AREA OF STUDY: TECHNOLOGY

UPPER DIVISION - STANDARD V

PROJECT: BRIDGES

AREA OF STUDY OUTCOMES
Pupils should:
WT1.a. Identify a simple problem/need
WT1.b. Design a simple device to meet a need/solve a problem
WT1.c. Construct a simple device to meet a need/solve problem
WT1.d. Test a simple device to see if it meets a need/solve problem

CROSS-CURRICULAR OUTCOMES
Pupils should:
CP1.a Recognize an issue or a prob
SP2.a Take part in group activities
SP2.f Help the group to achieve its
SP2.h Accept major decisions
SP3.a Assess their needs/interests
SP3.b Assess progress in relation to and adjust goals or strategies

CONTENT ORGANIZED INTO MANAGEABLE SETS	SUGGESTED TEACHING/LEARNING STRATEGIES	SUGGESTED STRA ASSE
Project: Constructing a model of a Bridge ▪ Structures are designed both natural and man-made, to provide support or give stability. A structure must be able to resist forces ▪ Bridges are examples of structure: Made to resist force; To have structural balance, both external and internal forces must match up. External forces may be stationary (static) or moving (Dynamic)	▪ Make a pictorial display to show the development of bridges through history ▪ Allow students research on types of bridges: Cantilever, Suspension, Cable-Stayed, Beam, Arch. Presentation ▪ Discussion on the kinds of forces: tension, compresssion and their effects. ▪ Compare and contrast the types of materials used on the construction of the different bridges. ▪ Allow students to collect materials needed for the construction of bridges ▪ In groups students will design any of the five listed bridges. ▪ In groups students will construct any of the five listed bridges. ▪ On completion of project, have children evaluate their own and others projects. Display projects in learning centre.	▪ The quality of childr generated out of ex projects, designing ▪ Presentations of ide ▪ The quality of childr design sketches an ▪ The quality of childr reports about inves processes, finished evaluation of finishe ▪ Evidence of aspect applied in complete tasks.

`

CONTENT ORGANIZED INTO MANAGEABLE SETS	SUGGESTED TEACHING/LEARNING STRATEGIES	SUGGESTED STRA ASSE

PROJECT: BRIDGES

Two kinds of forces which are needed for bridges are tension and compression.		

CONTENT ORGANIZED INTO MANAGEABLE SETS	SUGGESTED TEACHING/LEARNING STRATEGIES	SUGGESTED STRA ASSI

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION - STANDARD V

PROJECT: BRIDGES

Types of Bridges A Beam bridge is a structure which constists of a rigid beam supported by a series of pillars anchored at each end to the ground or pier. Any weight in the middle of the beam tends to bend it downwards, making this type of bridge unsuitable for long distances. (see fig. 1) **Figure 1**		▪ The evidence of im inventiveness and i children's ideas. ▪ Evidence of an abil with or leading othe project. ▪ Quality of craftmans construction of prac ▪ Name and describe process/completed

CONTENT ORGANIZED INTO MANAGEABLE SETS	SUGGESTED TEACHING/LEARNING STRATEGIES	SUGGESTED STRA ASSI

PROJECT: BRIDGES

An Arch Bridge: In an arch bridge the weight is carried outwards along curved paths. The ground resists this outwards force, keeping rhw bridge up. A road can go across the top of the arch bridge or through it. (See fig. 2) **Figure 2**		

CONTENT ORGANIZED INTO MANAGEABLE SETS	SUGGESTED TEACHING/LEARNING STRATEGIES	SUGGESTED STRA ASSI

PROJECT: BRIDGES

A Suspension Bridge In a suspension bridge, the roadway is supported by cable that are anchored at each end of the bridge. The cables take the weight to the top of the tower, which transfers the force downwards to the ground. Modern cables are made of strands of steel wire that only stretch under excessive weights. This makes the suspension bridge suitable for long spans. (See fig. 3) **Figure 3**		

CONTENT ORGANIZED INTO MANAGEABLE SETS	SUGGESTED TEACHING/LEARNING STRATEGIES	SUGGESTED STRA ASSI
A Cantilever Bridge The ends of the bridge are weig		

A Cable –Stayed Bridge

This is a new development in bridge technology. There may be one or two towers built in the centre of the deck, and the roadway is supported by cables that are directly connected to these. As this type of bridge requires few piers, it is increasingly used for wider rivers and estuaries. (See figure 5)

Figure 5

Skills:

Display
Research
Discuss
Compare & Cotnrast
Construct
Collect
Design
Evaluate

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION - STANDARD V

PROJECT: BRIDGES

Cut/Join
Saw
Tying
Screwing
Assemble
Generate Ideas

Attitudes:

Cooperation
Sharing
Respect
Responsibility
Leadership
Interest
Enjoyment

PROJECT: BRIDGES

Suspension Bridges

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION - STANDARD V

PROJECT: BRIDGES

Materials:

