

# History





# History

## Introductory Notes for Teachers

The History section of this folder has been designed to meet the requirements of the National Curriculum and enable pupils to reach the highest Attainment Targets.

The timeline can be used with all age groups to set any of the historic events in context. For Primary teachers the timeline pictures have been printed on separate pages so that you can use them for a simple chronological ordering activity where pupils build up their own timelines. (All images are also included on the accompanying CD).

At Key Stage 2, the Oral History of Life on Halkyn Mountain during the Second World War fits in well with **Life in Modern Wales and Britain**, as well as **Historical Topic in a Local Context**. The Moel y Gaer section provides plenty of materials for studies relating to **Life in Early Wales**.

The Key Stage 2 work obviously requires **Historical Knowledge and Understanding** as a prelude to focusing on the experience of local people during the Second World War. The Celtic Studies and Oral History project certainly allows the pupils to consider **Interpretations of History**, to conduct a **Historical Enquiry**, and in presenting the findings to demonstrate the ability to **Organise and Communicate** their material.

The Key Stage 3 work on the Halkyn Mountain and the Industrial Revolution offers similar opportunities for pupils to demonstrate their skills in history. It is important to emphasise that these units should form part of an overall study of the Industrial Revolution. The experience in Halkyn should be compared and contrasted with examples from throughout Britain and indeed Wales. To reach the higher Attainment Targets pupils will need to make these links and connections between different areas of the country during the Industrial Revolution. Indeed they may also need to make references to the period before industrialisation, and perhaps the situation today.

The tasks are designed to allow the pupils to make and evaluate differing interpretations of the past. Further, the tasks also offer the chance for pupils to produce extended writing. The style of the assignments are designed to encourage an overall understanding by using a key question. At the end of each unit it would be worthwhile to return to the key question to gauge pupil understanding.







## Halkyn Timeline



**12 000 years ago (10 000BC)**  
Stone Age people hunted here

**5000 years ago (3000BC)**  
Stone Age people began to farm and settle

**4500-2600 years ago (2500-600BC)**  
Bronze Age people buried their dead inside stone cairns on Moel y Gaer and Brynford



**100AD**  
Romans thought to have begun mining lead on Halkyn



**2500 years ago (500BC)**  
The first ramparts of the Iron Age hillfort on Moel y Gaer were built



**1086**  
Domesday book records a church in the lordship of Halkyn and Brynford



**1200-1623**  
Farmers supplemented their incomes with small-scale mining

**1403**  
Hwyl Gwynedd, partisan with Owain Glyndwr, reputedly took refuge on Moel y Gaer after defeat at the battle of Shrewsbury

**1634**  
Grosvenor family gained full control of mining – all mining carried out by leases granted by the Grosvenor family



**1715**  
Discovery of a rich lead vein created a lead rush! Influx of Derbyshire miners

**1767**  
Holywell racecourse opened – closed in mid 1850s



**1790s**  
Commercial chert quarries open on the mountain



**1875**  
Digging of Halkyn Tunnel begun which revitalised the lead mines

**1814**  
Firebeacon established on Moel Y Gaer to warn of any French invasion from the Dee estuary during the Napoleonic Wars.

**1824**  
Lord Grosvenor built Halkyn Castle



**1860 - 1880s**  
Peak production of lime at Waen Brodlas limekilns



**1897**  
Milwr Tunnel begun at Bagillt

**1938-45**  
2nd World War  
Troops stationed near Henblas

**1930-40**  
Milwr tunnel – World tunnelling record broken during extension of the Milwr Tunnel - 2037ft in 14 weeks!



**1957**  
Slump in lead ore prices



**2004**  
Large scale quarrying continues

**1944**  
Jones Balers opened in Rhosesmor

**1987**  
Halkyn mines fully closed

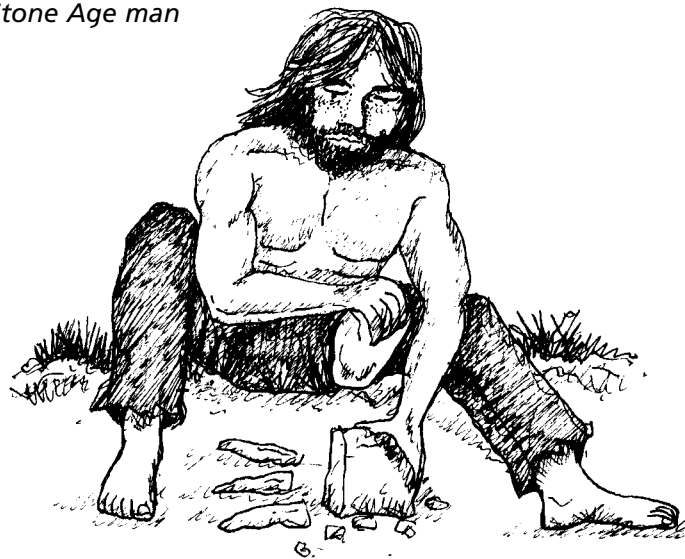


## Timeline Images

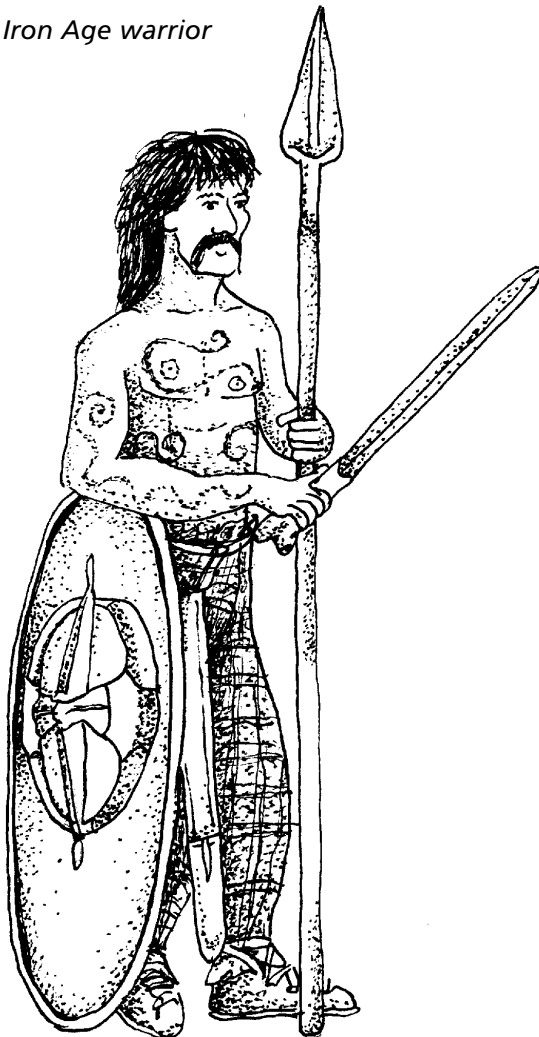
(also available on the CD)



