Marsh Mill-in-Wyre

Marsh Mill Village, Thornton Cleveleys, Lancashire. Tel/Fax: 01253 860765

Dear Teacher

Thank you for requesting this copy of the Marsh Mill-in-Wyre Teacher's Pack.

Marsh Mill is one of Wyre Borough's most valuable heritage resources and physical landmarks and we believe that a visit to the Mill will be of real value to your pupils' education, combining learning with enjoyment.

The Windmill, an excellent example of a Tower mill was originally built in 1794 and has been fully restored to its former glory. The original workings still visible today.

This pack complements the information and interpretation on display at the Mill and provides cross–curricular activities, which will enhance the experience for both yourself and your pupils. Our main aims, through this pack are to:

- Provide a resource for linking your trip with the National Curriculum, including Maths, English, Science, History, Art & Design and Geography.
- Make the Mill come alive for children with the help some hands-on experience and suggested projects.
- Providing material for discussion in class prior to and following the visit as part of an educational package, including poems, short stories, projects and model making.
- Maintaining the children's' interest throughout the visit through worksheets, videos, moving models and audio-visual displays. The suggested length of visit is approximately two hours, for a group of thirty including teachers and students.
- Encourage selective copyright free photocopying so that you can adapt the pack to suit the requirements of your particular group.

Charges per child are kept to a minimum. **To make a booking, simply contact the Miller at Marsh Mill on 01253 860765**

We would greatly appreciate your comments for the improvement of this pack.

PRE-VISIT

Suggested work to be covered by the children before a visit to Marsh Mill might include:

- Finding out how a windmill works, using the background information sheets and diagrams provided.
- Windmill map work - using Ordnance Survey maps and the Yates' map.
- Finding out from the information sheet the reasons for the decline of the windmill.
- Naming and describing different types of windmills.
- Colouring and labelling the various parts and machinery of a windmill
- Studying the history of Marsh Mill and producing a time-line of events in the Mill's history.

DURING THE VISIT

As a guide line, for 26 children accompanied by 4 members of staff, it is suggested that the class is split into four groups, with a teacher for each and to complete each of the following in sequence:

- General Introduction and Orientation
- Split into groups

1. Watch the Marsh Mill video
2. Complete the quiz and a selection of worksheet activities
3. Participate in the guided tour (max 6 per visit/lasts approx. 15-20 minutes)
4. To sketch and label the exterior of the Mill

- Re-group and listen to poems about windmills, answer questions and complete round-up discussion.
- Evaluation of visit.

POST-VISIT

Back in the classroom, the visit can be discussed and written work produced:

- Poems and creative writing, using the word list completed at the mill of sights, smells, sounds etc.
- Newspaper headlines describing the various events at the mill, or perhaps an interview with the Miller.
- Use the drawings of the Mill and make 3D models and paintings.

RELATING YOUR VISIT TO THE NATIONAL CURRICULUM

The following activities are recommended following a visit to the Mill, there are further suggestions within this pack, each of which tie in with the National Curriculum.

ENGLISH

- Poems & creative writing using the word list
- Making notes from the Marsh Mill video
- Using a tape recorder to orally describe the Mill
- Word Search
- Writing Newspaper Headlines
- Composition entitled 'A Day in the Life of....', e.g. a Miller, a Mouse at Marsh Mill etc.

SCIENCE AND TECHNOLOGY

- Draw diagrams to show the cuts on the millstone and how it works.
- Explain how various parts of the mill work, using photos, diagrams and plans
- Children could make pulleys and gearing back in the classroom
- Make a model of the Mill or make a whirly mill to blow around.
- Make bread from the Marsh Mill Recipe, learning about the properties of yeast.
- Find out how wind power is used today as an alternative technology and describe what effects this technology has upon the environment.

ART

- Drawings and paintings of the Mill and different parts of the machinery, taken from sketches completed during the visit.
- Draw animals, which could live in and around the Mill.
- Colour in the sheets provided in the pack
- Label the diagrams
- Draw pictures of people who would have lived in and around the Mill.
- Design a logo to use on a bag of flour.

HISTORY

- Create a time-line of the Mill's history
- Design the front page of a Newspaper, create headlines
- Understand why windmills declined, but have seen resurgence.
- How did the Miller live and work?