Six Bricks
Wire Staples
Strips of wood
Glue
Strips of cardboard
Sstring

1. Cut 4 eight inch wooden strips and 4 two and a half inch strips. Glue them together to make a tower as shown.

2. Stand the towers about 16 inches apart using four bricks to keep them in place.

3. Cut 3 strips of cardboard measuring 16 inches by 2 ½ inches to make the main deck and the two approach ramps.

4. Punch small holes every ¾ inch along both edges of the cardboard strips. Use an awl or a leather punch

5. For the bridge cables, stretch two long pieces of string over the towers, attaching them to the tops of the tower with staples. Place the spare bricks on either side of the bridge and the ends of the strings around them.

6. Now suspend the approach ramps from the cables using short pieces of string. Tie each piece first to the cable and then through a hole in the cardboard. Trim the ends neatly.

7. Finally, tie pieces of string every ¾ inches along the cables of the bridge, as shown. Pass them through the hole in the deck of the bridge and knot them tightly underneath. For extra strength, adjust the length of string to make the deck flexd into an arch.

* You could use your bridge and a water tank to make a river crossing below.

PROJECT: BRIDGES

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION - STANDARD V

PROJECT: BRIDGES

EL3.c. Demonstrate the ability to write for a full range of purposes.

EL4.a. Use Speech (English) effectively and appropriately in a variety of situations (for a variety of functional tasks)

H2.a. Ways to effectively maintain and improve the environment, and how the state of the environment affects human well-being.

Text:
Design and Technology Ket Stage 2 Ages: 7-11
Teacher's Resource Book Page 17-19

Materials:

Strips of wood
String
Wire
Nail
Glue
Cardboard
Scissors
Knife

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION - STANDARD V

PROJECT: Constructing a model home/building

AREA OF STUDY OUTCOMES
Pupils should:
WT1.a. Identify a simple problem/need
WT1.b. Design a simple device to meet a need/solve a problem
WT1.c. Construct a simple device to meet a need/solve problem
WT1.d. Test a simple device to see if it meets a need/solve problem

CROSS-CURRICULAR OUTCOMES
Pupils should:
CP1.a Recognize an issue or a prob
SP2.a Take part in group activities
SP2.f Help the group to achieve its
SP2.h Accept major decisions
SP3.a Assess their needs/interests
SP3.b Assess progress in relation to and adjust goals or strategies

- Structures are designed both natural and man-made.

- Structures are designed to provide support or give stability. This is best achieved by the centre of the mass structure being low and the base being broad/wide.

Natural Structures	Man-Made Structure
Caves	Houses
Mountains	Playgrounds
Volcanoes	Bridges

- Define structure.

- Tabulate natural and man-made structures by listing examples for both.

- Discuss to elicit purpose of structures. List purposes.

- Children hypothesize about what provides support and stability to structure.

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION - STANDARD V

PROJECT: Constructing a model home/building

- Name types of moving forces. Discuss effects that forces can have on structures that are not

PROJECT: Constructing a model home/building

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION - STANDARD V

PROJECT: Constructing a model home/building

- The quality of children's oral discussions generated out of/explanations given of the projects, designing activity, presentations of ideas and or completed work.
- The evidence of imagination, creativity, inventiveness and innovations exhibited in children's ideas.

- A range of materials can be used to build basiuc structures.
- Structures can be divided into two main group – frame structures, shell structures.

Example:

Frame - Roof frames
- House frames
- Playgrounds

Shell - Containers
- Cages

- Children collect materials that can be used to assemble or construct structures.
- Children look at a chart with pictures showing the two types of structures.
- Using what children see from pictures on chart. Children distinquished and define the two types of structures.
- Children use materials they collected to construct or assemble a type of structure of their choice.
- Quality of thinking exhibited in the drawn ideas and modelled test-pieces accompanying projects.
- Evidence of a range of skills exhibited by the child in resolving projects and or problem tasks.
- Quality of child's construction of practical pieces, test-pieces or proto-types in answers to a design, a technology problem or task.

Skills:

Arrange
Classify
Communicate
Construct
Assemble
Collect
Discuss
Explain
Hypothesize

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION - STANDARD V

PROJECT: Constructing a model home/building

Identify
Locate
List
Name
Organize
Question
Record
Suggest
View
Write

Attitudes

Understanding
Awareness
Participation
Interest
Ability to use

EL4.a. Use speech effectively and appropriately in a variety of situations.

M2.c. How shapes fit together to form patterns.

M2.a. How to draw and construct three-dimensional shapes.

ST6.a. The effects of forces on matter in relation to mass, speed, and direction.