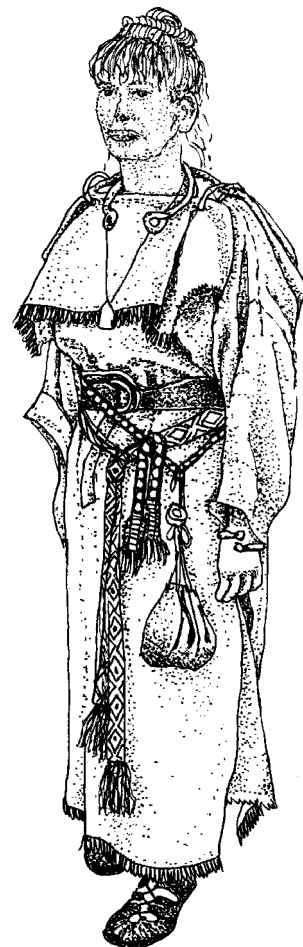
*Stone Age man*



*Iron Age warrior*



*Iron Age lady*





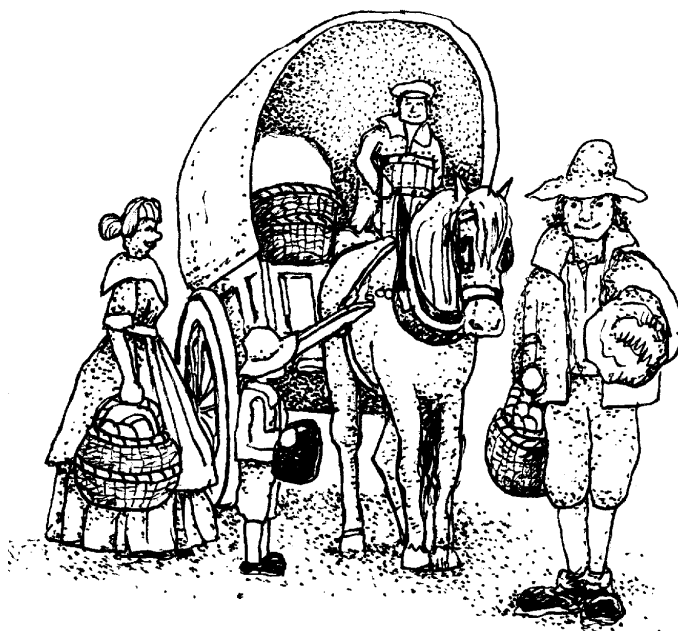
*Roman soldier*



*Medieval miner*



*Derbyshire mining family arriving*



*Victorian miner*



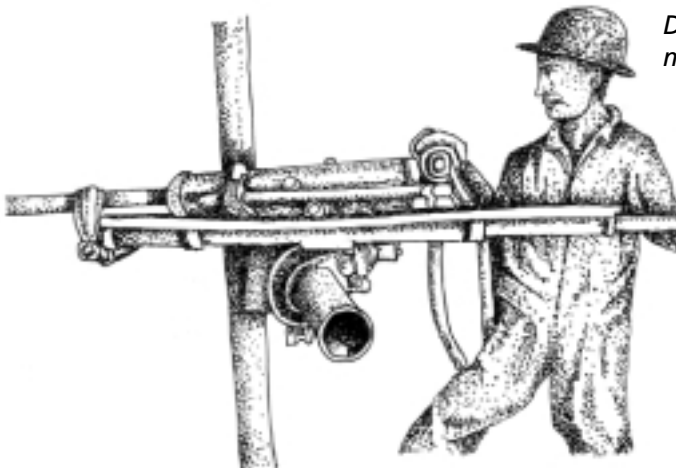
*Halkyn Castle*



*Waen Brodlas limekilns*



*Drilling a passage under the mountain in the 1930's*



*Winding headframe,  
Pen-y-bryn mine (now dismantled)*



## Teachers' Background Notes: Moel y Gaer and the Celts

For prehistory there is no written evidence and archaeologists piece together the past as best they can from the limited evidence left behind. The challenge for teaching about this period is to encourage the children to look at evidence and try and infer as much as they can about life in earlier times. Try to emphasise that nothing is certain - even the best archaeologists are still inferring from the available evidence.

Moel y Gaer is easily accessible on foot from Rhosesmor (parking may be available in the laybys at Berth Ddu or in Rhosesmor Community Centre). The well-preserved earth ramparts and clearly visible entrance on the eastern side make it an ideal field visit for Key Stage 2 pupils studying the Celts.

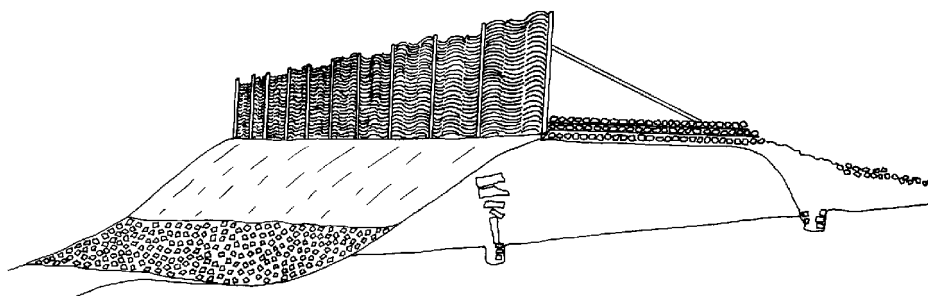
The first inhabitants of the hill top of Moel y Gaer were probably Stone Age peoples who built a wooden longhouse there over 5000 years ago (*Evidence: post holes and a stone-packed gully, flint arrowheads, pottery fragments*).

A Bronze Age cairn on the summit of Moel y Gaer and the important Bronze Age finds locally, particularly the Mold gold cape, indicate that this area was settled during the Bronze Age.