GEOGRAPHY

- Use Ordnance Survey maps to locate other windmills of the Fylde.
- Using old maps, find out where mills used to be located
- Identify landmarks visible from the upper storey of Marsh Mill
- Find out which way the wind is blowing during the visit

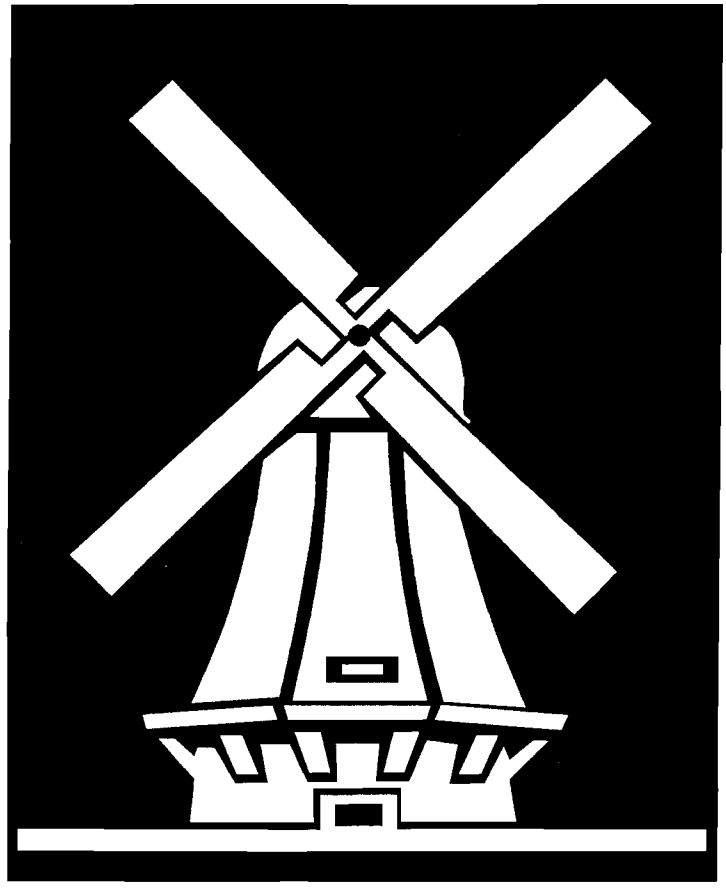
MATHS

- Measure the circumference and diameter of the Mill
- Draw the mill to scale
- Weights and measures - such as those used in the Bread Recipe

WORKSHEETS

The following worksheets contain information about Marsh Mill, the Milling Process and other topics to aid discussion and pre/post-visit activities.

Questions and Discussion topics are suggested at the bottom of each sheet



HISTORY OF MILLING AND THE WINDMILL

Worksheet 1

For thousands of years, wheat has been a part of our diet. We eat flour in Bread, Biscuits, Pastry and Puddings.

Grain must be ground into flour before people can digest it. The first millers used muscle power to grind flour on Quernstones. Later, waterpower and then wind power were used. No one really knows who invented the windmill, although scholars think that it was the Chinese, the Babylonians or the Persians. There are records of Persian wind machines of about 200BC.

Windmills were a common sight all over Britain from the Middle Ages right up until the nineteenth century, when there were over ten thousand Dutch style windmills in use in Britain.

It has been calculated that such windmills could produce a peak power output of around 30kW and do the work of around two hundred people. Their main uses were to grind grain, pump water, making paper and sawing timber.

The Miller worked long and unpredictable hours, depending very much on the weather. When the wind blew, the miller could work throughout the night. The more it blew, the harder he worked and even in the strongest wind, he had to keep feeding the stones with the grain. If he didn't the stones could spark and this was a real fire hazard.

When the wind was too calm to mill, he did repair work, helped by Millwrights and Stone-dressers. The only time the Miller did not work was on the Sunday, the Sabbath.

The Industrial Revolution saw the increased use of coal as a fuel and so windmills were used less and less, giving way to steam and electrically driven mills.

QUESTIONS & DISCUSSION TOPICS

1. *What is a Quernstone?*
2. *How would mills differ, depending upon the type of work they undertook?*
3. *Why would the millstones spark if left to turn without grain?*
4. *What is a Millwright?*
5. *What does a Stone-dresser do?*
6. *What was the Industrial Revolution?*
7. *What replaced the windmill for grinding flour? How is it done today?*

MILLSTONES

Worksheet 2

Marsh Mill has two pairs of French Stones and two pairs of Derbyshire stones.

The French stones are made of French Burr from the Marne Valley and measure 135cm and 150cm in diameter.