Design and Technology Curriculum Bank
Key Stage One Scottish Levels A-B
Make it Work – Building

Materials

Straws
Woods
Cardboard
Palatas sticks/tongue pressers
Play dough
Tape
Scissors
Stones

Roof Frames

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION - STANDARD V

PROJECT: Constructing a model home/building

You will need:

Cardboard
Glue gun
Thin dowels
A knife
Plastic straws

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION - STANDARD V

PROJECT: Constructing a model home/building

Procedure:

1. Cut six pieces of straw with angled ends as shown. Glue the three longer pieces together into a trinagular truss. Glue the three shorter pieces inside as shown below to give the truss extra strength.

2. Reinforce the joints at the base of the truss with small cardboard gussets.

3. Make five more identical trusses. To join them together in a roof frame, glue the trusses to three long straws by their points. Make the trusses an equal distance apart.

4. Use more straws to build the framework of a house to support your roof.

AREA OF STUDY OUTCOMES
Pupils should:
WT1.a. Identify a simple problem/need
WT1.b. Design a simple device to meet a need/solve a problem

CROSS-CURRICULAR OUTCOMES
Pupils should:
CP1.c Suggest ways of dealing with the problem/issue
SP1.b Choose between Alternative base on values
SP2.a Take part in group activities
SP2.b Express their opinion and feeling in a socially acceptable way.
2P2.f Help the group to achieve its goals
SP3.b Assess progress in relation to achievement of goals

PROJECT: Radio-Meter

- One way in which objects can be heated is through the absorption of radiant energy, which is energy carried in waves, such as light waves.
- Dull-black objects or surfaces absorb light waves readily and thus absorb radiant energy.
- Other surfaces such as a silvered, highly polished ones, reflect light rather than absorbing it and therefore do not absorb radiant energy in the same way that black surfaces do.

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION - STANDARD V

PROJECT: Radio-Meter

- The differences in the capacity of surfaces to absorb radiant energy is used to build an

PROJECT: Radio-Meter

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION - STANDARD V

PROJECT: Radio-Meter

- Research radiant energy.
- Explain radiant-energy concept by using a magnifying glass to burn/scorch a piece of paper.
- Children place different colour objects and fabrics out in the sun to establish that dull-black ssurface and objects absorb more radiant energy.
- In groups children demonstrate the reflection of light against black surfaces as oppose to silvery/shiny/surfaces.
- Children build a model of a home-made radio-meter.
- Groups display and explain how radio-meter works.
- Children evaluate each others projects by commenting on accuracy of information in presentation and model device workability.

- The quality of children's oral discussions generated out of explanation given of the projects designing activity, presentations of ideas and or completed work.

- Evidence of aspects of technology applied in completed projects.

- The evidence of imagination, creativity, inventiveness and innovation exhibited in children's ideas.

- The extent of the effectiveness of the designed and made technology solution in meeting the original need.

`

Skills:

Apply
Arrange
Communicate
Conduct
Collect
Complete
Choose
Contribute
Discuss
Develop
Display
Explain
Encourage
Follow (simple direction)
Name
Organize
Predict
Paint
Write

Joining
Cutting
Assembling
Drilling
Stapling
Bolting

Attitudes:

Pride & satisfaction
Appreciation
Cooperation
Persevarance
Willingness to share

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION - STANDARD V

PROJECT: Radio-Meter

SL4.a. interpret simple forms, notes, messages and follow instructions and directions

H1.d. the consequences of dangerous situations and unsafe practices, and how to respond to those consequences (make responsible choices)

SS2.b. Understand how the different natural landscape features and natural resources relate to human activity.

M2.d. the relationship between angles in different two dimenstional shapes.

M3.a. measure, estimate, express and compute distance, weight, time, capacity and temperature and apply to practical situations.

M4.b. predict likely occurrence of an event, through logical reasoning, based on trends.

Making Scientific Toys, Carson I.A Ritchie 1975
Pages 109-115

Materials

1 Stout glass jar (clear glass)
6" tall, 4 inches in diameter
The glass must be thick and the jar should form a small dome.

3 inch long needle

1 copper tube about 6 inches long ¼ inches in diameter

Some light wood e.g. bulsa

Aluminum foil

PROCEDURES:

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION - STANDARD V

PROJECT: Radio-Meter

Make a base for the jar out of the 1 inch thick wood. You can make either a round or a square base. It should be an exact circle or square. Its diameter should be 1 inch greater than that of the jar.

After you have cut out the base and sanded down the round edges, place the mouth of the jar on the base, make sure the center of the jar is over the center of the base. See figure below:

The jar will be properly positioned if the space between the jar and the edge of the base is the same on all four sides. When the jar is in position, draw around its mouth with a sharp scriber. Use a gauge and a craft knife. Cut a groove into the wood just inside this line.