However it is the Iron Age remains that are most obvious to modern-day visitors. The hillforts - settlements built on hill tops protected by tall, earth banks and deep ditches, are prominent features of North Wales. Moel y Gaer stands apart from the chain of hillforts along the Clwydian Ridge. It has a commanding view across the Dee Estuary and this may have been an important factor in its location.

Parts of Moel y Gaer have been excavated in detail prior to the building of a storage reservoir on part of the hilltop. These excavations revealed a series of settlements, mainly roundhouses built within the earthen ramparts, but the remains of later rectangular buildings have also been found, probably granaries, as emmer and other seeds were found at nearby Dinorben, which suggests arable farming took place. Post-holes cut into the sub-soil give clear evidence of the shape and number of buildings.

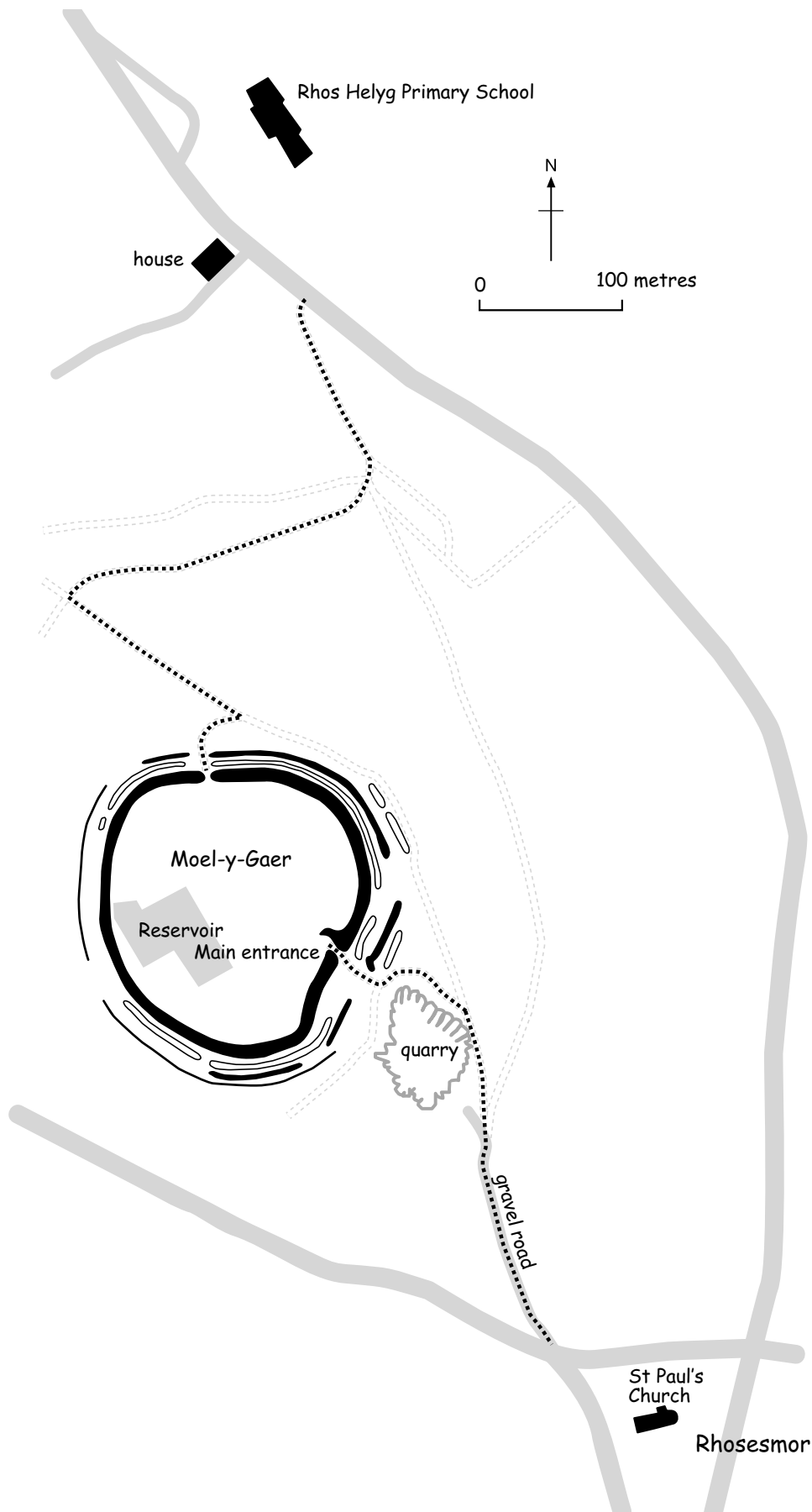
Few artefacts were found at Moel y Gaer as the sub-soil is very acid and metalwork would have slowly dissolved. Only pottery and stone did not decay. Shards of pottery and stone implements such as loom weights and sling stones were found and larger burned stones which may have formed hearths. In the following exercises items that have been found throughout North-east Wales have been used, to give a more rounded picture.



*Reconstruction of ramparts, Moel y Gaer  
The earth bank was topped by a wooden palisade fence.*



Location and access, Moel y Gaer







## What interpretations do we have of the Celts?

(linked to AACAC study unit, 'Interpretations of History')

### Materials provided:

Reconstruction drawings based upon local Iron Age finds,

A descriptive account written by an eminent archaeologist, inferring from the finds

Photographs of the 'Silures', an Iron Age re-enactment group.

A description of how an attack on Moel Y Gaer hillfort, Llanbedr may have taken place.  
Taken from Dr Willoughby Gardner's Presidential address printed in *Archaeologia Cambrensis*, 1926

