

Wind

Key Stage 2 Thematic Unit

Supporting the Areas of Learning and **STEM**



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This Thematic Unit is for teachers of Key Stage 2 children. Schools can decide which year group will use this unit and it should be presented in a manner relevant to the age, ability and interests of the pupils.

This Thematic Units sets out a range of teaching and learning activities to support teachers in delivering the objectives of the Northern Ireland Curriculum. It also supports the STEM initiative.

Acknowledgement

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Blowing a Storm

Planning together for the theme.

Recognising that the energy of the wind can be used in many ways.

Finding out how air vibrations can make a sound.

Investigating how changes in air vibrations cause changes in pitch.

Measuring, recording and analysing changes in pitch.

Designing and making wind instruments.

Creating poetry and music to reflect the effects of wind.

SECTION 1



Activity 1

Planning Together

New Words
and Phrases

research
investigate
explore
mind map
prioritise

Suggested Learning Intentions

We are learning to:

- plan a topic and think about key questions;
- prioritise questions about what we want to learn; and
- work effectively with others.

Creating a Mind Map and Planning Board

Introduce the topic of Wind to the children. Present the children with the question, 'What does the wind do?'. Give the children some thinking time, and encourage them to share other ideas for questions that they would like to have answered about 'wind'. Suggestions may include:

- What things use the wind to make them work? or
- What types of wind are there?

When they have created a list of suitable questions, get the children to decide on the ones that are the most important or most relevant. If you find that the children have thought of a wide range of questions, use **Zone of Relevance*** as a tool to decide which points are the most relevant.

In small groups, ask the children to create a **Mind Map*** about one of the questions, such as the one shown on the next page. Give each group a large page and some felt-tip markers with which to create their mind maps. When the children have completed these, you may wish to collate the main ideas on a whole-class version of the wind mind map. In an area of the classroom, or on a large display board, display this planning work, which can then be revisited and added to throughout the theme.

* see *Active Learning and Teaching Methods for Key Stages 1&2*

CONNECTED LEARNING OPPORTUNITIES

Use the planning board to encourage the children to think about what they would like to learn in relation to the theme of 'Wind', in all of the Areas of Learning.

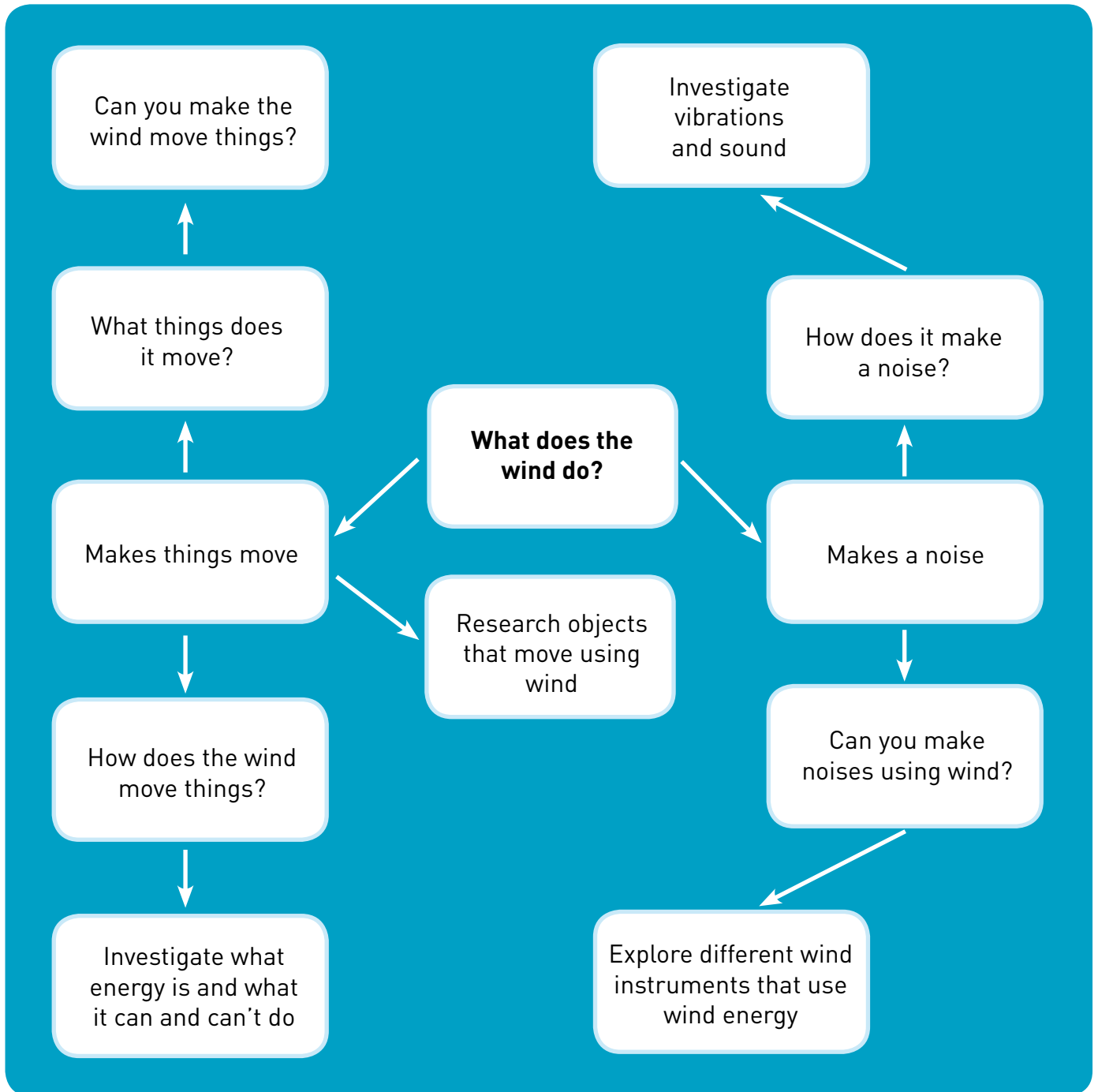
ASSESSMENT FOR LEARNING OPPORTUNITIES

Transferable Learning!

Will the children be able to use the learning intentions in different situations? Do the learning intentions describe the *new learning* or the activity itself?



Example of a Wind Mind Map



Activity 2

Making a Storm Recipe

New Words and Phrases

structure
patterns
haiku
opposite
compose

Suggested Learning Intentions

We are learning to:

- develop a vocabulary to describe wind;
- use a numerical structure to create a poem; and
- be creative with language and composition to describe a 'storm'.

Storm Bingo

Use a suitable search engine or CD Rom to locate a video clip of a storm, a tornado or a hurricane for the children to watch. Provide the children with small whiteboards or sheets of paper on which they must record six words that describe the storm they are watching. When the video clip has ended tell the children that they are going to play a game of 'Storm Bingo'. Read out wind-related words to the children, which may include:

- windy;
- stormy;
- blowy;
- rough;
- breezy;
- icy.

As you read each word, ask the children to tick it if they have it in their list also. When any child has ticked off all six of their words, they must call out 'Bingo!'. When several of the children have had an opportunity to call, 'Bingo!', collate the list of describing words on the board and add any more words that the children have thought of to the list. Discuss the list of words with the children, for example:

- Can the words be divided into categories? How?
- What about categorising by wind strength?
- What about grouping them by type of word, such as verbs and adjectives?
- What words are the opposites of the words on the list?

Display or distribute a copy of the Beaufort Scale for the children to see (you may find a good example of this on the Internet). Use the pictures and symbols to extend the list of wind vocabulary. Read out several examples of a haiku poem and/or provide the children with copies of a selection of haiku to read. In groups, ask the children to discuss what they think the poems have in common and if they can see a pattern. When the children have discovered that the poems have the same structure of five syllables, seven syllables, and five syllables in each line, encourage discussion about how this is effective.

Using the list of wind-related words, including the opposites that have been collated, ask each child, working individually or in pairs, to compose a haiku poem about the wind.

CONNECTED LEARNING OPPORTUNITIES

Language and Literacy

Writing a Haiku poem about Wind.

The Arts

Create 'Windy day' artwork or photography and manipulate the images using ICT.

Using ICT

Use a music technology package, such as 'Garageband' or 'Audacity' to create music or podcasts using wind sounds.

Activity 3

Changing Wind Into Sound (1)

Blow a Bottle

New Words and Phrases

prediction
theory
measure
equipment
vibration
scale
investigation
fair test
evidence
air column
volume
record
results
analyse
conclusion

Suggested Learning Intentions

We are learning to:

- understand that moving air vibrates and this vibration can be used to make sounds;
- measure accurately;
- explain the relationship between sound and volume of water;
- generate and test ideas;
- make a fair test; and
- work with others in planning and investigating.