Make the groove wide enough to hold the rim of the jar and deep enough to sink the jar in for at least ¼ inch. Next with a ¼ inch gauge drill a hole into, but not through the center of the base. Make the hole about ¼ inch deep. Insert the needle into it.
To one side of the base's center, about 1 inch from it, drill another hole, large enough for you to insert the copper tube all the way through the base.

Now make some legs for the base to stand on. To do this, put one of the hardwood balls in a vice, make the center point and cut in two, trying to cut it into two equal halves. Do the same with the other ball. All the legs must be the same size, so the radiometer will balance properly. Glue the legs to the base with wood glue, placing them at the outer edge of the base as though they were at the ends of a cross.

Take the copper tube and 1 inch from one end, bend it so that it forms an angle that is as close to a right angle as you can make it. Slip a plastic knitting needle in the tube when you bend it. Insert the short end of the tube into the hole in the base and glue it into place with rubber cement.

The tube should extend for about 5 inches from the hole in the base, because of the angle bent in it, it should not reach down below the legs and hit the table.

Glue the needle with the point sticking up, into the hole in the center of the base. Make a hub to go on the end of the needle. Make a hub to go on the end of the needle. The hub will hold the arms for the vanes. Use very light wood e.g. bulsa, that is ½ inch thick, and with a craft knife cut out a disk ½ inch in diameter.

In the center drill a hole halfway through the hub, make the hole large enough so that when the needle is inserted in it, the hub will point on the needle.

Now with a craft knife cut out the four arms. With a jeweler's saw or a piercing saw, cut a slit about ¼ inch long in one end of each arm. After you have made the vanes you will insert them into these slits. Cut the other end of each arm, so that it forms a point. Stick the pointed ends of the arms into the hub. To do this, take a bradawl and make four tiny holes, just enough to accept the arms, in the side of the hub. Place the holes so that the arms will stick out at right angles to each other and will be properly aligned.

To make the vanes, cut four circles with a diameter of ½ inch out of aluminum foil with your foil cutting scissors.

Point one side of each vane with matte black enamel. Polish the other side gently with a cloth, then insert the vanes into the slits in the arms, and glue them in place with contact cement.

When the glue is dry, glue the arms into the holes on the hub, inserting the arms so that the vanes are vertical and the blackened and polished sides alternate.

If the black side of the vane faces the black side of the next vane, the radio-meter will not work properly. Use bulsa cement to glue the arms, and if necessary support them with putty so the vanes will align properly.

Gently place the hub on the end of the needle. Blow on the vanes to make sure they will spin around properly.

Polish the jar inside and out thoroughly, then insert it in the groove in the wooden base, and glue it in place, using airtight cement.

Now you have to use a vacuum pump to pump most of the air out of the glass jar.
N.B. the possibility of an explosion may exists. To guard against the danger of flying glass is to use transparent adhesive tape.

To pump the air out of your radiometer couple the vacuum pump to the copper tube with a connecting link of rubber, then start the pump.

Once a partial vacuum is obtained, the vanes will begin to turn. At this point, compress about 1 inch of the copper tube with a pair of pliers and seal the end by forcing the walls of the copper tube with a pair of pliers and seal the end by forcing the walls of the copper, being careful not to puncture the tube.

Disengage the pump.

Seal the tube with airtight glue. Take the adhesive tape off the jar, remove traces of adhesive.

Place the radiometer in the sun, and it will go on turning as long as there is sunlight.

PROJECT: Radio-Meter

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION - STANDARD V

PROJECT: Table Lamp

AREA OF STUDY OUTCOMES
Pupils should:
WT1.a. Identify a simple problem/need
WT1.b. Design a simple device to meet a need/solve a problem
WT1.c. Construct a simple device to meet a need/solve problem
WT1.d. Test a simple device to see if it meets a need/solve problem

CROSS-CURRICULAR OUTCOMES
Pupils should:
CP1.a. Recognize an issue
CP1.c. Suggest ways of dealing with th
SP1.a. Recognize the values associated
SP1.c. Take action based on principled
SP2.a. Take part in group activities
SP2.b. Express their opinions and feelin acceptable way
SP2.f. Help the group to achieve its goa
SP3.3 Assess progress in relation to achie

Knowledge:

- Electricity is a form of energy that causes the bulb to light.
- There must be a complete circuit for electricity to flow.
- A switch is used to open and close the electrical circuit.
- He lamp is connected through a series circuit which allows the current to flow only in one direction.
- For the current to flow all parts of the circuit must conduct electricity.
- There are different types of switches.
- The electric lamp uses a toggle switch.
- The toggle level pushes down on the bar causing it to touch the connection thereby completing the circuit..
- The circuit remains closed until the switch is moved back to its off position.