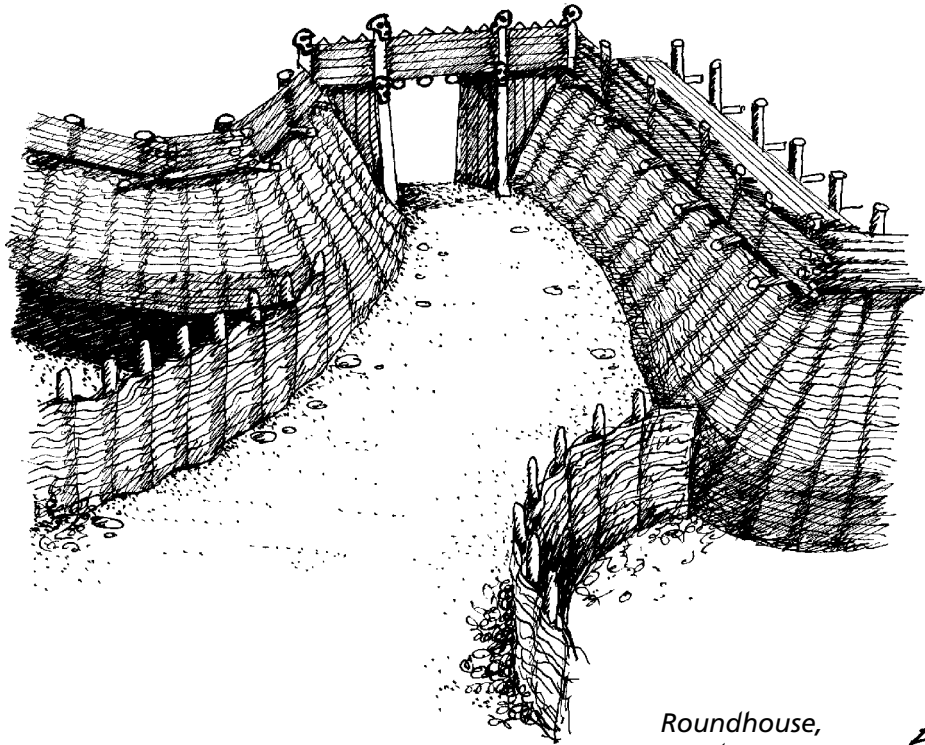
*"Let us picture to ourselves an assault upon the south-west wall of this hillfort. The attacking horde would first charge across the little obstacle ditch, and, rushing on the 'glacis' they would be brought to a halt by the first row of spiked stones inserted on its edge. Then for a distance of forty-five feet or more up the 'glacis' slope they could but slowly pick their way among the bristling points protruding out of the ground on either side. By these they would be badly bruised and cut if they were tripped or were struck down by the staves and the slingstones and other missiles poured down on them from the rampart above.*

*Those who survived this ordeal would renew their rush across the next ditch and scramble up the steep scarp slope in front which was very probably made more difficult by being covered with slippery scree upon its lower half. When they reached the firmer ground another charge would be made to cross the next ditch. But here an unseen and terrible reception was prepared for them in the form of a seven foot belt of sharp stone stakes lining the bottom of the ditch; on these they could hardly help but fall with the impetus of their dash over the last banks and the pressure of the throng behind.*

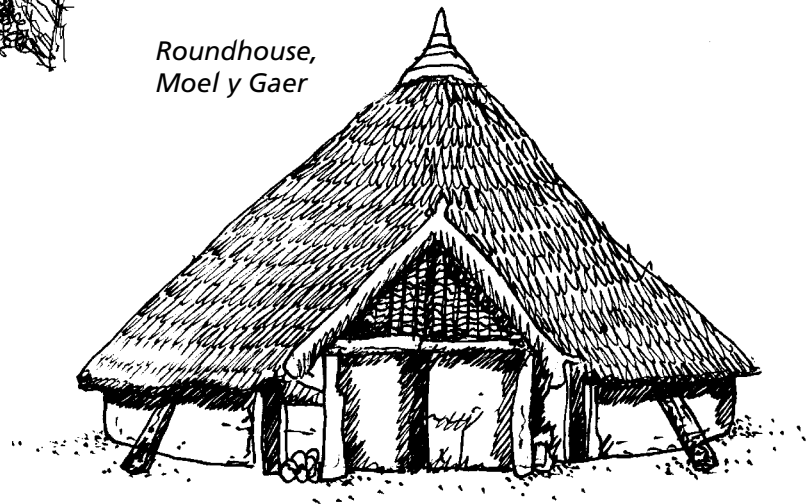
*All this time the shower of missiles from the ramparts above would doubtless continue; and one can well imagine that but few of the host that started on the 'rush' would survive to climb the last bank and to cross the final ditch and thus reach the foot of the great stone rampart.'*



*Artist's impression of entrance to Moel y Gaer hill fort*



*Roundhouse,  
Moel y Gaer*






*Possible Iron Age  
Granary, Moel y Gaer*



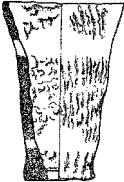





# Moel y Gaer and the Celts

*'Only the things they left behind survive to tell the tale.'*

Listed below are some of the objects and remains that have been found around Moel y Gaer and the surrounding area. What do you think each find suggests about Celtic life?

Finds	What might they suggest?
Shield (Dyserth)  Nb The one shown here was found in London  	
Stone tools	
Iron Fire Dogs (Capel Garmon)  	
Loom weights	
Stone Quern and seeds  	



Finds	What might they suggest?
Pottery fragments (this is a salt pot) 	
A brooch (Dyserth) 	
A bracelet (found elsewhere) 	
Post holes in the ground 	
Sling stones (a sling is shown here) 	
Bronze axe (Moel Arthur)	
Bronze Age Gold cape (Mold)	
Swords (Anglesey) 	



## The Silures have returned!

a)



b)



c)







d)



e)



f)



g)





## WW2 Oral History Activity

During World War two soldiers were stationed on Halkyn Mountain, training to drive tracked vehicles like tanks and Bren gun carriers. Here are some local memories of the war years.

### Voice One:

*I can remember the soldiers training on Halkyn Mountain. They were so kind to us children. We were on rationing, but they gave us their marmalade and jam.*

### Voice Two:

*The soldiers cheered us up during the war. They even made a bonfire on November 5th and invited all my friends.*

### Voice Three:

*My sister used to date one of the soldiers – I was so jealous as they rode around the Mountain on a motor bike.*

### Voice Four:

*The best bit about the war was being given rides on the Bren gun carriers. Once we even found some bullets and set them off by throwing them into a fire!*

### Voice Five:

*The war was a very frightening time for us children. The German bombers returning from Liverpool would drop their bombs on Halkyn mountain.*

### Voice Six:

*My family moved to Halkyn mountain from Liverpool during the war for safety from the blitz. At first we lived in a simple chalet made of wood and tin. Many other children from Liverpool were evacuated to Halkyn Mountain.*

### Voice Seven:

*We all remember when a young soldier fell down a mine shaft to his death. It was terrible. His car went straight down the shaft and his body was not found for weeks.*

### Voice Eight:

*The worst story I can tell you is when a young soldier fell down a mine shaft. He had been driving a bulldozer filling in some of the holes when the ground gave way. We all went to his funeral.*



### Tasks

1. Find out the meanings of the underlined words
2. How useful are these sources in telling us about life on Halkyn Mountain during the Second World War. Think of three ways in which they are useful and three ways in which they are not useful.