Good Vibrations

In this activity, children will learn about 'pitch' by investigating sounds made by blowing into bottles holding varying amounts of water.

Take an empty bottle, labelled 'Bottle 1', and blow into it to make a noise. Ask the children to describe what is happening. Prompt them to think about what the air being blown in is doing – it is vibrating. This is called *pitch*.

The vibrations of the moving air make the sound.

Ask the children to make suggestions about how they could change the pitch of the sound from the bottle. When they have had a chance to give their thoughts, demonstrate for them how the pitch will change when water is added to the bottle. Take another bottle, of the same type and size as the empty one, and label it 'Bottle 2'. Pour in a quantity of water and blow to make a noise. Then blow into the empty bottle and ask them to compare the two sounds that are made.

The empty bottle will have the lowest note.

In pairs or small groups, ask the children to think about why this is happening. When they have had time to discuss, make a list of their suggestions before revealing the correct answer.

The volume of air in the bottle is changed by adding water.

Take another bottle, again the same type and size as the others, and label it 'Bottle 3'. Pour in double the amount of water. Before you blow into Bottle 3, ask the children to predict if the sound will be higher or lower than Bottle 2. Ask the children to stand up if they think it will be higher, and to stay seated if they think it will be lower. Blow into the bottle to see whose predictions were correct. Compare the pitch of the note from Bottle 3 with the others and ask the children to discuss whether they see a pattern emerging.

When there is more water, the pitch (note) gets higher.

CONNECTED LEARNING OPPORTUNITIES

Mathematics and Numeracy

Create bar charts showing how pitch is affected by the volume of water in a bottle.

The Arts

Create a piece of music using homemade wind instruments.

Language and Literacy

Write reports about investigation of pitch and vibrations.

ASSESSMENT FOR LEARNING OPPORTUNITIES

Recognising What 'Good' Looks Like!

Help children to manage their own work and become independent learners by enabling them to recognise what 'good' looks like in any given learning context.

Challenge Time

Set the children a group challenge of investigating changes in pitch and its relation to the volume of water with another five bottles. At the end of their investigation, they should aim to have the following:

- a working instrument with eight different notes arranged from higher to lower;
- evidence that the theory, that more water in a bottle means a higher note, is correct or not; and
- a reason **why** more water in the bottle means that a higher note will be produced.

Each group will need the following equipment:

- 8 plastic bottles (of the same size and type);
- 1 jug of water;
- 1 measuring cylinder or jug;
- 1 funnel; and
- 1 record sheet (Resource A).

Note: If you are able, work out in advance the amount of water required for the eight bottles to create an octave and how much water is needed each time to create the next note on the scale. You could use a piano, keyboard, tuner or your ear to work out the notes of the scale. Alternatively, if you are not confident with music, you could get the children to make eight notes, simply ranging from lowest to highest.

Before they begin, discuss what a fair test is with the children. Encourage them to decide in their group how they can ensure that their test is fair. They will need to consider factors such as:

- the size, shape and material of the bottles used;
- who blows into the bottles each time (should it be the same person); and
- the force of the air being blown into the bottle.

Allow the children to set up and carry out their investigation, recording their results each time on the record sheet in Resource A.

Let's Analyse

When all of the groups have had the opportunity to complete their investigation, they record their results and discuss their findings in their groups. Ask each group in turn to play the 'scale' that they have made. Keep a few examples of these bottle instruments for use in Activity 5, 'A Storm Symphony'. Next, ask the groups whether they have found out if the theory that more water in a bottle means a higher note, is correct.

When they have come to agreement that it is, in fact, true, enquire whether they have worked out the reason why that pattern occurs. After discussion of the children's ideas, explain the reasons to them:

The air in the bottle is in the 'air column'. This is the air that vibrates. The number of vibrations in the air column causes the note to be lower or higher.

SO

As more water is added, the air column gets shorter. This means that when you blow into it, the smaller amount of air in there will vibrate more.

SO

The more vibrations, the higher the pitch (note).



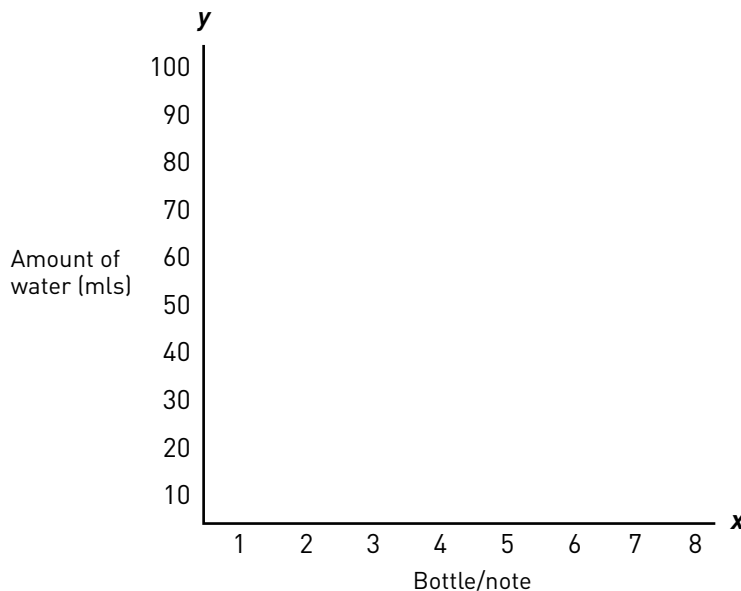
Extension

The children could use lengths of dowel rod to make a container for the eight bottles. They should work out what the length, height and width of the container should be, so that the bottles could be contained, but still be able to be played.



If you used an actual scale for the range of notes in this activity, get the children to plot their results on a graph such as a bar chart or a scatter graph. On the **x** axis, get the children to label the notes (or Bottle 1, 2, 3 and so on). On the **y** axis, get them to label the amount of water that was in each bottle.

When they have completed this graph, ask them to write statements to describe their conclusions, based on the evidence from their results.



Activity 4

Changing Wind into Sound (2)

Blow a Straw

New Words and Phrases

measure
equipment
vibration
record
scale
investigation
prediction
evidence

Suggested Learning Intentions

We are learning to:

- understand that moving air vibrates and this vibration can be used to make musical notes;
- explain the relationship between sound and the length of a pipe;
- measure accurately;
- generate and test ideas; and
- work with others in planning and investigating.

Make a Pipe Instrument

In this activity, children will each create a wind instrument from different lengths of plastic straws. The children will need to have accurate measuring skills in order to cut the straws to the required lengths.

In pairs, provide the children with the following materials:

- approximately 20 plastic straws;
- adhesive tape;
- paper clips;
- blutac;
- scissors;
- ruler (showing cm and mm);
- two cardboard strips, approximately 30 cm in length; and
- pencil and paper (to work out calculations).

Remind the children of what they learned in the previous activity; that the air in the air column vibrates and makes a sound, and that when the air column is smaller, a sound with a higher pitch is produced. For these reasons, they will need to be very accurate when they are cutting straws to specific lengths in order to get the right

sounds. Ask the children to work in their pairs to measure and cut straws into the following lengths:

- 4 cm
- 4.2 cm
- 4.8 cm
- 5.3 cm
- 6 cm
- 6.4 cm
- 7.1 cm
- 8 cm

These straws will be the 'pipes' of Instrument 1.

Next, tell the children that they need to measure and cut straws that are **double** the length of each of the above measurements. They may use a pencil and paper to work out these measurements, or a calculator if that is more appropriate. These will be the 'pipes' of Instrument 2.

When they have done this, they now need to block one end of each straw for both instruments. They should squeeze the two ends of the straw together and seal it closed with adhesive tape. Now, ask the children to cut fifteen 2 cm lengths of straw. These will be used as 'spacers' between the pipes on both instruments.

CONNECTED LEARNING OPPORTUNITIES

The Arts

Listen to pipe music from around the world. Create paintings using various colours of watered-down paint blown across paper with straw.

Mathematics and Numeracy

Measure and estimate.

ASSESSMENT FOR LEARNING OPPORTUNITIES

Giving Children Responsibility!

Allow pupils to manage their own learning. This will help them to raise the quality of their work and promote active learning.



Finally, get the children to arrange their lengths of straw in order of height, from shortest to longest. They need to stick these in a row onto their strip of cardboard, ensuring that the sealed end of each straw is at the bottom. They should space out each straw by placing one of the 2 cm lengths of straw between each musical straw. When finished, the children can play their instruments.

What Have You Discovered?

After the children have played their instruments, encourage the following discussion:

- What do you hear when you blow from the shortest to the longest pipe?
- Why is there a change in pitch from high to low?
- What is the connection between the sound of each note and the length of the straw?
- Can the pipes be played high and loud? High and soft? Low and loud? Low and soft?
- Can they define the terms high and low pitch? Loud and soft sound?

