be the cupboard or the staff-room) or the back of a van.

Give them an imaginative reason for finding out which rooms in the school are the largest or how many times the school building would fit into the school grounds.

Box Models
Take apart some commercially-produced boxes to find out how they are made. Imagine that you are a manufacturer requiring a specific type of box. Give children the task of constructing a box to suit your requirements.

Find out how to make nets for models of solids such as a tetrahedron or dodecahedron.

Dice
Make dice for all manner of number activities. Make 'alternative' dice with numbers other than 1-6 or with more than six faces.



LIGHT BOXES

There are many practical activities concerning boxes and light. A box is able to either keep light in or keep light out. The following activities are concerned with controlling the way that the light enters or leaves the box.

Infinity Box

There are a number of ways of constructing an 'infinity' device, the method you choose will be dependent upon the availability of materials.

In its simplest form two small mirrors are held a short distance apart facing each other. By looking into one mirror from a viewpoint immediately behind the other a series of reflections is seen. Children could find ways of increasing the number of observable images. With larger mirrors (perhaps attached to opposite walls in a cupboard or corridor) the observer is able to stand between them.

To construct an infinity box requires at least 4 mirrors, preferably identical in size. They are fastened to the inner walls of a box (which may have to be tailor made). A fifth mirror is placed on the floor of the box. Objects are placed in the box.

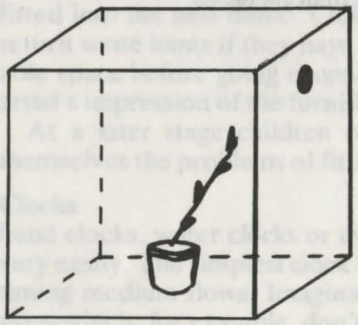
To make a more elaborate device four large mirrors are fastened or suspended so that the observer may stand inside.

Having constructed an infinity box you will probably now abandon the theme of 'boxes' for a while and investigate mirrors and light etc.

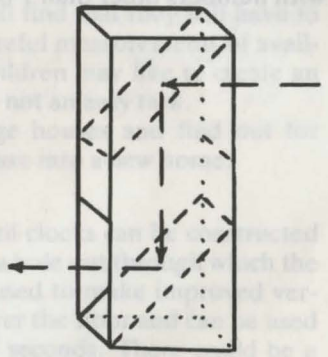
Periscope

A periscope is nothing more than a box with 2 mirrors and 2 holes. The inside should be painted black.

Children could investigate the effects of mirror size, periscope length etc.



Plant Box



Periscope

Plant Box

Place a young fast-growing plant (such as a bean) inside a closed box with light allowed to enter from one point only. The plant will grow towards the light.

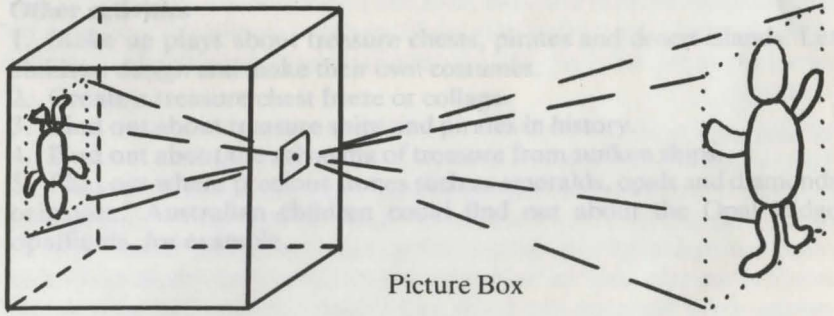
Does this mean that plants can see or have intelligence?

What happens if there are two apertures?

What would happen if the aperture position was changed after a few days or every day?

Picture Box

1. Take one box (with a height and width of 15cm although the dimensions are not that important).
2. Remove one end so that the length is about the same as the width and height.
3. Cut a small square from the middle of the end which is intact.
4. Cut a square of metal foil large enough to be taped over the hole which has just been made in the end of the box.
5. With a pointed instrument make a small hole in the centre of the foil.
6. Look through the open end of the box and point the pin-hole towards a light source to check for light leakage. Patch any leaks.
7. Secure a piece of greaseproof or tracing paper over the open end of the box to make a screen.
8. Cover your head and the screen with a coat to keep the light out, point the pin-hole end of the box towards a brightly-lit scene and look at the screen. The image of the scene will be inverted.
9. Experiment with different sizes of box and aperture to find the combination giving the best image.