Useful	Not Useful

3. Which sources seem to tell the same story? Why might this happen?
4. Carry out your own piece of Oral History. Design the questions you wish to ask. Think carefully about the people you will interview.



## Teachers' Background notes on Mining History

### Introduction

Mining has fashioned the landscape and people of Halkyn Mountain. After a 2000 year history, all mining has now ceased. Most surface relics are gone. All that remain are the unique mining landscape, the silent tunnels deep below the surface and the stories people tell.

### Mining by Hand to 1700

#### Early miners

A lead vein is a mineralised fault or crack in the earth's crust. Many such veins would have been clearly visible on the mountain as grey bands running over the surrounding white limestone rock. The soft malleable mineral must have attracted the interest of people long ago, but the first people thought to have mined for lead in North Wales were the Romans who had interests on Halkyn Mountain and at Minera. It is not known how much mining was being carried out in those times, but they may not have mined more than a few metres below the surface. In fact, lead was found in such abundance that a law was passed to limit production.

After the Romans left Britain around 400 AD, it appears that very little mining was carried out for about 800 years. It was not until medieval times that mining was again carried out when farmers began small-scale mining as a means to supplement their incomes. These farmers either worked from the bottom of the Roman workings or searched for 'new' undiscovered veins on the surface. As the veins were gradually worked deeper, flooding became a serious problem and many veins had to be abandoned. This flooding problem dogged the industry for most of its life.

In 1282 (after the English conquest of the Welsh Princes) a major castle building programme revitalised the industry. Many churches and abbeys also needed repairs and lead was much needed for roofing, plumbing and drains. In 1296, Edward I ordered many Flintshire miners to work in the silver mines of Devon.

### Pick & Shovel

The basic tools needed to extract ore from the ground have not changed for thousands of years. They are: the pick, the crowbar, the hammer, the wedge and the shovel. The ore itself was normally easy to pick from the vein. Progress would have been steady until a passage had to be driven through the surrounding rock. On Halkyn Mountain the native rock was mainly limestone (or in the area to the north-east, chert) and was much harder than the vein material and firesetting became necessary. When a lead vein in the roof of a passage was being picked, a canvas ore-sheet might be laid along the floor to catch the falling pieces. An ore-sheet from 1883 lies in place at a mine near Bryn Gwiog where it has remained undisturbed ever since.

### Firesetting

Fire was used for 'mining' a tunnel through hard rock in search of lead ore. The process was



known as 'firesetting'. It was in use from ancient times until around 1700 when gunpowder provided a more speedy method of mining. The technique involved simply lighting a fire against a rock face. The heat generated would crack the surrounding rock allowing it to be picked away by hand. It was far more effective if water could be thrown onto the heated rock. If a passage roof needed to be removed, a platform would be constructed with a bed of stones. The fire could then be built on the platform, thus applying the heat where it was required.

It was important to use the hottest fuels such as "cord-wood, coal or horse bones" (Hooson 1747). The most effective fires were those which had a good supply of air. It was possible in some mines to provide air by constructing a 'flue' built into the passage floor known as a 'fang'. Firesetting was normally done at the end of the day and allowed to burn overnight. The following morning all loose rock could be removed. This was extremely slow and laborious work. Tunnelling rates of 2 or 3 metres a month were typical. By 1700 gunpowder was beginning to replace firesetting in most mines as a preferable alternative.

### **Shafts and levels**

The method by which ore was mined followed generally similar lines; shafts would be excavated vertically from which horizontal passages known as levels would be driven off. When a body of ore was found, the entire deposit would be removed before continuing to create further levels. Many workings on Halkyn Mountain consist of a single shaft, perhaps 10 metres deep, with a short level off in search of ore. If unsuccessful, it was abandoned as they moved on to try their luck elsewhere.

### **Raising to Surface**

Ore was normally put into buckets which were either carried to the nearest shaft or were placed upon wooden sledges (as at North Hendre Mine) to be dragged along a passage floor by rope. Larger buckets or 'kibbles' could then be raised to surface by means of a simple hand operated windlass. At deeper shafts, a horse whim might be erected consisting of a large winding drum rotated by a horse. As mines became more extensive, rails were laid along main passages and ore was transported in wheeled wagons.

### **Early pumping**

Pumping water from mines in the early years was difficult. Most wet mines on Halkyn Mountain relied upon wind power to drive crude and inefficient pumps. 'Rag and chain pumps' were used in Flintshire which operated by pulling a metal chain through hollowed logs or metal pipes. Balls covered in horse hair were fixed to the chain at intervals and these were able to lift water when the chain was pulled through the pipe. Although rag and chain pumps are known to have been used throughout Europe for at least two hundred years, they must have had a limited effect and were only able to operate on windy days.





### **Ancient Mining Laws**

The Black Death hit the area in 1349 when a quarter of the population died. Men refused to work the mines and little mining was carried out. In an attempt to stimulate lead production, ancient Mining Laws were re-introduced into the area in 1352 by Edward the Black Prince. The origins of these laws are unclear but they may have existed from around 1000AD.

Early mining was for many years controlled by these laws which are similar to those still upheld in Derbyshire today. Strict procedures governed the industry and grievances could be dealt with at a Barmoot Court convened for the purpose and presided over by a Barmaster.

The laws are set out in a detailed register preserved today in the Public Records Office. The following extracts have been translated from the original Anglo-Norman French and simplified.....

*If the Barmaster finds a meer not being worked, he shall have the meer marked (nicked) on three successive weeks. If it is still not being worked on the second day following the three weeks, the miner will forfeit the meer to the lord (landowner).*

*The Barmaster shall allocate every miner working on the vein a plot to build a house and the right to take wood to repair his house or fence. The miner may also take timber that he needs for his workings.*

*Miners shall not pay rates or taxes so long as they pay the lord 2p a year. This also allows the miner to graze his animals on the lords property except in parks, meadows, sown fields or designated wastes.*

*If anyone is found guilty of stealing ore, the fine shall be 25p for the first offence and 50p for the second offence. For a third offence, his right hand shall be pierced with a knife through the palm and pinned to the drum of the windlass up to the handle of the knife. And there he stays until dead or frees himself, in which case he shall forfeit any rights to the mine and his meers.*

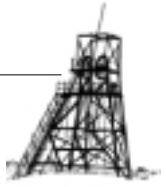
### **Involvement of the Grosvenor family**

Sadly the old mining laws were not to last. Richard Grosvenor first came into possession of a few mines in 1601 by holding short-term grants or leases. The Grosvenor family then began acquiring other local mineral grants. In 1614 Richard Grosvenor was granted rights by the Crown which effectively gave him control of the mines. A radical move was to abolish the miners laws in 1623. This caused great conflict with Halkyn miners who claimed their historical right to mine for lead. A court case followed which resulted in victory for the Grosvenors and the mining laws were extinguished. All consequent mining has been carried out by leasing the rights to mine from the Grosvenor family. With the mining laws now crushed, the Grosvenors were in a position to begin managing the industry in a more organised fashion and gradually, production and profits began to increase. The Grosvenors today still own most of Halkyn Mountain's mineral rights.