Ask the children to make a plan drawing of their instrument with the measurements added. Using peer assessment such as **Two Stars and a Wish***, get the children to evaluate this activity. What went well? What could be improved if you did it again?

Extension

Ask children if they can see any pattern between the length of the pipe and the pitch? Can they give reasons for any patterns that emerge?

In each pair, the lengths of straws on the smaller instrument are double the lengths of the longer instrument.

What difference does this make?

* see *Active Learning and Teaching Methods for Key Stages 1&2*

Activity 5

A Storm Symphony

**New Words
and Phrases**
composer
instrument
performance
composition
represent
sound-effects

Suggested Learning Intentions

We are learning to:

- analyse and identify patterns and instruments used by the composer to create the impression of a storm;
- help create a class composition developing musical ideas and different musical effects;
- improvise and maintain different musical parts of the class performance; and
- make improvements on individual and group performance.

Let the children listen to some pieces of music which depict storms or wind, for example, 'Summer' from 'The Four Seasons' by Vivaldi. When the children have listened to the storm music, ask them to name any instruments that they recognised.

Vivaldi was a Baroque composer and wrote this piece in 1723. He didn't have many different sorts of instruments available to him. Most music written at this time was for stringed instruments. Vivaldi wrote this piece of music for violins, violas and a harpsichord continuo. The harpsichord was an early version of the piano but the strings inside it were plucked, so it sounds different to a piano. It is a very noticeable sound when you listen to the music. The harpsichord was used to 'thicken out' the harmonies in the music and to make it sound fuller and richer.

The main instrument in 'The Four Seasons' is a solo violin, and it is used to create sounds to represent the different seasons. Some examples of how the violin does this are:

- **Tremolo** – means 'trembling' (shaking). The violin does this by repeating notes very quickly. This represents **thunder** in this piece.
- **Glissando** – a sliding sound created by sliding the finger up the fingerboard of the instrument. This represents **lightning** in this piece.
- **Minor key** – when the storm begins, the music changes to a minor key. The music sounds scarier and dark.
- **Trills** – a very fast alternation between two notes. This represents the birds.

Divide the class into three groups. Give each group three pages with one of the following headings on each:

- The Beginning of the Storm
- The Middle of the Storm
- The End of the Storm

Play each stage of the storm and ask the children to write down their ideas about what the composer is doing to make the sound-effects. Collate the ideas and add to the list if there are gaps in the feedback.

CONNECTED LEARNING OPPORTUNITIES

The Arts

Create, perform and record music.

Language and Literacy

Research a composer and create a fact-file about their life and career.

ASSESSMENT FOR LEARNING OPPORTUNITIES

Giving Praise

Praise the process rather than the ability. This will help foster a 'growth mindset' rather than a 'fixed mindset'.

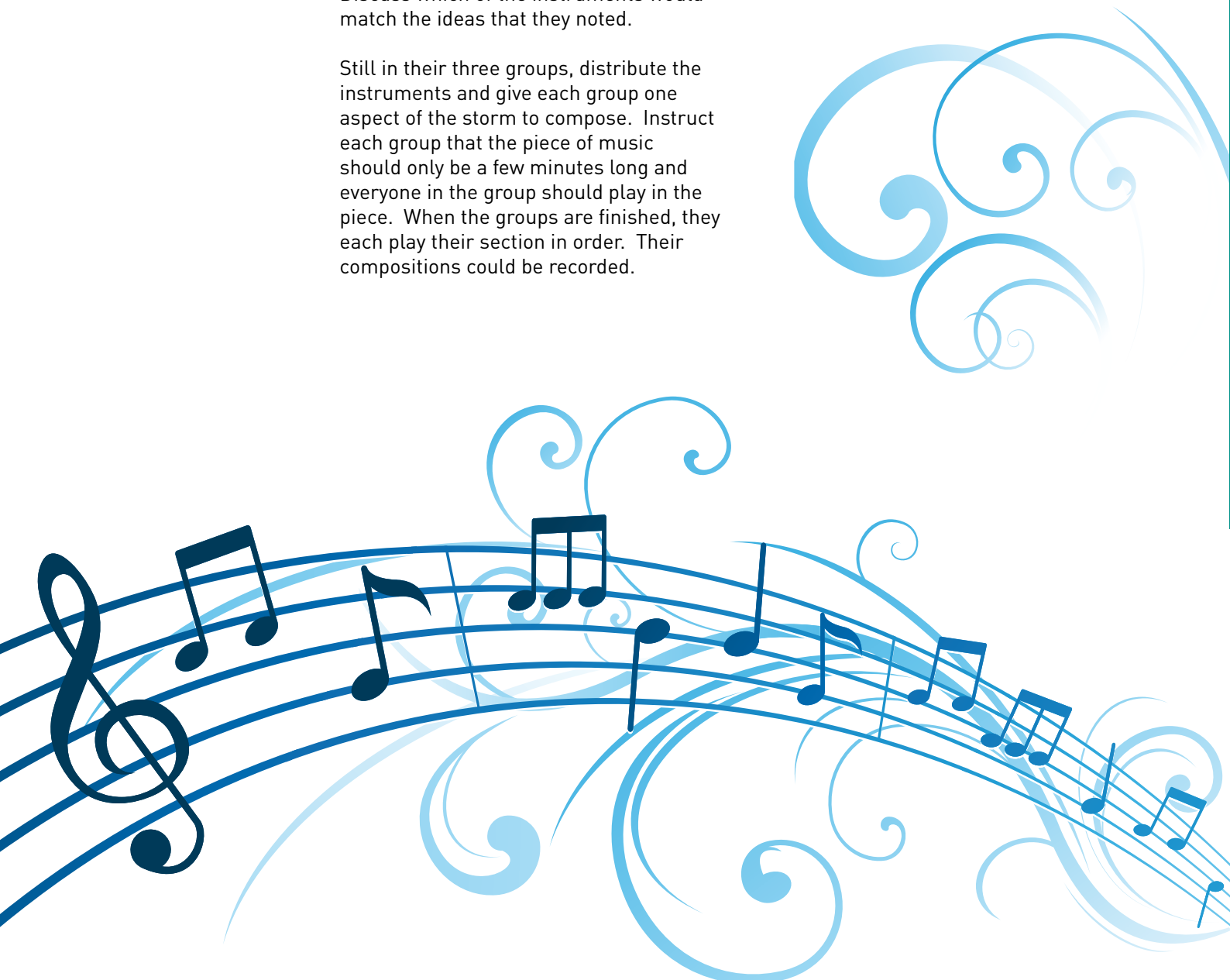
After this discussion, allow the class to view a range of musical instruments if you have these available, so that children can use them in composing their storm symphony. The instruments can include the wind bottles and pipes the class have already made.

Discuss and make notes on the progression of the storm in each section of the composition (beginning, middle and end). For example, does the beginning of the storm have calm music? What sounds represent a light wind or raindrops? Discuss which of the instruments would match the ideas that they noted.

Still in their three groups, distribute the instruments and give each group one aspect of the storm to compose. Instruct each group that the piece of music should only be a few minutes long and everyone in the group should play in the piece. When the groups are finished, they each play their section in order. Their compositions could be recorded.

Use a strategy such as a **Dartboard Evaluation*** to self assess how they got on in the activity and whether they enjoyed it or not. Alternatively, give each pupil a copy of Resource B, Storm Symphony Evaluation, so they can evaluate their performance. You may also like to get the children to perform their composition at a school assembly.

* see *Active Learning and Teaching Methods for Key Stages 1&2*



Go With the Wind

Creating a set of safe rules for design and technology work.

Investigating, designing and creating wind-related projects.

Making accurate designs based on wind as an energy source.

Applying knowledge of materials and tools to the making of a model.

Constructing and testing working models – a kite, a land yacht and a windmill.

Evaluating what has been designed and made.

Making comparisons between the original and the final design.

SECTION 2



Activity 6

Create a Safety Code

New Words and Phrases

health and
safety
design and
technology
tools
materials
appropriate
behaviour
safe manner
precautions
contract
responsibility

Suggested Learning Intentions

We are learning to:

- understand the need for safety when working with various tools and materials; and
- take responsibility for our own safety and the safety of others.

Within this section, children will use a variety of design and technology methods when completing the activities. It is essential that all children and classroom adults have a clear understanding of:

- what is appropriate, acceptable and safe behaviour when using the various tools and materials involved;
- how to select the correct tool or material for a specific job;
- how to correctly and safely use the tools and materials; and
- how to safely and correctly tidy away and store tools and materials.

Talk with the children about health and safety in the classroom and what this entails on a day to day basis. When they have given some suggestions, ask them to think about what this would look like in the 'design and technology' classroom. Ask the class the prompt questions listed on the next page and discuss and agree the correct answer, which will form part of the classroom 'Safety Code'.