- Make a pictorial display to show the development if lamps through history from the rush light or Roman oil lamp through to the candelabra and miners' safety lamps and then on to electric lights.
- Discuss with children what causes bulbs to light.
- Conduct a simple experiment showing how ekectricity from a dry cell (battery) lights a small bulb.
- Have students research parallel amd series circuits. Compare and contrast parallel and series circuits.
- Have students disassemble a toggle switch to discover the different components of this switch, thereby gaining a clear understanding of how it closes and opens a circuit.

- The quality of children's oral discussions generated out of explanations given of the project, designing activity, presentations of ideas and/or completed work.
- Evidence of aspects of technology knowledge applied in completed projects and/or problem tasks.
- The quality of children's explanations in written reports about investigations, design, ideas, processes, finished products and the evaluation of finished products.
- The evidence of imagination, creativity, inventiveness and innovation exhibited in children's ideas.

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION - STANDARD V

PROJECT: Table Lamp

- Evidence of an ability to work in collaboration with or leading other children (as appropriate)

PROJECT: Table Lamp

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION - STANDARD V

PROJECT: Table Lamp

`

- Some electrical terminologies are:
  Watts – units of electric power
  Volts – units for measuring electric force
  Amperes – units for measuring electric current

Skills:

Make connections
Display
Compare & contrast
Discuss
Conduct
Experiment
Research
Disassemble
Discover
Create
Design

Attitudes:

Cooperation
Pride & Satisfaction
Ability to use
Awareness
Enjoyment
Interest
Sense of Achievement

- Conduct an experiment where they will make a complete circuit using batteries, bulb, wires, switch.
- Discussion of electrical terminologies: watts, volts, amperes.

EL3.c. Demonstrate the ability to write for a full range of purposes.

EL4.a. Use speech effectively and appropriately in a variety of situations.

ST1.a. Some of the explanations for changes in life forms since

Text:
Design and Technology Key Stage 2 Teachers Resource Book
Page 52-56

Design and Technology Key Stage 2 Photocopiable Pupil Resource
Page 59-61

Materials:

Switches (Toggle Switch)
Wire (insulated)

PROJECT: Table Lamp

Bulbs

Battery

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION - STANDARD V

PROJECT: Design/Construct a Well

- A mechanism is used to help us move things and do work. An example os such is a pulley wheel.

- A pulley wheel always has a groove to stop the cope (wire or string) slipping off. Because the pulley wheel turns round, it makes it easier for someone to lift a heavy load. The winding mechanism help someone to turn the axle and wind up the heavy object. The rope is wound round the pulley wheel. Use nursery rhyme "Ding Dong Bell, Pussy's in the Well" to present

(a) Use nursery rhyme "Ding Dong Bell, Pussy's in the Well" to present problem.
(b) Stimulate discussion on different ways or means of solving problem and how the mechanism work.

    (i) List types of simeple machines
    (ii) Name examples and collect samples of simple machine

(c) Name examples of pulley and wheel and axle.
(d) Discuss purpose of wells and how they are operated.
(e) Demonstrate the use of pulleys and wheel and axle by using things in immediate surrounding.
(f) Children should explain how the use of the pulley and wheel and axle affect work and lifting a load.
(g) Display models together with pictures of objects in everyday life that contains pulley wheel and winding mechanism.
(h) The children could make their own model, using different materials and a different context.

(a) Quality of thinking exhibited in the modelled test-piece accompaying projects.
(b) Evidence of aspects of technology, knowledge applied in completed project.
(c) The extent to which the child displays the capacity to reflect on design ideas and the maturity of critical thinking skills displayed.
(d) The evidence of imagination, creativeity, inventiveness and innovation exhibited in children's idea.
(e) Quality (craftmanship) of the child's construction of practical pieces, test-pieces (mock ups) or prototypes in answer to a design and technology problem or task.

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION - STANDARD V

PROJECT: Design/Construct a Well

PROCEDURE:

(a) Explain that they are going to us4e a pulley wheel and winding mechanism using their own models.

(b) Construct a pulley wheel example illustrated in figure 1.

(c) Attach barrel below the pulley.

- Resourcefulness of child.
- Ability to use a variety of strategies and ask which method they prefer.

Skills

- Maping
- Measuring
- Cutting
- Finishing (decorating)
- Thinking
- Creativity
- Fluency

Attitude

- **Willingness to share, participate and experiment**
- **Understanding**
- **Appreciation**
- **Respect**

EL4.a Use of speech in presentation of project.
M2a How to draw and construct
M3a Measure, estimate and express
ST6.b How the force created by combining simple machines can accomplish a common task.
EA1.e Explore and experiment with styles, methods and techniques that have been used to create artistic representations.