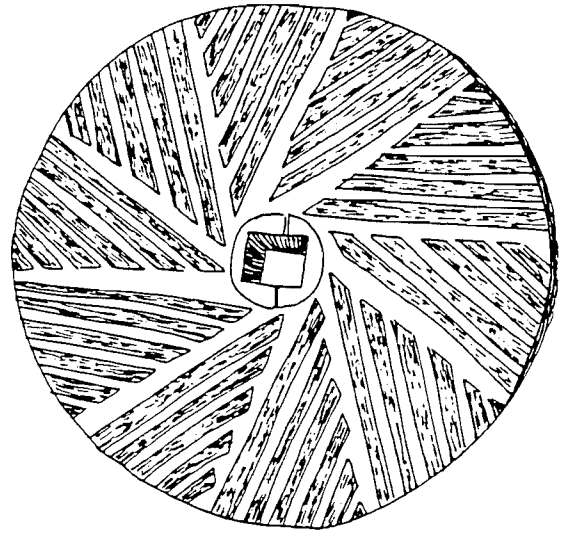
These stones were cut and imported in sections before being assembled in Liverpool. They have an iron bow fixed across the central hole and are carefully balanced for grinding wheat into flour. These were the hardest millstones and lasted anything upto twenty years.

The Derbyshire or Peak stones (from the Peak District) were softer and therefore only lasted five to eight years.

The speed of the turning stones affects the distance between them and therefore the fineness of the flour produced. This meant that to regulate the flour, governors needed to be fitted, to ensure that that the stones were kept at the same distance apart and the flour was always the same fineness.

STONE DRESSING

The grinding surfaces of the millstones have furrows cut into them. These cut the grain in a scissor-like action and work the meal out to the edge of the stones, where it is collected. When the stones become blunt they have to be 'dressed'. Some millers used to dress their own stones, but it was usually done by a 'stone-dresser', who cut new furrows into the stones.



QUESTIONS & DISCUSSION TOPICS

1. *Why is one stone larger than the other in grinding pairs?*
2. *How many millstones did Marsh Mill have altogether?*
3. *Why would the Derbyshire stones only last five to eight years?*
4. *What is a governor?*
5. *What tools would be used by a stone-dresser?*

HARNESSING THE WIND
The Sails and the Fantail

Worksheet 3

The sails and the fantail capture the power of the wind.

If you look at the mill from the front, you will see that it has four sails. These sails turn through 360° and the area covered by the sails is known as the 'solidity'. The more sails a windmill has, the higher the solidity.

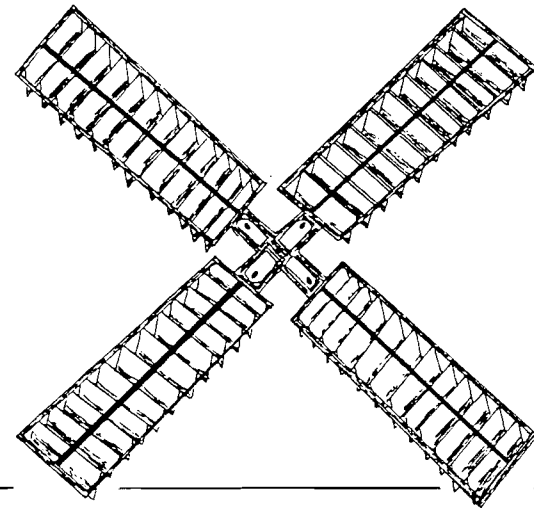
High solidity = low speed
Low solidity = high speed

In 1896 Marsh Mill was fitted with four 'patent sails' of the kind invented by William Cubitt in 1807. These sails could be adjusted to suit the strength of the wind without stopping the mill. The older style 'common sails' were canvass covered and work had to stop when the wind strength changed so the miller could alter the area of the canvass.

The thirty four shutters, arranged on each side of the sail back are opened and closed by levers connected to the striking rim, which runs along the inside of the hollow wind chart. A continuous chain hangs down from the controlling levels to the gallery on the third storey of the mill, so the miller can control the sails from there. Adjusting the shutters to suit the strength of the wind is called 'reefing' and therefore the gallery around the mill is called the 'reefing stage'.

The fantail is at right angles to the sails and acts as an automatic rudder, turning the cap so that the sails face the wind. Early windmills did not have a fantail and the miller turned the cap by hand.