It is a good idea to turn the 'Safety Code' into a contract that each child can sign, for example:

Classroom Safety Code

My teacher has gone over these safety practices with me. These rules are to protect my safety and the safety of my classmates. **I understand that I am responsible for my own safety** and to ensure it, I agree to follow these safety rules at all times.

ABC - Always Be Careful

Pupil Signature

Date

CONNECTED LEARNING OPPORTUNITIES

The Arts

Dramatise what could go wrong if children do not display appropriate and acceptable behaviour when using tools.

Personal Development and Mutual Understanding

Create a 'Health and Safety in the Classroom' poster.

ASSESSMENT FOR LEARNING OPPORTUNITIES

Revisit the 'Safety Code' rules when using materials and tools and get the children to grade themselves on how well they feel they are following the rules.



Prompt Question:	Examples of safety rules
Can you go ahead and make something if you don't know how to?	I must receive instruction on proper use <i>and</i> permission from my teacher before using any tools or materials.
How might your appearance and what you wear affect safety in technology?	I must ensure that no loose clothing, jewellery or hair could be the cause of an accident. I should wear appropriate shoes.
How might your behaviour affect safety in technology?	Running, playing, pushing or throwing objects is strictly not allowed.
How might you cause an accident if you have to move holding a sharp tool?	I must carry and handle tools in a safe manner. I will always cut away from others or myself. Tools should be carried pointed down and slightly behind you. Conversations are distractions that may cause accidents.
Why should you keep your work area tidy?	I must clean up cuttings or scraps of material on the floor where they may cause someone to slip or fall. I will put all tools and materials away when finished using them. Objects left on the edge of a table may be hazardous.
What should you do if something does happen that might cause an accident?	I must report to my teacher immediately any hazards, or if I see something happening that goes against safe practice. I must report all accidents to my teacher immediately, no matter how slight.
What special precautions should we have at the gluing table?	Safety glasses and gloves must be worn at all times at the gluing table. Only two people at a time allowed at this table.

Activity 7

Kites

New Words and Phrases

accurate
measurement
symmetry
sequence
billow
flexibility

Suggested Learning Intentions

We are learning to:

- plan a topic and think about key questions;
- make observations on how a kite is powered by the wind;
- research, design and make a model kite; and
- investigate symmetry.

Explore

Introduce the topic of 'kites' to the children. Ask the children what they think is the purpose of a kite. When you buy a kite, what do you want it to be able to do?

Responses will probably include 'fly', 'stay up' or 'use the wind to move in the sky'.

As a homework task, get the children to do some research on kites, to find out:

- How are kites built?
- What shapes do kites come in?
- What materials are used for making kites?

In school, allow children time to share their findings. They could create a class display about this or add some of their information to your planning board.

Kites and Symmetry

Before beginning, discuss 'symmetry' with the children. Depending on their prior knowledge, they may need some revision of symmetry. Show the children a selection of kites (either real or photographs/drawings).

Discuss with the children why they think a kite would need to have symmetry and make a list of their suggestions, these may include:

- **Sail shape** – the shape of the kite needs to be exactly the same on each side. If it is not, it won't fly straight.
- **Weight** – if this is uneven, it may make the kite tip to one side.
- **Flexibility** – if one side of the kite is bending more than the other, it may cause the kite to loop the loop out of control.
- **Billow** – the amount of 'billow' is caused by the kite material not being attached strongly enough on one side of the kite. This will make the kite unable to fly smoothly.

Make and Test a Kite

Give each pupil two sheets of A4 paper to make a kite. Get them to place one page in front of them (landscape) and mark the measurements shown in Figure 1. Then, using a ruler accurately draw folding-lines as shown. Remind the children that they need to be very careful with their measuring and folding so that their kite is symmetrical.

CONNECTED LEARNING OPPORTUNITIES

Mathematics and Numeracy

Investigate lines of symmetry in regular and irregular shapes.

Language and Literacy

Creative writing about flying a kite and an adventure that it could lead to.

The Arts

Music and dance related to kites. Printing kite patterns onto various textiles.

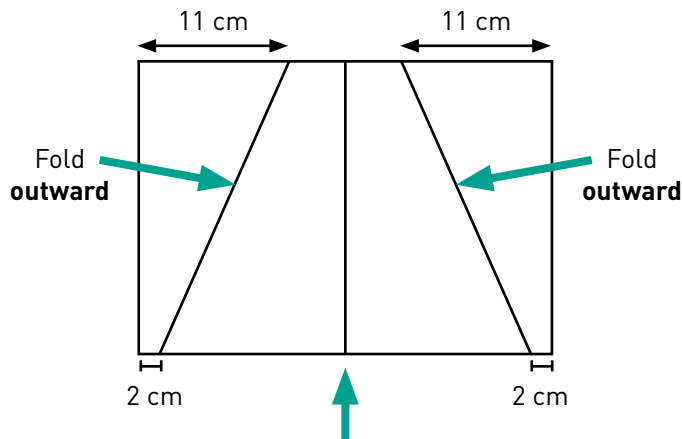
ASSESSMENT FOR LEARNING OPPORTUNITIES

WILF! (What I'm Looking For)

With agreement from the children, create a WILF sheet for making a kite or for investigating types of kites and get them to self-assess at the end of the activity.



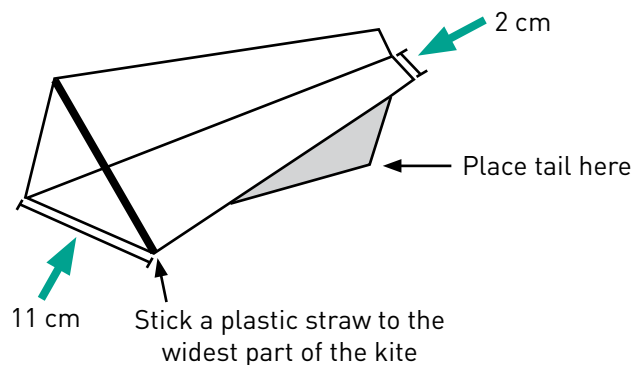
Figure 1



Folding line is at the exact midpoint of the page. (Fold **inward**)

Allow the children to colour and decorate the kite and fold the sheet to make their kite.

Side view of kite



On the second page, draw lines 2 cm apart and accurately cut the page into strips. Join the strips together, lengthways, to create a long tail. Attach the tail to the base of the kite. Finally, join a string to the kite by tying the string to a paper clip and slipping the clip on to the folded line at the base of the kite. Allow each child two attempts at flying their kite. Encourage them to think about how they could improve their design if the kite is not flying well. For example, do they need to reposition the paperclip holding the tail? Take photographs of the kites flying.

Investigation Time!

Using the same size and measurements of kite as before, the children create new kites, but this time using different materials. They could use plastic, light or heavy paper, or card. They will then test out each kite to see how well it flies, how long it stays in the air and so on. Remember to take photographs throughout the investigation. The children may need to have a stopwatch to accurately record the time the kite stayed in the air. They should record their findings in a table, like the example below:

Type of Material	Comments on the Material	Comments on the Flight of the Kite	Time in Air (secs)
plastic	A strong material	It flew high and stayed in the air for 10 seconds.	
light paper			

This time, the children use the same style and materials of kite but change the size. However, they need to keep the ratio of the parts the same. So, if they double the size of the page from A4 to A3, they should also double the measurements. Again, get the children to test out and record their findings in a table.

Type of Material	Comments on the Material	Comments on the Flight of the Kite	Comments on the Size of the Kite	Time in Air (secs)
plastic	A strong material	It flew high and stayed in the air for 10 seconds.	20 cm	
light paper				



When they have all completed the tasks, allow the groups time to discuss their findings with each other. Ask them to think about the factors that affect how well the kite flies. Summarise these ideas with the class and come to a list of agreed statements.

Extension

Upload the photographs that you took throughout the activities onto a folder on the computer where the children can access them. When the children have access to the computer, ask them to choose photos that they would like to use and copy these onto a Word document. They could then sort and sequence these photographs to create a report entitled, 'How We Made our Kites'.



Activity 8

A Wind-Powered Vehicle

**New Words
and Phrases**
material
accurate
measurement
symmetry
sequence
wind-powered

Suggested Learning Intentions

We are learning to:

- research, design, make and test a land yacht;
- understand how friction affects speed;
- choose suitable components and materials;
- work safely with tools;
- work effectively as a group; and
- carry out reflective evaluation.

Build and Race a Land Yacht

Use a suitable search engine to locate various images of land yachts, a wind-powered vehicle. Arrange the class into racing 'companies' to design, build and race a land yacht (the one they build will be a small, unmanned land yacht). Looking at an image of one of these vehicles, discuss how it is powered by the wind and how this affects the types of materials that will be used. Lead the children to understanding that the materials used to make both the sail and the frame need to have specific properties that will allow the land yacht to work well such as being lightweight and friction-free.