1. Design and Technology, Curriculum Bank,
   Key Stage One Scottish Levels A-B,
   Clare Benson, Pg. 35

2. Design and Technology, Curriculum Bank,
   Key Stage Two, Scottish Levels C-E
   Richard Ager

Materials use for Constructing a Well

(a) A copy of the rhyme “Pussy’s in the Well’
(b) Cotton reels
(c) Dowel
(d) G-clamps

(e) Hole punches
(f) Scissors
(g) String
(h) Wool
(i) Boxes
(j) Junior bench hooks
(k) Junior hacksaws
(l) Paints, crayons

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION - STANDARD V

PROJECT: Water Wheel

- Water power has been used for thousand of years and it comes in many different forms. If water is required to move heavy machinery, it needs to flow quite slowly, but if it is used to produce electricity it needs to flow very quickly.

- Water-wheels are used to turn machinery. There are two types – the overshot, where the weight of the water falling turns the wheel and the under-shot, where the weight of the water pushing causes the wheel to turn. They are used to convert power of flowing water into usable energy.

- The basic element of the water wheels is a wheel with blade or propellers arranged on its circumference in such a fashion that moving fluid can exert a force and turn the wheel and impart energy on it. This mechanical energy can operate a machine compressor, electric generator or propeller. Research on Hydro-electric power
- Research on Hydro-electric power

- Presentation on research.

- Reinforcement of Hydro-electric research.

- Name the sources of water.

- Discuss which sources are used to produce electricity.

- Group childdren to have them design and assemble a water wheel to show knowledge of research.

- Encourage children to be original inconstructing their water wheels.

- The quality of children's oral discussions generated out of explanations by way of research, presentations/or completed work.

- Evidence of aspects of technology, knowledge applied in completed projects and/or problem tasks.

- Quality of thinking exhibited in the drawn ideas and modelled test pieces accompaying projects.

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION - STANDARD V

PROJECT: Water Wheel

- The evidence of imagination, creativity, inventiveness, resourcefulness and innovation

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION - STANDARD V

PROJECT: Water Wheel

Water Wheels are used to turn machinery.

They are used to convert power of flowing water into usuable energy.

Skills

Construct
Discuss
Measure
Contribute
Encourage
Follow simple directions
Question
Solve
Manipulate
Estimate
Evaluate

Attitudes

Respect
Responsibility
Participate
Pride
Appreciation
Tolerance
A sense of achievement
leadership

- Quality of thinking exhibited in the modelled test-piece accompaying project.

- EL2.d Follow instructions/directions
- SS2.c How the land and water are used to provide for the physical needs of people in the community.
- WT1.c Construct a simple device to meet a need/solve a problem.
- WT1.d Test a simple device to see if it meets a need/solves a problem
- Design and Technology Key Stage Two Scottish Levels C-E Pg. 128-130

Materials needed
Cotton reel
Wooden wheel
Plastic sheeting
Plastic tea spoons
Large plastic container
Cork and strips from a plastic washing-up bottle
Plastic ice cream spoons
Strip of wood
String
Water
Craft knives

IDEAS FOR MAKING WATER WHEELS

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION STANDARD V

UNIT: A pneumatic car park barrier

AREA OF STUDY OUTCOMES
Pupils should:
WT1.a. Identify a simple problem/need
WT1.b. Design a simple device to meet a need/solve problem
WT1.c. Construct a simple device to meet a need/solve a problem
WT1.d. Test a simple device to see if it meet a need/solve a problem

CROSS-CURRICULAR OUTCOMES
Pupils should:
SP1.c. Take action based on principled
SP2.a. Take part in group activities
SP2.b. Express their opinions and feeli acceptable way
SP2.e. Lead and follow where appropria
SP2.f. Help the group to achieve its go
SP3.a. Assess their needs/interest
SP3.b. Assess progress in relation to a adjust goals or strategies as nec

- Pneumatic and hydraulic are very similar concepts. In pneumatic system a gas, usually compressed air, is used to transmit movement. In hydraulics a liquid, usually some kind of oil is used.

The following features needs particular notice:
- Air can be squashed (it is compressible)

- Air is springy – if one syringe is pushed in, the plunger in the second syringe comes out.

- Ask the students to think about the noises they hear when a bus puts its brakes on, or when the sliding door of a bus opens or closes.
- Focus is on the hiss of escaping air. These are examples of pneumatic systems, where air is used to make things move.
- Provide students with the following resources: (in group of two's)

Two small syringes, one large syringe, a T-piece and a 50 cm length of plastic tubing for each pair of children, square section wood, card triangles.
PVA adhesive, saw, bench hook, G-cramp, plastic tube cutter. Acrylic paint or water based varnish, one copy of photocopiable sheet 118, paper.
Have pupils complete investigation on sheet 118.

- The quality of children's thinking exhibited in the design sketches and drawings.
- Quality of thinking exhibited in the drawn ideas and modelled test-pieces accompanying projects.
- Evidence of aspects of technology knowledge applied in completed projects.
- The extent to which the child displays the capacity to reflect on design ideas and maturity of critical thinking skills displayed.