Picture Box

10. Improve upon the design by making a screen which can be moved in and out of the box. This enhancement will enable the image to be focused and the coat to be disposed of.
11. Improve upon the design yet again so that the image may be traced over with a pencil to make a 'photograph'.

The device is, in fact, a pin-hole camera and, by substituting photographic paper for the screen, will enable real photographs to be taken.

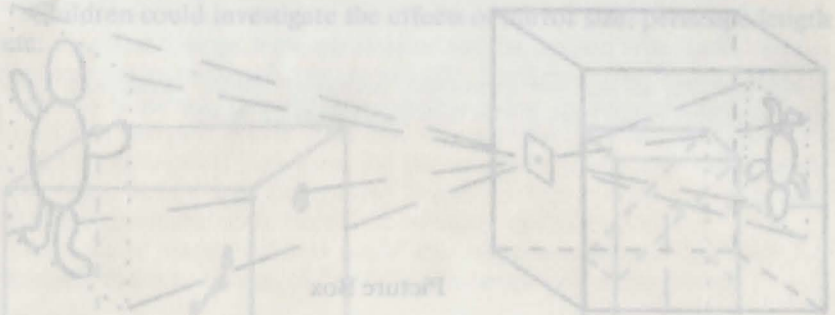
Pin-hole Camera

It is beyond the scope of this booklet to explain in detail how the photographs taken with the 'picture box' (described above) can be processed. Those who dabble in photographic processing at home should have few difficulties.

Essentially what is required is a darkroom (with a red light), a quantity of monochrome (black and white) photographic paper, developer, fixer, and suitable containers and trays for mixing the solutions and bathing the photographs. It sounds like a lot of hard work. It is — but it is well worth the effort. If you are determined to have a go try finding a book which will explain the process in some detail.

NB the process does not require photographic film. The print produced will be a negative but by placing the negative over an unexposed piece of photographic paper and exposing it to a light source a positive image will be produced.

If you achieve success with this project you could move on to designing and making more sophisticated camers which utilise film.



TREASURE CHESTS

Make a collection of treasure chests using the one in the BOX OF TREASURES box to stimulate imaginations.

X Marks the Spot

It's no use having a treasure chest unless there's an old map to show where it's hidden and a sheaf of ancient documents inside it.

1. Look through books to find some examples of the style of writing used a century or two ago. Give children the chance to practise before they make a start on their first document.
2. Find (or make) some suitable writing instruments. There may be some dip pens still hidden in a dark cupboard somewhere. If there are any swans, geese, emus or turkeys nearby try making quills.
3. Locate some suitable paper, perhaps some sheets of coloured paper which have been left in direct sunlight for a few weeks.
4. Damage the edges of the paper with a hamster or by finger tearing. You may allow children to go outside and use a magnifying glass to singe the edges (not a very practical suggestion in the UK but rain damage can be almost as effective).
5. Once the document looks sufficiently old the map or text can be added. The ageing process should be carried out first just in case it is too effective.
6. If the ink used is waterproof when it is dry the finished document could be immersed overnight in cold, strong tea and left to dry flat in the sun (or near a radiator). Other ageing processes could be tried.

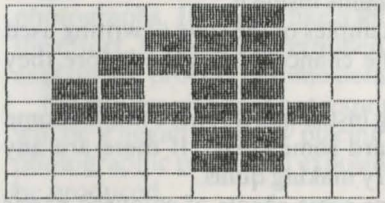
Other activities

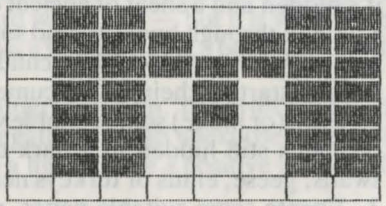
1. Make up plays about treasure chests, pirates and desert islands. Let children design and make their own costumes.
2. Create a treasure chest frieze or collage.
3. Find out about treasure ships and pirates in history.
4. Find out about the salvaging of treasure from sunken ships.
5. Find out where precious stones such as emeralds, opals and diamonds originate. Australian children could find out about the Opal Ridge opalfields, for example.