Teacher Preparation

The following preparation must be carried out before the children begin the design of their land yacht.

1. Arrange the classroom so that all of the tools and materials can be used safely. Alternatively, allow just one group at a time to complete the challenge, supervised by yourself or another adult.
2. Recap on the 'Classroom Safety Code' rules from Activity 6.
3. Gather the following materials and tools:

- card
- corriflute
- 4 mm dowel rod
- 10 mm² lengths of wood
- elastic bands
- pegs
- different types of paper
- wheels
- measuring tape
- scissors
- junior hacksaw
- hole punch
- cutting mat
- glue gun
- straws
- blutac
- adhesive tape
- pipe cleaners
- desk fan
- extension lead

CONNECTED LEARNING OPPORTUNITIES

Using ICT

Use plasticine to make a model of a land yacht and use a digital camera to take still images. Manipulate the still images with appropriate software to create a simple animation.

The World Around Us

Investigate materials and their properties.

ASSESSMENT FOR LEARNING OPPORTUNITIES

Peer Assessment!

Each group can assess each other on how well they participated in the group work.



- Set up the track where children will test out their wind yacht. It should be two metres wide and at least four metres long. In order to keep the vehicle within the two metre-wide boundary, the children need to work out how to make the wheels run straight on their vehicle.

Design and Make

Give each group a Design Challenge sheet (Resource C). Read through the sheet with the children to ensure they all understand the task. You may also find it useful to talk through the 'Talking about Thinking' statements for 'Working with Others', 'Self-Management' and/or 'Being Creative', to remind children of the qualities and skills that they need in the task. These statements are in the Introduction booklet and can also be downloaded from www.nicurriculum.org.uk

Give the children some planning time. Allow them to look at the images of land yachts to note things such as the shape and scale of the sails, the shape of the base and the number of wheels. Encourage them to create annotated plans, with measurements if possible, and to make a list of all of the materials that they will need.

If appropriate, set a time limit of one hour for building the land yacht. As they are building, remind the children that a designer would often test parts of a design out piece by piece. Get the children to consider testing:

- **the wheels** – do they run smoothly, do they go straight or turn?
- **the sails** – are they light enough for the base to be able to move fast, but strong enough to be able to handle the wind?

If any of the parts don't work as expected during testing, ask children to think about how they can correct the fault.

Race!

When all of the groups have had time to make and complete their models, it is time to race them. You will need to use a desk fan to create the wind for the vehicles. Decide with the children on a suitable place to situate the fan so that each of the yachts has an equal chance of catching the wind from it.

Following the scoring criteria on the 'Design Challenge Sheet', score each group's wind yacht to see who the winner for distance is. If you race all of the wind yachts together, you can also have a winner for speed.

Evaluate

When all of the testing and recording has been completed, get each group to evaluate their design and the build of their yacht, on large sheets of paper, or in an ICT presentation. The children should consider the following questions:

- Which materials were used and why?
- What went well with the project?
- Did you encounter any problems? If so, what were they? How did you overcome them?
- How close was the finished model to the original design? What changes did you make and why?
- If you were making the model again, what would you improve in your design and its construction?
- How well did you work together as a team? Did you take turns? Did you allow everyone to make decisions? How did you manage when not everyone agreed about decisions that had to be made?

Activity 9

Make a Hand-Held Windmill

New Words and Phrases

windmill
wind turbine
wind farm
rotate
blades
generate electricity
compare and contrast
similarities and differences
template
dowel

Suggested Learning Intentions

We are learning to:

- research, design, make and test a windmill;
- choose suitable components and materials;
- work safely;
- record our findings; and
- work together as a group.

Windmills, Wind Turbines and Wind Farms



Write the words, 'windmill', 'wind turbine' and 'wind farm' on the board for the children to see. Ask the children to work with a partner to come up with a definition for each of these, for example:

- A **windmill** uses wind power for jobs such as grinding corn or pumping water;
- A **wind turbine** uses wind power to generate electricity; and
- A **wind farm** is a collection of wind turbines.

Give each pair two pages. They are going to do a 'compare and contrast' of a windmill and wind turbine. On one page they should

write down all the ways that they are the same, and on the other, they should write all the ways that they are different. To aid them in this task, provide them with some discussion questions such as:

- Do they both look modern?
- What shapes can you see in the windmill structure?
- What are they used for?

What Can a Windmill Do?

Show the class a selection of windmills (both images and shop-bought pin-wheel windmills). Ask them to discuss what features the windmills have in common and how they differ. Make a list of their suggestions. These may include:

Similarities	Differences
all have blades	number of blades
all turn in the wind	size of windmill
	height
	material

CONNECTED LEARNING OPPORTUNITIES

The World Around Us

Find out about the use of windmills and wind turbines around the world.

Using ICT

Photograph the construction and testing of the windmill at various stages to create a presentation with an added voiceover.

The Arts

Create a silhouette landscape picture of windmills against a sky.

ASSESSMENT FOR LEARNING OPPORTUNITIES

Self-Directed Learning

This involves:

- self-management
- self-monitoring
- self-regulating

When pupils are in control of learning, they are less likely to respond negatively to setbacks and challenges.

Ask the children to suggest as many uses as they can think of for a windmill, for example, as a toy, a garden decoration, in a mill to grind flour or on a wind turbine to make energy. Give each group of children a shop-bought windmill to look at. If there is any wind outside, they could take the windmills outside to see them moving. Ask them to have a look at how it is made and to think of a few good points about the design that make it good at its job, for example, do the blades turn fast in the wind, are the blades strong? Draw up a list of these good points which can then be used as success criteria when the children make their own windmills.

As well as the templates, other materials that the children may need to make their handheld windmill include:

- paper fasteners
- drawing pins
- plastic straws
- dowel
- art straws
- cotton spools
- plastic bags
- bubble wrap
- cling film
- fabric
- tinfoil
- tissue paper
- glue
- scissors
- adhesive tape
- stapler and staples
- hole-punch

Task Time



Present the children with the following task: research, plan and make a hand-held windmill that will rotate on a straw or dowel rod when placed in front of a desk fan. When the children have made their own windmills, they will then test these against the shop-bought versions.

Provide each child, or pair of children, with two windmill templates. One of these can be a copy of Resource D, Windmill Template, which you should either get the children to trace around onto cardboard or photocopy onto thin card. You will find more versions of windmill templates on the internet. The children will also need access to two shop-bought windmills so that they can test these also. Try to ensure that the windmills are of varying qualities as well as design.

Allow the children to have time to decide what materials they will use for their windmill and allow one child from each pair to collect the materials and templates they require. Remind the children about the safe use of materials. While they are making their windmill, encourage each group to test it at various stages by blowing on it to see if it is rotating smoothly and quickly, and if the parts are staying together well. If not, get them to make changes to improve the windmill.

When all of the children have had the opportunity to create their windmills, allow each pair to use a desk fan to test their windmills and record their results. Give each child a copy of Resource E to record their results. Other children can decorate their windmills while waiting for their turn.

When all of the pairs have tested their windmills and recorded their results, discuss with the class which windmills were the most successful and why? Was the choice of material a factor? Did the shape of the blades make it rotate more smoothly?

Energy and Power

Developing an understanding of what energy is and the forms that it can take.

Understanding the difference between renewable and non-renewable sources of energy and investigating the role of wind turbines.

Calculating average and total amounts of money spent on electricity and heat.

Investigating ways to save energy and money on energy bills.

Investigating the suitability of a wind turbine as a source of power in school.

Considering the implications of wind farms in a community.

SECTION 3



Activity 10

What is Energy?

New Words and Phrases

energy
created
destroyed
ability
work
form of energy
tidal
solar
renewable
non-renewable

Suggested Learning Intentions

We are learning to:

- understand what energy is;
- know where energy comes from;
- know what renewable and non-renewable energy is; and
- know how electricity is made and how it gets to our homes.

Ask the children to look around the room and give examples of where they see energy being used, or where they see energy being used when they are at home or in the street. They may respond with answers such as, lights, radiators, computers, cars or people working. Make a list of their suggestions. Next, ask the children to have a think about how they could categorise these types of energy, such as 'light energy', 'sound energy', 'movement energy' or 'heat energy'.



When they have done this, ask them to consider where the different types of energy come from, for example,

- sunlight changes into plant energy;
- food gives our body energy; and
- electricity gives a television energy.

Using all of this information, ask the children, if appropriate to their age and experience, to think of a definition for the word 'energy'. When the children have tried to define 'energy', display the following six sections of text for the children to see (do not place them in the correct order as seen below). Discuss the phrases and explain any of the words that the children do not understand.