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION STANDARD V

UNIT: A pneumatic car park barrier

- The evidence of imagination, creativity, inventiveness and innovation exhibited in children's

`

- If one syringe is pulled out, the plunger in the desond syringe moves inwards.

- As you push down on one side the other side goes up.
- As you push down on the left the right hand side moves much further.

- Pneumatics control the gate from a distance
- When the small syringe is placed near the end of the barrier as it is forced down the barrier rises.
- The outer casing of the syringe needs to be fixed to the wooden frame to allow the innder piston to move freely.
- The barrier will close automatically because there is more weight to the right of the fulcrum (pivot point)

- Now show the students the model of the sea-saw.
- Take out the piece of dowel (fulcrum) and move it along to the left.
- Discuss what happens.
- Ask them to look at car park barriers for ideas. Remind them that they often have a holder for the barrier when it is in the down position.
- Students should complete initial designs and then build their models.
- The models could be coloured with water based varnish or acrylic paint both of which can give a reasonable finish.
- When the barriers are completed, each child should do a presentation to show features of design such as the materials used, reasons for their selection and the ways in which the components are fixed together.
- It should also highlight particular problems which occurred during the making.
- This is a good strategy to make children think about the process of evaluation throughout an activity.

SUGGESTION

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION STANDARD V

UNIT: A pneumatic car park barrier

Students could be asked to make a model of their own choice which incorporates a pneumatic

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION STANDARD V

UNIT: A pneumatic car park barrier

Skills

Create
Construct
Draw
Explain
Follow (simple directions)
Interact
Measure
Manipulate
Participate
Suggest
Sequence
Share
Speak
Visualize

Attitudes

Understanding
Awareness
Willingness to (share, participate, experiment, interact)
Ability to use
Enjoyment
A sense of achievement
Respect for others

WT3.a. The elements which contribute to the effectiveness of the work people do.

WT3.b. Some of the processess within Belize's industrial sectors

M2.b. How to plot the position and movement of two-dimensional shapes.

M4.b. Predict the likely occurance of an event, through logical reasoning, based on trends.

ST8.a. The interrelationships and dependence that exist within the environment.

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION STANDARD V

UNIT: A pneumatic car park barrier

EA1.h. Explore and experiment with styles, methods and techniques that have been used to

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION STANDARD V

UNIT: A pneumatic car park barrier

- Design and Technology (Key Stage Two)
  Pages 25, 26 & 118

  Materials Needed:
  Two small syringes
  A T-piece
  50cm length of plastic tubing for each pair of students
  square section wood
  card triangles
  PVA adhesive
  Saaw
  Bench hook
  G-cramp
  Plastic tube cutter
  Acrylic paint or water based varnish
  One copy of photocopiable sheet 118

Make a simple see-saw model out of square section wood

An annotated presentation drawing

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION STANDARD V

UNIT: Speaker Phone (Two way)

AREA OF STUDY OUTCOMES

Pupils should:

WT1.a. Identify a simple problem/need
WT1.b. Design a simple device to meet a need/solve problem
WT1.c. Construct a simple device to meet a need/solve a problem
WT1.d. Test a simple device to see if it meet a need/solve a problem

CROSS-CURRICULAR OUTCOMES

Pupils should:

SP2.a. Take part in group activities
SP2.b. Express their opinions and feeli acceptable way
SP2.e. Lead and follow where appropria
SP2.f. Help the group to achieve its go
SP3.a. Assess their needs/interest
SP3.b. Assess progress in relation to a adjust goals or strategies as nec

- Sound waves can be converted from sound energy into electrical energy and back again. That's how sounds can be carried over long distances by the telephone.
- Modern telephones convert sound waves into electrical pulses- and back.

(A) You can make a simple telephone using magnets and copper wire.

- When you speak into the paper cup, the sound waves are changed into electrical impulses, by the magnet bouncing up and down inside the coil of copper wire.
- On the other end of the wire another copper coil, drum head and magnet convert the electrical impulses back into sound waves.

(B) You can make a simple telephone using small speakers from old radios.

- Discuss the science relaed to sound waves and the making of electricity.
- Allow students research, experiment on the formation of sound waves (presentation)
- Conduct simple experiments with students using a coil of wire and a magnet to produce electricity.
- By making a simple telephone, the teacher will show the application of sound waves being changed into electrical impulses and back in order to facilitate communication.
- Have students conduct experiment shown. Present a scenario.
- Discuss the use of the device in solving problems.
- On completion of project have children evaluate their own and others projects.
- Evidence of students having actively drawn on knowledge from other curriculum areas.
- Have small groups present findings from their research on the formation of sound waves.
- Have students compare their research information to that obtained from experiments.
- The quality of children's explanations in written reports about investigations.
- Evidence of aspects of technology knowledge applied in completed projects.