### **Mining 1700 to present day**

#### **Gunpowder**

The first major technological innovation in mining was the introduction of gunpowder for blasting from around 1680. Although gunpowder was first used in mines around 1680, it took another 50



years before most mines fully adopted its use. This delay was due to the fact that methods used were initially very unsafe. Many miners were injured or killed before the technique was improved to an acceptable degree and tunnelling rates began to increase by up to three times that of earlier firesetting.

A lead miner working for a mine company paid for his own tallow candles and gunpowder which he bought from the company store. The method used first involved the drilling of a hole by hand. This was done by hammering a drill 'steel', perhaps 3ft long by almost an inch in diameter. With each blow of the hammer, the steel would be turned a little in the hole before the next blow. When deep enough the hole would be cleaned out with a long thin metal scraper. Powder was then poured into the hole leaving perhaps a third of the hole empty. A fuse would then be gently pushed down the hole into the powder, leaving its end hanging out of the hole. Sand was then pushed into the hole and tamped down to form the 'stemming'. Several holes could be set at one time. When ready their fuses were lit and the men would move to safety. Unless the passage was well ventilated, the men might not return until the next morning when the poisonous fumes had cleared. When safe to return, the broken rock was shovelled onto wooden sledges or into mine wagons to be taken to the nearest shaft up to surface. A common practice was to use lead dust instead of sand as stemming. The resulting airborne lead particles from blasting added considerably to lead poisoning statistics.

In 1878, the 'high explosive', dynamite was introduced. This was far more effective for tunnelling and the use of gunpowder rapidly died out.

### **London Lead Company**

In 1692 the Grosvenor family introduced leases demanding royalties. This led to a downturn in production and the Grosvenors sought outside investment. Two London Quaker men then took up 21 year leases on Long Rake and Old Rake. They did well and within 3 years had invested £5000 and became the London Lead Company. They also introduced many technological innovations. By 1709 this company was producing 1000 tons of ore a year; more than all the other local mines combined. The company transformed their mines from small-time mining ventures into mines that were highly organised and productive, paving the way for the many companies that followed. The company eventually left the area in 1792 at a time when ore prices were slumping.

### **The lead rush of 1715**

In 1715 an exceedingly rich vein was discovered in a field just to the south-east of Pentre Halkyn village belonging to George Wynne of Leeswood. He brought in miners from Derbyshire. The discovery led to a 'lead rush' in the area which attracted further Derbyshire men; investors, managers and skilled miners followed by labourers. Derbyshire names such as Bagshaw, Ingleby, Harrison, Hooson and Oldfield became well-known in the area. 'Profit fever' was such that leases were granted for mining within the grounds of Halkyn Church and beneath a main road.

Further large discoveries helped to secure a promising reputation for Halkyn Mountain such as at Silver Rake in 1750. In 1770 a rich find at Rowley's Rake (Pant-y-pwll-dwr) produced ore valued at



over £1,000,000. At Brynford in 1774 another mine made £100,000 in a few years. The last large discovery of the century was at Great Holway Mine in 1798 which continued to supply large quantities until 1825.

Although people invested heavily in the hope of making large profits, many failed to find the rich deposits hoped for. Consequently several large estates became bankrupt and some individuals ended up in the 'debtors prison'.

### **A landscape is created**

Mining was commonly carried out by small groups of men who were granted annual licences known as Bargains. This encouraged them to try their hands at prospecting and many local people searched the mountain for new discoveries or ore. If they were lucky and made a rich discovery, they either worked the vein themselves or sold their bargains to a mine company. Consequently, many of the thousands of small shafts which pock-mark the mountain were 'trial shafts' made by two or three miners. Many miners did indeed make small fortunes, but the majority however struggled to survive. It was the larger companies who began to control the industry, strengthened by their ability to plan ahead and invest in new technology.

Although a few old shafts are up to 200 metres in depth, most are about 10 metres deep with perhaps a short level driven off. Many failed to find lead and were abandoned. The Grosvenors attempted to ensure that old shafts were covered but this was not successful and scores of dangerous open shafts remained open for many years. A project in the 1980s successfully sealed most of these shafts and today only a dozen or so remain open.

### **Lead, silver and zinc and limestone**

Lead ore (galena) was the chief mineral mined throughout most of the Mountain's history. Its uses have included the manufacture of bullets, roofing sheets and drain pipes; an additive in the manufacture of paint, face make-up and as a whitener in bread; batteries etc. Seven hundred years ago it was even used for making lead brine pans used at Cheshire's salt mines.

Silver was found as a by-product of galena in small quantities, varying usually from 6 to 10 ounces per ton only. Silver was used for jewellery and coin production. Silver coins minted in Flintshire were stamped with the emblem of the plume and feathers.

In 1720 it was realised that calamine had a value and this was mined in small quantities. It was used for brass making.

Zinc ore (blende or blackjack) was initially thought to have been worthless. However, the invention of the galvanising process (involving the use of zinc) in 1837, led to a huge demand for products that kept many mines in profit after the 1870s when lead prices were in decline.

Limestone surprisingly, was mined in large quantities between 1939 and 1969 when up to 80,000 tons a year were being extracted. The stone was considered to be of the highest quality by Pilkington's who used it in the glass manufacturing process. It was also used as fertiliser. Most of this stone was mined from the south side of the mountain just north of Hendre village. The chambers created are enormous and cover several acres.



### **Output**

Imported lead ore from Europe began to put pressure on the industry from 1825. But optimism remained high and more and more companies invested in the area. By 1845 Flintshire was producing record figures of 10,000 tons a year and employing nearly 3,000 people. The next peaks were not until the 1890s with 8,000 tons and the 1930s with 20,000 tons; both due entirely to the driving of deep drainage tunnels.