Energy is	the ability of a person or a thing to do some kind of work.
Energy can	be changed to other forms of energy.
Energy cannot	be created or destroyed.

CONNECTED LEARNING OPPORTUNITIES

The World Around Us

Create electrical circuits. Investigate how electricity is made and how it gets to our homes.

Language and Literacy

Write a speech for or against using renewable/non-renewable energy sources.

The Arts

Dramatise the different types of energy – create movements to represent the different types of energy.

ASSESSMENT FOR LEARNING OPPORTUNITIES

KWL!

Get the children to use a **KWL grid*** to record what they know about renewable energy, what they want to know, and what they have learned.

* see *Active Learning and Teaching Methods for Key Stages 1&2*

With the children in mixed ability groups, give out a large sheet of paper and markers to each group. Ask the groups to match the six phrases into three statements and write these on the page. Reveal the correct answers to the children and discuss with them, in a manner appropriate to their age and experience, what is meant by the phrases.

Energy is the ability of a person or a thing to do work because when work is done on or by an object, it gains or loses energy.

Energy is changed to other forms of energy when, for example:

- electricity is used to light a bulb, which turns electrical energy into light and heat energy; or
- chemical energy, stored as fuel, makes a car work and this creates movement energy and heat energy.

Energy cannot be created or destroyed, because:

- a person or thing always needs to get energy from somewhere else first, before it can do its work; and
- every time a person or thing uses energy, it transforms into another type of energy.

Renewable Energy



The main types of energy that we use everyday are electricity, fuel for transport and heat for homes. Ask the children to consider where this energy comes from. Each time they give a suggestion, for

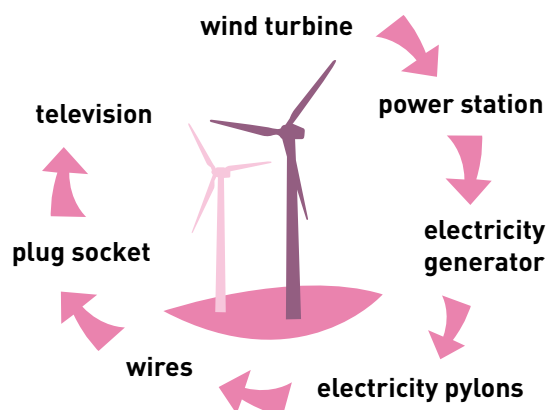
example, 'we get it from the electricity company', prompt them to think further about where that energy comes from. Energy cannot be created from nothing. We need a source that will allow us to change it into electricity or petrol for example.

If the children do not already know, ask them to discuss with a partner what they think the words 'renewable' and 'non-renewable' mean, in relation to energy. Lead them to understand that renewable sources of energy will never run out and can be used over and over again, whereas non-renewable energy sources of energy *will* run out.

Give the children the following list and ask them to decide, with a partner, whether it is a renewable or non-renewable source of energy:

- coal
- wind
- oil
- waves (tidal)
- gas
- sunlight (solar)
- peat or turf
- underground heat (geothermal)
- wood.

Discuss the answers with the children and discuss with them how we need to try and move towards renewable sources of energy as the non-renewable ones are running out. To extend this task, you may like to get the children to research and sequence (in words or in pictures) the journey of energy from a wind turbine to their television, for example:



Activity 11

How Much Money Does our School Spend on Energy?

New Words and Phrases

bills

energy

consumption

average

calculate

quarterly

monthly

saving energy

Suggested Learning Intentions

We are learning to:

- calculate energy costs from bills;
- work out averages;
- work together to investigate, calculate and present our findings;
- appreciate how we can make a difference by taking steps to save energy; and
- use persuasive language to get others to save energy.

Money, Money, Money

If possible, get copies of the school's energy bills (electricity and heat) for the previous year (if the bill for the year is not available, you can use the month or quarter). If these are not available, you could use your own electricity and heat bills if that is appropriate. Photocopy the relevant information for the children so that each small group has a copy to work from. Tell the children that their task is to calculate and present information on how much money is spent on energy in the school in one year. They could complete this activity in groups, or work together as a class.

Before the children begin, discuss the following points with them:

- Should they base their calculations on averages? For example, will they spread the year's energy use over twelve months or should they exclude school holidays?
- How can they find out the average?

Remind the children to check if the bills are monthly, quarterly or yearly. If they only have one month's bills available, they should

work out the average by multiplying the amount shown on the bill by the number of months in the year that the school is open (or by twelve if that is what they decide).

Provide the children with calculators and paper on which to do their calculations. You may wish to provide them with 'investigation' questions, around which they can base their findings, for example:

- What is the average monthly overall energy cost?
- What is the average monthly electricity cost?
- What is the average monthly heating cost?
- Which month has the greatest overall **actual** energy cost?
- Does the school spend more money on electricity or on heat?
- What factors might cause some months to have higher heating costs than others?

CONNECTED LEARNING OPPORTUNITIES

Language and Literacy

Look at persuasive language as used in advertisements.

Mathematics and Numeracy

Calculate averages.

The World Around Us

Look at the invention of electricity and the invention of the light bulb.

Personal Development and Mutual Understanding

Research other countries around the world who do not have access to the energy sources we enjoy.

ASSESSMENT FOR LEARNING OPPORTUNITIES

Self and Peer Assessment!

Use the 'Talking about Thinking' texts to allow the children to create success criteria for working effectively in a group.

When the children have had time to complete their investigation, allow them time to create a presentation of their information. They may wish to make a poster, create graphs showing month by month what the energy costs are or make an ICT presentation.

Do We Waste Energy?

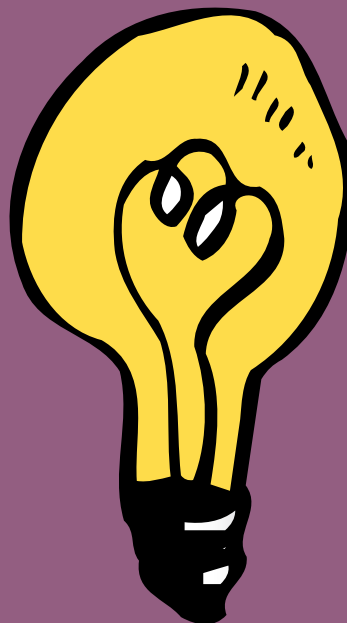
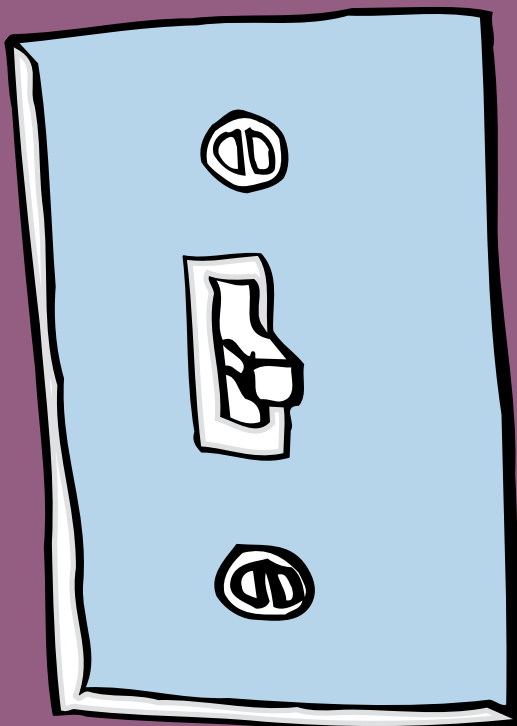
When the children have presented their information, discuss with the children whether they are surprised about how much money is spent on energy in the school. Get the children to prepare some questions for other teachers and the principal, about what resources the school would like to buy, but does not have enough money. A few of the children ask the questions and create a list of things that are needed. The children could look at some educational catalogues to see the prices of these resources.

Next, ask the children to think of ways that everyone in the school could help to save energy, and in this way save money for extra resources, for example:

- turn off lights when it is a sunny day or when you leave the room;
- close windows when the heat is on;
- close doors to keep heat in;
- turn off computers if no one is using them; and
- make sure that televisions and other equipment are not left on standby.

Get the children to design A3 posters on saving energy. These could be displayed throughout the school. Look at other examples of posters and advertisements to discuss with the children how they can make their posters more effective by using persuasive language and eye-catching designs and slogans.

Switch off!



Activity 12

Turbines and Wind Farms

New Words and Phrases

coordinates
grid references
engineer
friction
gears
estimate
measure

Suggested Learning Intentions

We are learning to:

- locate things using maps and grid references;
- carry out independent research to locate information about windmills, wind turbines and wind farms;
- understand how a wind turbine changes wind power into electricity;
- understand how gears change speed; and
- understand how friction affects the speed of rotating blades.