The fantail is attached to the rotating top (cap) of the mill by a series of gears. The fantail has to turn more than 1000 times to make the cap turn a full circle.



QUESTIONS & DISCUSSION TOPICS

1. *What is the difference between the sails and the fantail?*
2. *What are the differences between the 'patent' and 'common' sails?*
3. *Why do the sails need to be adjusted (discussing solidity)*
4. *What is turning force/torque?*

Worksheet 4

WEIGHING AND DRYING ROOMS

The milled flour, meal or animal feed was kept here for collection or sale. The Miller's office was most probably on this floor, with any damp grain dried in the kiln adjacent to the mill.

Open sacks were attached to a frame and filled with flour or meal by chutes from the floor above. There may have been a groat machine, which removed husks from oats and blew them into a husk cupboard in the alcove.

To the side of the mill at this level are the wet grain store and the drying room above the kiln. The kiln itself is an accurate reconstruction of the original. The drying floor is formed of perforated clay tiles on which a layer of grain would be dried.

When dry, the grain went down into two chutes to the ground floor hoppers, where it was bagged and hoisted to the grain floor at the top of the mill on the fifth storey. If the grain was already dry on arrival at the mill it would be taken directly up to the 5th floor.

THE MEAL FLOOR

The miller checked and controlled the milling process from this floor. He monitored the quality and grade of the flour, adjusted the sails and applied the brake. The flour was sifted and sorted here.

Controlling the Mill and the Stones
On this floor the Miller tested the meal coming down from the stones and adjusted the stones if necessary (see worksheet 2) this is called 'tenering'. The tenering handle is used to raise and lower the upper stone.

The bed stone is visible in the ceiling. Each spindle through the stones ends in a bridging box, where an adjustable bearing keeps the spindle vertical. This is vital for the balance and running of the upper stones. There are two doors to the gallery or reefing stage so one exit is always well away from the sails, for safety reasons.

The Meal Floor contains various cleaning and dressing machines.

The sifter or dresser and the rotary screen (known as the bolter) were used to separate the flour from the meal. The elevator at the side of the sifter was used to recycle the meal back through the sifter (also known as a 'Jogscry' or jogging screen.

The machine used for cleaning the grain before it is put through the stones is called the Winnower that would have been situated on the farm.

QUESTIONS & DISCUSSION TOPICS

1. *Why was wet grain dried before it was milled?*
2. *What would happen if the millstones were not level and balanced?*
3. *Why do you think that the sifter was called the jogging screen?*

Worksheet 5

THE STONE FLOOR

As the name suggests, this floor houses the millstones.

The Great Spurwheel is in the ceiling of this floor. This large wooden wheel originally had wooden teeth, but these were replaced by iron ones when the mill was modernised in 1896. It drove four smaller by-wheels called 'stone nuts', which turn the upper millstones of each pair.

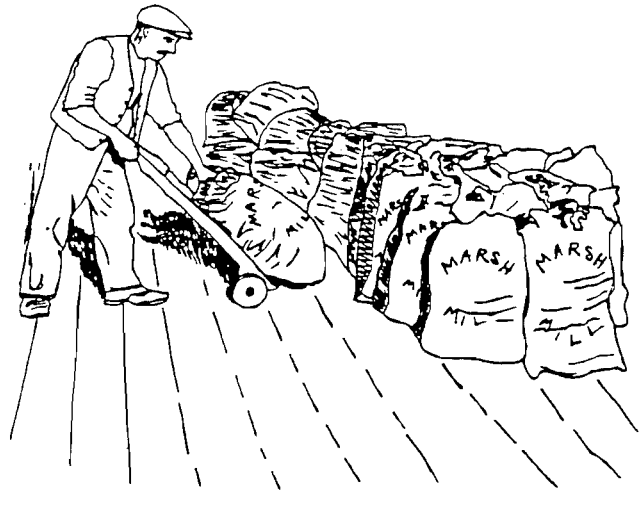
All of the stone nuts have wooden teeth, which are quieter than metal teeth and act as a safety measure in as far as if they break, the stones jam, which prevents worse damage to the mill machinery. The stone nuts are different sizes and turn the stones at different speeds.

The millstones are hidden in 'tuns' or 'vats'. The vats support wooden frames, which carry 'hoppers and 'shoes'. The hoppers receive the grain from bins on the floor above and each shoe is pulled against the drive shaft or 'quant' so that as the shaft turns, the grain is shaken into the eye of the millstone below.