The most accurate records cover the years from 1845 to 1938. Throughout the whole of this period, Flintshire produced nearly 500,000 tons of lead amounting to 10% of the UK's total.

Such figures give the impression of a generally healthy industry. However, throughout the mining history, the story is one of constant boom and bust. One year of large profits could easily be followed by another of depression or even closure. Over the years, mines were repeatedly being re-opened or closed as flooding or price fluctuations dictated.

### **Flooding solution No 1: The Cornish pumping engine**

The first Cornish pumping engines were introduced around 1800. These were far more efficient and cheaper to run than earlier machines designed by Newcomen or Boulton & Watt. During the 1800s Cornish engines became the commonly accepted method of deep mines drainage. The engines were simply coal-fired boilers operating a single huge cylinder, commonly having a piston over 2 metres in diameter. These large machines created a slow but powerful up and down movement of a large rocking beam that projected out of the stone engine houses. Heavy timber 'pump rods' attached to the beam were then connected to water pumps down below. This up and down motion at the pumps forced water to surface up large iron pipes known as 'rising mains'. The beam of a Cornish engine operated at about 8 strokes per minute and was capable of working continuously for 6 months at a time or more, under a load of 56 tons. When mines closed, engines were frequently sold to neighbouring mines or were taken to other mining districts. Many were given names such as Queen of the Mountain and gained grand reputations commensurate with their pumping ability. To be an engine driver, as the operator was called, was not an easy task. Mastering the controls required "great skill and nerves of steel". Keeping the pressure under control was a matter of operating several levers. Many early engine boilers exploded due to imperfect handling, but this was overcome by the invention of a pressure release mechanism, much to the relief of drivers everywhere.

Cornish engines served the area well for many years and permitted mining to be carried out deeper than ever before. Unfortunately as workings became deeper, more water was encountered and eventually even these mighty engines struggled to cope.

### **Flooding solution No 2: The Halkyn Tunnel**

Mining at Halkyn Mountain would have ended from around 1875 were it not for the local topography. It was possible to drive a long tunnel under the entire mountain to drain each mine intersected. It was therefore decided to extend an existing tunnel already a mile long that was origi-



nally driven between 1818 and 1822. The Halkyn Tunnel (or “Old Drainage” or “1875 Tunnel”) was driven at a height of 60 metres above sea level from woods near the town of Flint. It was driven under Halkyn Mountain and continued to Pantymwyn, a distance of five miles from its entrance. This tunnel led to mine after mine re-opening and continued production in the face of cheap imported ore. It revitalised the mines of Pant-y-Go, Great Halkyn, Rhosesmor and North Hendre for the next 30 or 40 years. By 1920 these mines had been worked down to the tunnel or deeper until yet again, flooding stopped progress.

### **The final solution: The Milwr Tunnel**

If mining were to continue in the area, only one option remained; the driving of a new tunnel from the deepest point possible. The Milwr (or Sea-level) Tunnel was begun in 1897 from the coast at Bagillt. From 1928 it operated from Pen-y-bryn Shaft at Halkyn where a large mill processed the ore. As the tunnel continued southwards, operations moved from Pen-y-bryn to Olwyn Goch Shaft at Hendre. This tunnel was eventually driven a distance of 10 miles to Cadole near Loggerheads by the year 1957. It is one of the UKs longest mines drainage tunnels. It successfully drains over 50 veins and creates a labyrinth of over 60 miles of interconnected passageways. At a time when low ore prices were decimating the industry, the Milwr Tunnel was cutting previously unknown veins and making profits from the systematic exploitation of known veins by the removal of ore down to, and even below, sea-level.

### **Mining in the 1930s**

All mining after 1928 was carried out by a single company; Halkyn District United Mines. They developed a method very different to the traditional method of working veins deeper and deeper by hand. Instead, most veins were worked upwards from the Milwr Tunnel or its branches. The company drove passages along each vein they encountered and then removed all minerals from the vein, working upwards until they met with the bottom of the deepest Old Man's workings. This resulted in large open spaces, typically 60 metres high and 400 metres long. The width of such veins however varied from only 1 to 2 metres. All waste rock and galena was taken by train to Pen-y-Bryn Shaft or Olwyn Goch Shaft where it would be raised to surface for processing. During the 1930's up to 650 men were employed by the mine and tunnelling records were being broken.

### **The end of lead mining**

The low price of imported ore eventually closed the last remaining mines in Britain. Halkyn Mines produced less and less until in the 1970s they were merely mining a single vein at Pant-y-Buarth between Cadole and Gwernaffield. The last ore to be mined after a history of over 2000 years was taken from this vein in 1978. The mine kept operating on a “care and maintenance” basis for a few more years but eventually closed down in 1987. The centre of operations at that time being Olwyn Goch shaft at Hendre. The headframe was taken down shortly afterwards and the shaft was permanently sealed.





### Modern day exploration

Since lead mining ended and the last mine closed in 1987, a local cave and mine enthusiast group have been granted a licence to explore Halkyn Mines. In the years since 1994, they have explored over 30 different veins and a total of 23 miles of passages. During this time Grosvenor Caving Club have photographed the workings and its artifacts and are continuing to explore the more remote parts of the complex.

Many items of machinery were left underground when the mine closed. Amongst them are diesel and battery locos, various kinds of rolling stock, compressed air drills, old pumping machinery, drum winches, windlasses, wooden buckets, felt hats, tallow candles etc. Some items have been undisturbed for 120 years. Two rare items dating from around 1883 are a wooden sledge used for hauling ore buckets along a passage, and an ore canvas used to collect the ore picked from above.

Most of the workings explored from the Milwr Tunnel date from 1928. The older workings lie closer to the surface. The first of these older workings found by the explorers were the mines around Rhosesmor, Hendre and Halkyn. These date from 1870 to 1920. The most recent exploration work near Pentre Halkyn has revealed workings dating back to 1840.

No evidence has yet been found of Roman workings on the mountain. These lie close to the surface. If Roman passages do exist, they are likely to have been used for dumping waste material and may need to be excavated, as was the case at the Bronze age copper mines at the Great Orme. The only evidence of Roman interest in our local mines was the discovery of lead ingots found at Flint.