Provide the children with a copy of an outline map of Northern Ireland (or of Ireland if you prefer). You can find a range of Ordnance Survey maps free of charge using 'NIMaps', which can be accessed at www.nimaps.co.uk or through LearningNI.

Children use the Internet to research wind farms in Northern Ireland. Using Ordnance Survey maps, ask the children to locate where the wind farms are in Northern Ireland, for example:

- Slieve Rushden;
- Bessy Bell;
- Owenreagh;
- Rigged Hill;
- Corkey;
- Elliot's Hill; and
- Wolf Bog.

When they have located several wind farms, ask the children to estimate where these places are on their copy of the outline map.

Depending on the age and experience of the children, they could research each of the windmills and record this information in the table in Resource F, Wind Farms in Northern Ireland. If possible, the children should record the following information in the table:

- The name of the wind farm;
- Where the wind farm is;
- The grid references for the wind farm;
- Whether it is on high or low ground;
- When the wind farm opened;
- How many wind turbines are at the wind farm; and
- The approximate distance between each wind turbine at each wind farm.

If the children do not already know how, you should show them how to read the grid references on an Ordnance Survey map and also how to tell if land is high or low by looking at the map.

CONNECTED LEARNING OPPORTUNITIES

The World Around Us

Find out about the features of a map.

Physical Education

Use maps to complete an orienteering course.

ASSESSMENT FOR LEARNING OPPORTUNITIES

Formative Feedback

Pupils need to know what counts as 'good work'. Give informal, interactive and timely comments.

How Does a Wind Turbine Work?

If you can, purchase small desk-top models of wind turbines, enough for one per small group of pupils. This exercise will provide the children with an excellent opportunity to investigate practically how a wind turbine works.



Once the children have built and tested their wind turbines with a desk fan, there is the opportunity to extend the learning experiences to a study of the following:

- Discuss how the models could be improved. Explain to the children what 'friction' is and how this can be lessened by using a lubricant (in this case, oil) on the fan. Discuss where the oil should be applied on the model and why. Get the children to rebuild the model using oil and compare the results.
- Investigate different substances that could be used as a lubricant. Could they use washing-up liquid or soap?
- Look at the sizes of the gear wheels on the model. Explain why the large gear wheel runs into the small gear wheel and the small gear wheel runs into the generator. The small gear wheel revolves at a much higher speed and the faster speed generates more electricity.

A Visit to a Wind Farm



As an extension to the theme, you may be able to arrange a visit to a wind farm. In order to do this, you should use a suitable search engine to find the owners of the estate or land on which the wind farm is built. By contacting these people, you may be able to find out which energy provider owns the wind farm.

Alternatively, it may be useful to contact Northern Ireland Electricity headquarters for advice. Some energy providers do have the resources to lead a guided tour around a wind farm for school children, perhaps with an engineer who can speak to the children about what happens at a wind farm and how it works. They may even be able to take groups of children inside one of the turbines and talk to them about the various pieces of equipment. If you would like to do this, contact the energy provider in advance, so they can carry out any necessary risk assessments prior to the visit.

Alternatively, you could visit an 'eco-centre' with a wind turbine or arrange for a representative from a firm that deals with wind energy to talk to the class.



Examples of Activities to Undertake at a Wind Farm

A visit to a wind farm can present opportunities, not just to find out about how electricity is generated and how a wind farm works, but also to complete activities such as:

- identifying features in the habitat surrounding the wind turbines/wind farm;
- using Ordnance Survey maps to compare features on the map with real features of a landscape;
- estimating and measuring distances such as those between each turbine;
- using various methods to work out the height of the wind turbines;
- using a stopwatch to time the rotation of blades and calculate their speed; and
- using an anemometer to work out wind speed and direction.

Activity 13

Is a Wind Turbine Suitable for Us?

New Words and Phrases

potential site
obstacles
weather survey
suitable
controversy
issue
pros and cons
debate
scenario
opinion
viewpoint

Suggested Learning Intentions

We are learning to:

- consider the pros and cons of different options;
- collect, record and present data;
- investigate a controversial issue; and
- develop a viewpoint by making an informed decision.

Where Does the Wind Blow Most?

Plan and carry out a class task of investigating the following questions:

- Does your school receive enough wind to power a turbine?
- Where is the best place for a wind turbine on your school site?

To find the answers to these questions, draw a simple map of the school and the school grounds on a large sheet of paper. With the children, agree on several potential sites for a wind turbine. Get the class to consider and predict where they think the windiest places in the school grounds will be and why. Consider what obstacles to the wind are in the school grounds or in the surrounding area, such as tall buildings.

Next, get the children to carry out a weather survey. Over a period of days or weeks, get the children to measure and record the wind speed and direction at the agreed places in the school grounds. Analyse the results and perhaps create graphs with the results. For each of the



agreed positions, work out the average wind speed and direction.

When the children have found the windiest place in the school grounds, extend the investigation by getting them to measure the wind speeds at two different heights, if this is possible. Compare these two sets of readings on a graph.

- Are there any differences in the wind speeds?
- Does height make a difference?
- Is the wind speed faster at the higher or the lower height?

CONNECTED LEARNING OPPORTUNITIES

Language and Literacy

Write a speech to debate the pros and cons of building a wind farm.

Mathematics and Numeracy

Analyse data from a questionnaire and present it graphically.

The World Around Us

Consider the environmental, social and economic factors of building a wind farm.

The Arts

Write and perform a short play.

ASSESSMENT FOR LEARNING OPPORTUNITIES

Effective Questioning!

Ask more open questions. Try 'no hands up' to encourage all children to use thinking time before answering a question.

From a map, find the coordinates (grid reference) of the school. Use a suitable website to work out an estimate of the local annual average wind speed at your location. See 'Suggested Additional Resources' section for useful websites.

The Most Suitable Site

Walk around the school with the children and look at the two windiest places that they discovered from their wind speed investigations. In groups, get the children to take photographs of the potential sites for the wind turbine. Back in class, print off the photos and get the children to display them, along with comments on site suitability. They should consider factors such as:

- space
- are there overhanging cables above?
- will the turbine block light?
- would it be a health and safety hazard in this location?

Work with the children to design a questionnaire aimed at finding out the views of people in the school and/or surrounding area. They could give the questionnaire to parents, neighbours or local businesses that might be affected by the turbine. They should present the results of the questionnaire in graphic form and analyse them to see how many people would be in favour of the wind turbine and how many people would be against it.

Let the People Speak

Based on the opinions and comments gathered from the questionnaires, tell the children that a wind farm is going to be built in a nearby village. The children must consider the viewpoints, feelings and emotions of the people involved in order to create a presentation on the pros and cons of having the windmill at the chosen site in the village.

As a class, brainstorm or create a **Mind Map*** to show the groups of people who may be affected by a wind farm and also how they will be affected, for example:

- people who work with wind energy;
- people who live in the local area;
- farmers;
- hill walkers;
- environmentalists; and/or
- local businesses.



As a class, discuss the groups of people and decide whether they think that the views of each group would be positive or negative towards the building of a wind farm. Divide the groups into two: the people who are in favour of building the wind farm and the people who are against.

In order to further develop the children's understanding and to help explore the issue of controversy surrounding the building of a wind farm, it may be useful to give the pupils news articles or videos about protests against wind farms (see 'Suggested Additional Resources' section).

Put the children into groups. Give each group a card from Resource G which briefly describes the viewpoint of an individual about the building of a wind farm at the site in the village. Get the children to discuss the information on the card in their group and to develop any of the points or add in others they think are important. They should weigh up the pros and cons about the wind farm as seen by their character and decide if the person would be for or against the wind farm. Thinking as the character on the scenario card, the children should present their thoughts in one of the following ways:

- create a short dramatisation where the character is telling another person about their viewpoint and reasons;
- write a speech debating what they see as the pros and cons of the wind farm being built, from the viewpoint of that character; or
- write an interview by a reporter with the character, asking questions and giving responses that show the character's viewpoint.

When all of the groups have completed the task, give each group the opportunity to present their scenario to the rest of the class.

Reflection

Ask the children to discuss their views and opinions on this subject. Create a class list of all of the views of pros and cons for the wind farm being built in the village.