THE GRAIN FLOOR

The grain was stored in large bins on this floor, before being ground. The bins at Marsh Mill today are new and rectangular in shape. The original bins would have been wider and deeper.

The Sack Hoist lifted sacks of grain from the ground floor. It was driven by a belt and pulley system. Pulling a rope tightened the belt and the sacks were attached to the chain at ground floor level, being lifted by the pulley through sack flaps to this floor



QUESTIONS & DISCUSSION TOPICS

1. *What are the grain bins made of? Why is this material chosen?*
2. *How do pulleys work? Why are they used?*
3. *Why was the grain stored on this high level?*
4. *What problems would there be with storing grain?*
5. *Discuss the technical words above.*

Worksheet 6

THE DUST FLOOR OR CAP

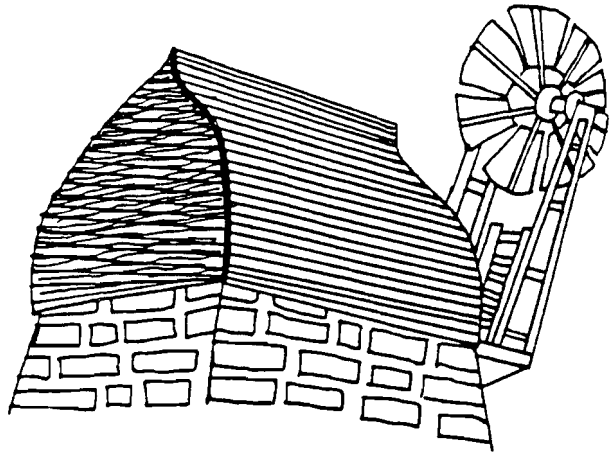
The very top of the mill is called the cap, inside of which the rotation of the sails is transferred through 180° to turn the upright shaft and put the mill machinery into motion. The huge brakewheel, which is used to stop the mill, is located here.

Like many of the Fylde mills, the cap of Marsh Mill is boat shaped and 'clinkerbuilt'. This means that the wood is overlapping, just as some boats and houses are constructed to allow water to flow off. Despite being one of the largest in the country, space inside Marsh Mill's cap is limited due to the machinery housed there.

The sails turn the Windshaft, with the original oak one being replaced by the present one made of cast iron. The windshaft is angled so that the weight is evenly spread on the mill walls and the sails do not touch the outside of the mill.

The brakewheel is 300cm in diameter and is made of oak and elm. It carried eighty cast iron teeth, which replaced the original wooden ones. It can be turned by a lever to move the sails, for repairs or to put them in the resting position.

The brake is a wooden bank around the outer edge of the brakewheel. When the heavy brake lever is pulled down, the brake band tightened around the brakewheel, preventing movement. The brake is taken off or put on by the Miller using a rope from the Reefing Stage.



QUESTIONS & DISCUSSION TOPICS

1. *How does the mill trap the energy of the wind?*
2. *What is the Beaufort Scale?*
3. *Brakes - what are the properties of a brake?*

Worksheet 7

MARSH MILL HISTORY CHART

Height: 21.5 meters
Sails: 10.78 meters in length

DATE	EVENT
1794	The Mill was built by Ralph Slater, upon low lying common land, which was drained Marsh land (hence the name Marsh Mill) The land was owned by Lord Fleetwood Hesketh.
1896	The Mill had new sails fitted, whilst being updated by its owner Parkinson Tomlinson
1922	The Mill was closed down after a spell of producing animal feed.
1928	The Mill was converted into a tea shop, which was used until 1935
1930	Two ladies were killed when the fantail staging they were on collapsed, sending them tumbling to the ground. One of the ladies was looking at the Mill with a view to buying it.
1957	The Mill was bought by Thornton Cleveleys Urban District Council (later Wyre Borough Council)
1965	The exterior of the Mill was restored to its former glory
1972	Walter Heapy formed the Windmill Preservation Society
1983	A fierce storm left the Mill with only three sails, the other blown off. The remaining sails were removed for safety
1988	Plans were drawn up to fully restore the Mill to working order
1990	The works were completed and the sails turned for the first time in sixty years

QUESTIONS & DISCUSSION TOPICS

1. *Draw a timeline to show the Mill's history*
2. *What else was happening in England, the Region, Thornton at and around key dates above?*
3. *Why do you think that Marsh Mill was built where it was? Think about location and weather.*

FURTHER RESOURCES