LANGUAGE

Letter Boxes

Computer characters are generally formed on a grid measuring 8 x 8. The examples below show how the boxes are filled in to generate the characters.





There is no single way of constructing a particular character and children may like to design their own character set. If you have access to a printer you can always use BLANK to print some suitable grids.

Digital watches, calculators and other digital displays produce their characters in a similar way. Children could look for examples in shops, petrol stations and so on.

In the label printing part of the MAKE-A-BOX program it is possible to design additional characters by printing one over another. Children could design boxes from other worlds with text written in an alien language.

Using the grids they could design a completely new character set from the planet XOB (don't reverse BOXES!).

Going one stage further they could attempt to construct a completely new language and even try communicating with each other in that language.

Word Boxes

Take a number of empty boxes and place them on a table. Have a number of blank cards available. The boxes may be labelled either with numbers or with descriptions of the sort of words which they are to contain. You may, for example, have boxes for 'nouns', 'describing words', 'gentle words', 'action words' or 'weather words'. The children think of suitable words, write them on the cards and deposit them in the appropriate boxes. Obviously they must be very careful about the words they select. Certain rules must be established but the nature of those rules is up to you and the children.

Once the boxes contain enough words the cards can be taken out at random to be used for whatever activity is taking place. They could, for example, be put together to generate random poems or to construct the first sentence of an oral or written story or you might have a box of 'interesting words' for children to look through when their inspiration is

lacking. The following example is an attempt to put words into four boxes for the generation of random poems on the theme of 'springtime':

1	2	3	4
gentle	tufts	sway	gracefully
smooth	flowers	grow	rhythmically
soft	clouds	dance	lazily
beautiful	trees	drift	majestically
quiet	blossoms	dream	warmly
fragrant	paths	play	slowly

The fact that many combinations will not be sensible is part of the activity: children can decide which combinations are suitable and which must be rejected.

Box Names

The following is a list of names for specific types of boxes:

packet	chest
carton	tin
container	hamper
tub	pack
package	case
trunk	crate

There are other names which children may suggest.

You may like to ask your children to discuss the meaning of each word. What, for example, is the difference between a pack, a package and a packet? What sorts of things are found in crates? Is a tub different from a carton?

It can be quite interesting to examine boxes from the supermarket to find out what the manufacturers call their boxes. Over a period of time a collection of pictures of boxes could be established and children could decide into which category of box-type the pictures belong.

Suggestion Box

If a suggestion box rapidly fills with pieces of paper advising you to take a long holiday it can always be abandoned but why not give it a try?

Children are not often asked for their opinions about school matters but being given the opportunity to think about things and put their thoughts into words has got to be a worthwhile activity and preparation for adulthood. Many children are reluctant to voice their opinions in front of you and the other children but the privacy of a suggestion box may encourage them to make a contribution.

The suggestion box does not have to be restricted to school matters. Call it an 'opinion box' or an 'ideas box' and ask for contributions on all manner of different subjects ranging from *"What I think about adults"* to *"What worries me about going to a new school next term"*.

Story Boxes

A box containing a variety of objects is placed behind a 'story teller'. A second child takes objects from the box and hands them to the story teller at intervals. The child telling the story must incorporate the object into the tale with the minimum of hesitation. The objects in the box could be three-dimensional, they could be pictures or they could be no more than a single word written on a card.

As a variation the story teller could view the objects in privacy and the other children could then guess the nature of the objects when the story has ended.

Telephone Box

Construct a telephone box in the classroom or corridor and allow children to make calls from it. If telephone directories are provided children could be given such tasks as "Find the number of the nearest florist's shop and imagine that you are ordering some flowers for someone's birthday."

If you or someone else is really clever you could make a working telephone so that children could talk to each other. Some exciting and stimulating role-playing activities could result.