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION STANDARD V

UNIT: Speaker Phone (Two way)

- Evidence of an ability to work in colaboration with or leading other children (as appropriate) in

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION STANDARD V

UNIT: Speaker Phone (Two way)

`

- When you speak into the paper cup, the sound waves are changed into electrical impulses, by the coil of wire, in the speakier bouncing up and down around the magnet.
- On the other end of the wire a simple device will convert the electrical impulses back into sound waves.

Skills	**Attitudes**
Discuss	Cooperation
Research	Sharing
Experiment	Respect
Observe	Responsibility
Create	Interest
Present	Pride & Satisfaction
Evaluate	Enjoyment
Display	Sense of Achievement
Record	
Cut/glue	
Wind	
Join	
Assemble	

- Make it Work – Baker & Haslam
  The hands on Approach to Science

  Materials Needed:
  Paper cups
  Writing paper
  Glue and tape
  Poster board
  Scissors
  Cylinder magnets
  Insulated electrical wire

Step by Step Procedure

1. Make two copper coils.
   Cut and glue the pieces of poster board as shown
   To make reels that will fit neatly around the cylinder magnets.
   Wind copper wire around each reel forty or fifty times (wires must
   Be very thin)

2. Using thick poster board cut star shapes. Put them together to
   Make cradles for the reels and copper coils.

3. Take two equal pieces of insulated wire to pass through the bottom
   of each paper cup and connect them to the end of the copper coils.

4. Using thin airmail paper, cut a drumhead. Snip the edges so that
   You are able to glue it to fit tautly inside the rim of each paper cup.

5. Assemble each paper cup receiver. Glue the reel and coil into the

Cradle. Fix the cradles inside the paper cups.

6. Glue the magnet into a small circle of poster board and glue that Poster board onto the back of the paper drumhead. Glue the Drumhead in place. Check that the magnet fits neatly inside the Reel, but has room to move freely up and down.

7. Cup your hands around the cup and talk right at the drumhead. To listen hold the drumhead up to your ear.

SPEAKER PHONE (TWO WAY)

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION STANDARD V

PROJECT: Traffic Lights

AREA OF STUDY OUTCOMES **Pupils should:**	**CROSS-CURRICULAR OUTCOMES** **Pupils should:**

- Traffic lights can be controlled by manual switches.
- Desinging a traffic light circuit.
- The circuit should have 3 light bulbs (red, amber. Green) that operates independently from one battery.

- Discuss or revise safety rules needed when working with electicity.
- Conduct research of Micahel Faraday.
- Create designs of parallel circuits
- Discuss the different types of switches e.g. toggle, bell, push switch and reed switch.
- Display teacher's model of a traffic light.
- Children design and create a structure of traffic lights that will function.
- Conduct reseaarch on computerized traffic light.
- Compare and constrast with their own models.
- The quality of children's oral discussions generated out of explanations given of the projects designing activity, presentations of ideas and/or completed work.
- The quality of children's explanations in written report about investigations, designs, processes, finished products and the evaluation of finished products.
- The extent to which the child displays the capacity to reflect on design ideas and the maturity of critical thinking skills displayed. Quality (craftmanship) of the child's construction of practical pieces, test pieces or prototypes in answer to a design and technology problem or task.

`

A toggle Switch

- A toggle switch will allow a number of circuits to be connected. The circuits will allow the bulb to operate in an independent fashion. The toggle level will be pushed across the ends of the wire causing the circuit to close, thus lighting the bulb.

Polarity

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION STANDARD V

PROJECT: Traffic Lights

- A device will operate in only one direction i.e. the red wire (t) should be connected to the

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION STANDARD V

PROJECT: Traffic Lights

- Children can make a model of a complete road junction in their communicty. Have them

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION STANDARD V

PROJECT: Traffic Lights

- Honesty and integrity
- Self reliance and idependence
- Reliability and responsibility
- Time efficiency
- Adaptability and integrity
- Inquisitiveness
- Thooroughness and craftmanship
- Personal productivity
- Patience and detemination
- Adventurous

Skills

Discuss
Review
Conduct
Create
Design
Compare
Evaluate
Display
Sequence
Monitor
Manipulate
Predict
Participate

Attitudes

Willingness to (share, participate, experiment, interact)
Pride & satisfaction
Ability to use
Appreciation
Cooperation
Supportive
Optimistic
Enthusiastic
Disciplined
Progressive

- Design and Technology Key Stage 2
  Ages 7 – 11 Scotland
  Pages 4 – 7
  Teachers Resource Book

  Materials/Equipment needed:
  Batteries
  bulbs (Red, green, amber with bulb holder)
  split pins
  paper clips
  cardboard boxes

AREA OF STUDY: TECHNOLOGY

UPPER DIVISION STANDARD V

PROJECT: Traffic Lights

wooden/correx base
wire
wire stripper
screw driver