** see Active Learning and Teaching Methods for Key Stages 1&2*



Resources

Resource A

Blow a Bottle Record Sheet

Bottle No.	Amount of water (mls)	<u>Pitch</u> <u>Higher or Lower?</u> Is the sound higher or lower than the previous bottle?
1	0 mls	-
2		
3		
4		
5		
6		
7		
8		

Resource B

Storm Symphony Evaluation

My Storm Symphony Evaluation	
Our group played the	<input type="checkbox"/> beginning <input type="checkbox"/> middle <input type="checkbox"/> end
The instrument I played was	<input style="width: 100%;" type="text"/>
It made a sound by...	<input style="width: 100%;" type="text"/>
With my instrument, I made the following storm sounds:	<input style="width: 100%;" type="text"/>
I made these storm sounds by...	<input style="width: 100%;" type="text"/>
I	<input type="checkbox"/> think <input type="checkbox"/> do not think
	my instrument sounded the way it was meant to.
My instrument was	<input type="checkbox"/> easy <input type="checkbox"/> difficult
	to play.
My instrument made a	<input type="checkbox"/> good <input type="checkbox"/> fair <input type="checkbox"/> poor
	sound.
I think that our part of the symphony sounded	<input type="checkbox"/> brilliant <input type="checkbox"/> good <input type="checkbox"/> fair <input type="checkbox"/> poor
The overall sound of the performance was	<input type="checkbox"/> brilliant <input type="checkbox"/> good <input type="checkbox"/> fair <input type="checkbox"/> poor
I think the most important instrument in the performance was	<input style="width: 100%;" type="text"/>
because...	<input style="width: 100%; height: 50px;" type="text"/>

I would give each part of the performance the following marks out of 10:

Beginning	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Middle	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
End	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
The overall performance of 'The Storm Symphony'	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

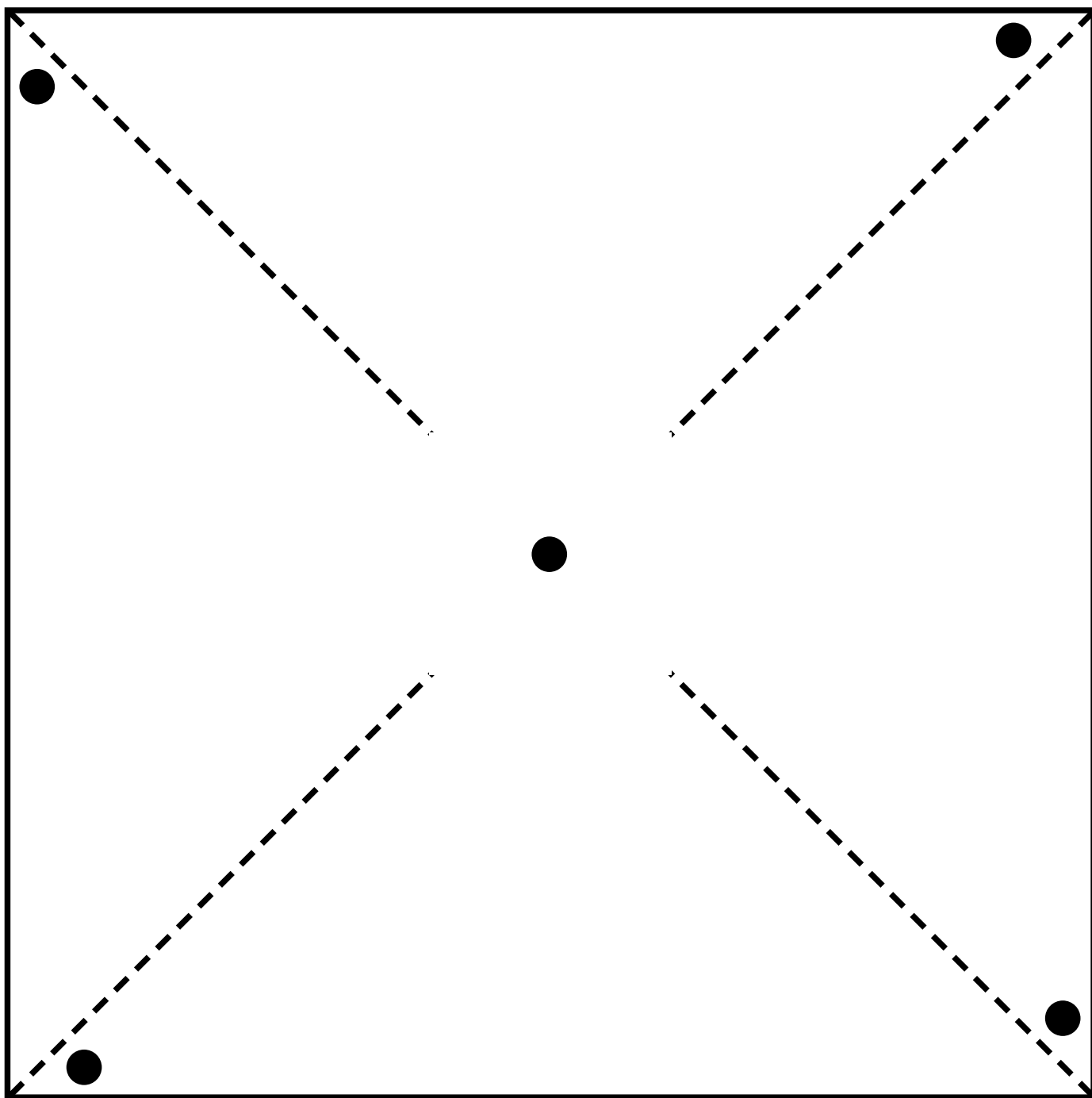
Resource C

Design Challenge Sheet

A Wind-Powered Vehicle		
The Challenge	Design and construct a wind-powered vehicle that will travel the furthest distance within a 2 metre-wide track.	
Rules	<ol style="list-style-type: none">1. You must only use the materials provided.2. You must use A5 card as the base for your vehicle.3. A desk fan is the source of wind for your vehicle.4. Your vehicle will score one point per 10 cm travelled, up to a maximum of 4 metres.5. Your vehicle must stay within a 2 metre-wide track.6. Points will be awarded for good design work and quality of construction.	
Materials you could use	<ul style="list-style-type: none">• card• corriflute• 4 mm dowel rod• 10 mm² lengths of wood• elastic bands• pegs	<ul style="list-style-type: none">• different types of paper• wheels• straws• blutac• adhesive tape• pipe cleaners













Resource D

Windmill Template



Resource E

My Windmill Investigation Results

Type of Windmill?	Materials Used to Make It	Star Rating	Windmill Works Well/Not So Well Because...
Windmill 1 Shop-bought  Homemade 			
Windmill 2 Shop-bought  Homemade 			
Windmill 3 Shop-bought  Homemade 			
Windmill 4 Shop-bought  Homemade 			

Resource F

Wind Farms in Northern Ireland

Distance between each wind turbine on the wind farm						
How many turbines?						
When it opened						
Low or high ground?						
Grid reference						
Where is it?						
Name of wind farm						

Resource G

A Wind Farm – Pros and Cons Scenarios

<ul style="list-style-type: none">• I am a sheep farmer.• I'm afraid my sheep will be scared by the wind turbines.• The energy company wants to buy my fields in the hills from me.	<ul style="list-style-type: none">• I work for the Northern Ireland Tourist Board.• I think the turbines at the wind farm spoil the view.• Maybe people will want to visit the wind farm to see it working.
<ul style="list-style-type: none">• I live in the village.• I think that my TV reception will be destroyed when the wind farm is built.• I'm worried that the turbines will be noisy.• My electricity might be cheaper.	<ul style="list-style-type: none">• I live in the village.• I am unemployed and cannot find a job in the area.• The wind farm will need people to work at it, to help build the site and maintain it.
<ul style="list-style-type: none">• I work for the government.• I think that we must start using renewable energy sources because all of the coal, oil and gas are running out.• I think a wind farm is a brilliant source of renewable energy.	<ul style="list-style-type: none">• I visit the village on my holidays each year.• I love the views and long walks along the hills surrounding the village.• Some of the walks will be blocked off if the wind farm is built.
<ul style="list-style-type: none">• I am a scientist and study the plants and animals in the area.• Building the wind farm will mean that lots of land will be dug up and animal homes and plants will be destroyed.• The wind farm is better for the environment than coal or oil power stations, because it doesn't cause as much pollution.	



Suggested Additional Resources

Useful websites

Renewable Energy and Wind Farms

Northern Ireland Electricity (NIE)

www.nie-yourenergy.co.uk

Action Renewables

www.actionrenewables.org

Renewable Energy Centre

www.therenewableenergycentre.co.uk

The Low Carbon Partnership

www.ourplanet.org.uk

Making Wind Instruments

www.teachingideas.co.uk (follow links to design and technology)

BBC Learning Zone

www.bbc.co.uk/learningzone/clips

Carbon Trust

www.carbontrust.co.uk

STEM

Report of the STEM Review (NI), 2009, DE & DEL

www.delni.gov.uk

Useful Resources

Thematic Units (CCEA)

Years 3 and 4 – What's the Forecast?

Health and safety in the primary school classroom: Science and Technology

Be safe! Health and safety in primary school science and technology, 3rd edition, ASE₂, 2001

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