'Feely' Box

A box of suitable size has two holes cut into one side large enough for a pair of hands (and forearms) to be inserted. The de-luxe model will have either a cloth apron to cover the holes or a pair of baggy sleeves fastened to the holes so that the 'feeler' cannot see through the holes into the box.

Activities:

1. Discussion about the sorts of objects which could be placed in the box for identification by touch.
2. Children could bring one secret object from home to place in the box.
3. When a child is handling an object inside the box he/she describes how it feels, its texture, size, shape etc. The other children try to identify it from the descriptions.
4. Children take it in turns to feel the mystery object but keep their opinions to themselves. They produce written descriptions and/or illustrations of the mystery object to be compared with one another's before the nature of the item is revealed.
5. Certain items could be identified by sound or smell instead of touch.

Box Descriptions

Make a varied collection of different sorts of boxes.

Activities:

1. Children sort them into types having first discussed the different criteria which could be used.
2. Descriptions are written about the boxes. A child reads out a description and the others try to identify the box from the description.
3. Children are shown a small part of a box and must guess which one it is. An ever-larger portion of the box is revealed until it has been identified.

Box Themes for Creative Writing

1. Use ideas resulting from listening to the three audio productions or from the book of children's work or from the book of poems.
2. Imagine a world without boxes.
3. The Invisible Box.
4. Box World.
5. Boxes on Another World.
6. The Pirates' Hoard.
7. The Telephone Box which Walked.
8. My Secret Box.
9. The Magic Box.
10. The Box of Tricks.

PACKAGES

This section refers to the type of box found in shops (particularly supermarkets) eg cartons and packets.

Names and addresses

Examining the manufacturers' names and addresses on packages can provide an interesting study. A suitable data-base may be used to store and interpret the data. The first step is to get the children to collect a variety of empty (and clean) packages.

Make a list of manufacturers and their products. Does each company restrict itself to one particular type of commodity or does it produce a variety of goods? Do pet food companies also produce human food? Do detergent makers produce butter or margarine?

Make a list of addresses but remember that a "Quality Control Officer" or "Consumer Services Manager" may not be housed in the same location as the factory. The locations (and type of product) can be plotted on a map of the country to see if any geographical patterns emerge. If there are patterns there must be a reason for them. It is possible, for example, that frozen fish are packaged in market-gardening areas because initially the company dealt solely (excuse the pun) with frozen peas.

Ingredients

Examine the lists of ingredients on food packages.

Are there any surprising ingredients?

Do some ingredients appear in many different types of food stuffs?

What proportion of foods have added preservatives?

Weight and price

How is the weight shown?

Does the weight refer to the contents or does it include the packaging?

A mini consumer survey could compare similar products by different manufacturers. Where products are packed in different sizes or quantities some calculations will be necessary to compare prices.

A 'shopping basket' price list could be prepared at the beginning of the school year by finding out the costs of certain items. During the year the prices could be examined again to see if they have increased and, if so, by how much.

Package design

Examine the different types of design. Are they utilitarian, eye-catching, luxurious etc.?

Look at the different styles of text on packages. Imitate some of the styles.

Is the package sensible? Is it easy to open? Is it obvious what the package contains?

Design a completely new package for a fictitious product. Hold an advertising agency meeting to plan a campaign for the promotion of the product. Write a script for, and perform, a TV commercial.

Cost of packaging

It can be quite staggering to discover how much we pay for the part of the product which is immediately thrown away. Some boxes may be used to store the product during its lifetime or some may be used for other purposes.

Examine different packages to determine how wasteful or essential the packaging is.

Examine different packages to see how much 'fresh air' is being purchased ie when the package is more generous than the contents.

Think of ways of recycling boxes. Convert them into presents for Christmas. In fact you'll need to do something with all those boxes which are now cluttering your classroom.

Find out how food was sold in the past. Find out where food is still sold without packaging.

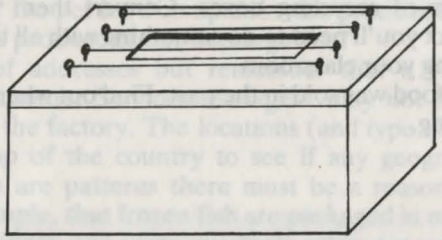
ART,CRAFT AND DESIGN

Sound Boxes

In addition to the tea chest bass it is possible to convert a box into a stringed zither-like instrument.

A plywod box (even as small as a cigar box) will provide the sturdiest instrument and the best sound but it may be possible to achieve something with a cardboard box if a plywood lid is added.

A hole is cut into the lid. Guitar strings are fixed in place by attaching them to screw eyes in the lid. The strings are tightened and tuned by turning the screws.



Having made the instrument and played it by finger-plucking, or by using a plectrum or bow, children may be interested in examining other stringed instruments to see how they are made and played.

Wall panels

Wall panels designed and constructed from box forms can prove to be an interesting way to display the work of children.

Method:

Collect a variety of cardboard boxes from supermarkets etc. Cut the boxes to various depths with a sharp knife or scissors, see Fig 1.

If the task is to be carried out by the children it may be advisable to make some rules regarding the depth of the boxes e.g. boxes with the largest surface area must be the shallowest in depth. When the collection of different sized boxes is complete cover all exterior surfaces with black paper (good chance to discuss cuboid nets) or paint black. When all this frenetic activity is complete join all the boxes together making sure that the open side of all the boxes is to the rear of the panel. Artwork or written work can then be displayed in a 3D pattern. The difference in the depths of the boxes will also create small shelves: this allows for small models etc. to be exhibited.

Single display panels can also be made using this method. Depth of boxes should be approx. 3-5cm. Artwork or written work can be mounted on the exterior surface giving a block mounted effect or mounted inside thus forming an effective frame for the work.

The tops of margarine containers can also be used to produce frames for work.

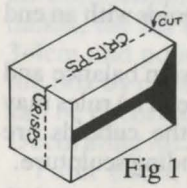


Fig 1

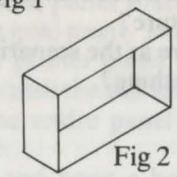


Fig 2

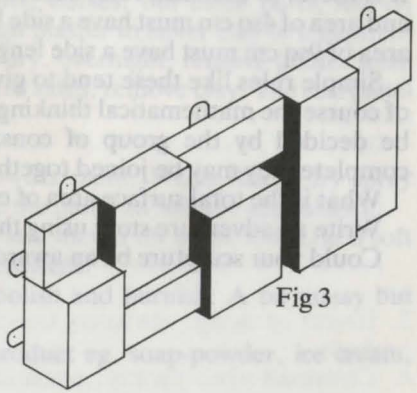


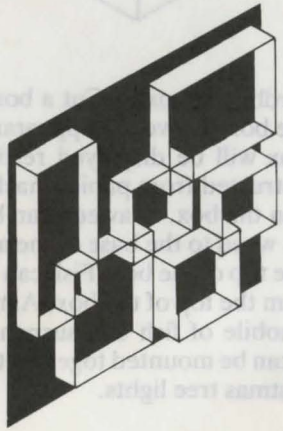
Fig 3

Box frame wall panels

Cut thin white card into strips measuring 1, 2 and 3cm wide, the length of the strips is not important but should be at least 15cm. Establish rules for the construction of the frames e.g. strips 3cm wide must not have a frame side measurement greater than 3cm.

Divide strip into the side lengths of square or rectangle and leave approx. 1cm spare on one end to glue joint. Score the dividing lines to produce a neat corner and bend and glue strip to complete frame.

Construct a variety of frames using this method, enough to cover an area approx. A4 size. Where frames are to be connected, cut through half of the strip on both frames and interlock together. When a satisfactory arrangement has been selected glue edges of card to a black background. This method of constructing wall panels can be used very effectively with clay. The interior sections of the box frames could be filled with different glazes, oxides or glass.



Box sculptures

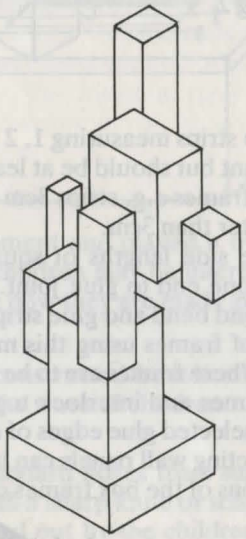
Make a variety of cuboids from white card; these need not be very large. It is useful to establish rules before work commences eg cuboids with an end area of 4sq cm must have a side length of 10cm or cuboids with an end area of 9sq cm must have a side length of 5cm.

Simple rules like these tend to give the work some design balance and of course the mathematical thinking is a valuable exercise. The rules may be decided by the group of constructors. When all the cuboids are complete they may be joined together to form a free standing sculpture.

What is the total surface area of each sculpture?

Write an adventure story using the sculpture as the scenario.

Could your sculpture be an award for something?



Box aquarium

Collect a variety of cardboard boxes. Cut a box to a depth of 15-30cm. Paint the interior of the box to give the appearance of being under water (bluey green). The box will be displayed resting on one of the sides. Rocks etc. can be constructed from papier mache, plasticine or clay and painted and mounted in the box. Seaweed can be cut from tissue paper. Stick the bottom of the weed to the base of the aquarium and using black thread support from the top of the box. Fish can be cut out and decorated and also suspended from the top of the box. A more ambitious method is to construct a small mobile of fish and suspend this inside. For added effect a series of tanks can be mounted together to form an entire wall and illuminated using Christmas tree lights.

Other ideas

1. Use the lid or main body of shoe boxes for plaster castings. Roll clay to approx. 2cm thick and fit into box. Press any objects into the clay to make an impression. Toy soldiers, knights, horses, old clock parts, leaves, hands, the list is endless. Mix enough plaster to cover clay to a depth of 3-4cm and pour into mould. When dry, overnight, remove plaster from the box by cutting away the cardboard sides, remove clay. The cast panel can be decorated in a variety of ways.

Decorating ideas:

Paint entire panel black with powder paint. When this is dry spray lightly with gold paint. This will give the panel an antique appearance.

Coat the plaster panel with glue and mould on silver foil. Use a soft cloth to burnish the foil into all the crevices.

Cover the entire panel in boot polish and burnish. A bit messy but worthwhile.

2. Design and paint a box for a product eg. soap-powder, ice cream, crisps.
3. Design and construct a model village using boxes for buildings.
4. Make a Jack-in-a-box.
5. Make a Jill-in-a-box.
6. Make kaleidoscopes.
7. Examine a variety of box labels and design some of your own.
8. Convert some sturdy boxes into furniture strong enough to support a child's weight.
9. Make box girders by folding and glueing (or 'L' shaped girders by folding only) long strips of sugar paper. Use the girders to construct all manner of things such as bridges, cranes and buildings.

MISCELLANEOUS IDEAS

1. In some parts of the world people actually use boxes to make roofs and walls for their homes. Find out more about the socially and financially deprived peoples of our planet.
2. Use boxes to classify plants, animals, insects, trees etc. as a sort of non-computer data-base.

Birds, for example could be 'boxified' as follows:
Box 1 water birds
Box 2 town birds
Box 3 field birds

Inside Box 1 would be smaller boxes for waders and swimmers and so on.

3. Invent or design conjuring tricks using boxes. Saw a teacher in half, perhaps.
4. Construct a box theatre or panorama.

Remove the front and the top of a large box. Cover the top with a cloth or removable lid. Construct scenes which are slotted in from above either singly or in series. If more than one scene is to be inserted it must be a cut-out scene to avoid obscuring the scene behind. Construct figures (actors) which can be inserted and moved from side to side through slots in the bottom of the box. This is a rudimentary description but should give some idea of where to start.

5. Make a puppet theatre or Punch and Judy show.
6. Make box kites having first found a good book containing instructions on how to do it.
7. Conduct experiments to discover the 'protection-index' of the various types of packaging found in boxes eg. expanded polystyrene chips and slabs, crumpled newspaper, corrugated card, shredded paper and bubble plastic. Allow children to design the experiments and work out how measurements can be made.

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