### Living conditions for miners

#### Housing

##### Miners cottages

It was customary practice in most UK metal mining districts for miners who could afford it, to take waste land and build their own homes. This would, of course involve a great deal of time and effort. It would also cost the equivalent of many months wages. In 1861 a miners cottage could be built for £50 to £100. It was generally simple housing consisting of a living room with two bedrooms above. The floor would be made of compacted earth or flag -stones. These cottages would have been similar to those of non-mining families of the time.

Such miners lived in their own freehold properties giving them an independence that was much prized. This irritated an Agent for the Grosvenors who said *“I cannot understand why a miner would choose to build his own home for £100 rather than rent a comfy cottage for £2 a year”*.

In 1842 Halkyn miners homes were described as “neat though scantily furnished”. “Most had at least a rag rug to soften the hearth”. In the years that followed clocks were owned by most mining families. Metal cutlery then became the next functional addition. China and other ornaments then began to appear, marking the beginning of the modern consumer society.

Many mining families were indeed very poor on the Mountain, particularly at times when mines were closed and no wages could be earned. Such times were presumably being described in the fol-



lowing two grim accounts of miners housing, although it seems likely that these may have been extreme examples.:

A Government Enquiry in 1846 heard that *“Some miners cottages consist of a single room from 9 to 12 feet square; others have in addition a lean-to, forming a separate place to sleep in. They are in general devoid of furniture, the roofs are wattled others are of straw, and full of large holes open to the day”*.

Parliamentary Papers in 1864 further state that the lead mining community of Halkyn was criticised for bad ventilation and drainage: *“Cesspools were too near houses and there were constant outbreaks of typhus and scarlet fever”*.

### **Miners barracks**

It was common at mines throughout Europe to provide accommodation for miners who did not live locally. At Halkyn Mountain one known barracks still survives near Pant-y-go Mine (photo) between Rhosesmor and Halkyn. Miners would normally stay in barracks during the week, for which they paid 3 pence in 1888, and returned home for the weekend.

It was noted in 1888 that some European mines had barracks which were warm and roomy with heated changing rooms. Those in Wales however were described as *“Dirty, disordered and uncomfortable places, where men slept two to a bed”*, but this may have referred to those of mid-Wales. Moves were made to improve conditions in Welsh barracks but the decline in the industry at that time meant that any such plans were shelved.

### **Illness & Accidents**

#### **Carbon dioxide poisoning**

Poor ventilation was common in many local mines and created dreadful working conditions. As men and candles used up oxygen in the air, carbon dioxide was created. Known by miners as *‘the damp’*, this caused men to fight for breath and go red in the face. In only small concentrations a candle flame struggles to burn or will extinguish. Working in bad air was simply accepted as an occupational hazard on the Mountain although in high concentrations, it could be fatal. Higher rates were paid to miners working in badly ventilated areas as a means of inducement.

A Derbyshire miner, William Hooson, who came to work the mines of Flintshire wrote a fascinating “Miners Dictionary” in 1747. He describes *“unsavory damp”* thus....

*“The Air is thick and muddy, making him Pant and Blow, and Sweat, with a Pain and Beating in his Head and Stomach; and when he comes to the Day into the fresh Air, he is troubled with a Giddinefs in his Head, and fometimes with Vomiting”*.

#### **Lead poisoning**

This was a common occurrence and was known by miners as *‘bellan’*. Typical symptoms included constipation, cramp, vomitting, poor appetite, weight loss, anaemia, muscle weakness, headaches. Others symptoms were described as *“Dull skin, a clammy body with perspiration and blue gum”*.

## HISTORY

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Blue gum was a distinctive thin black line over the gums indicative of lead poisoning. The problem was not helped by the practice of 'stemming' shot-holes with lead dust instead of sand. Although there was no known cure, miners attempted to alleviate the symptoms by taking bread dipped in sweet oil and taking no alcohol.

On the surface lead poisoning was known to have been a problem for animals. Cattle and sheep were prevented from drinking contaminated water that ran off from the washing areas, tips and settling ponds. In 1780 a farmer near Maeslygan Mine at Halkyn was given compensation of £3-15-0 for a mare and cow that died from bellan.

Hooson describes lead poisoning as.....

*Belland: The name of a diftemper that Miners are often subject to, the Miner is not seized with it, but in Working upon hard Ore, the Duft whereof that arifes from his Pick-point, being a very Sulphureous Smell, gets into his Bowells, and causes a strange Coftivenefs, with Intolerable Pain for many Days together, (oftentimes) and the worft is, the Doctor's Skill does not eafily remove it.*

The risks today from lead contamination are far less than they were. The chief risk to humans appears to be from drinking contaminated water for long periods.

### Silicosis

Lung disease was more widespread. If you were a lead miner at Halkyn Mountain before 1900 you were likely to have died 15-20 years earlier than the average non-miner. This was due to a combination of silicosis and lead poisoning. Amongst miners, silicosis was known as consumption, phthisis, miners rot or miners asthma. It was the earliest known industrial occupational disease. Records exist of its occurrence at stone mines in southern England as long as 5000 years ago.

It was eventually identified as being silicosis, caused by silica dust entering the lungs.

The link between the disease and dust was made as early as 1556 by the German physician and mining expert Agricola, but it was not for another 350 years that his theories were confirmed.

The incidences of silicosis varied according to the type of rock being mined. For example, the limestone of Halkyn Mountain did not contain as much 'free-silica' as the local chert rocks or the slate mines of Ffestiniog where death rates were even higher.

When compressed air drills became widely used after 1875, there followed a huge increase in silicosis deaths due to the increased amount of dust created. Drilling was carried out without any method of suppressing the dust. Miners were soon dying within 3 or 4 years of using these drills without water. When these drills were first introduced, part of the equipment that was considered absolutely necessary by the manufacturers was a piped water supply "to cool the bit and damp down the dust". This was invariably ignored!

Although the cause is now well established, the mining industry were very slow to accept that dust was the cause. In fact it was not until 1904 that the excessive death rate was officially established as being "*due solely to the inhalation of stone dust*". Drilling machines were then modified to ensure that a water spray kept dust to acceptable levels. During the 20th century, most lead mining at Halkyn Mountain was carried out between 1918 and 1950. During this period most drilling was carried out safely.

Miners in the nearby collieries did not normally suffer from silicosis due to the low levels of silica in coal



seams, although they did however suffer from another lung disease, pneumoconiosis. Although this was also a serious lung disease, colliers nonetheless lived considerably longer than lead miners.

Lead poisoning and Silicosis were common amongst Halkyn Mountain's lead miners as the following quotes indicate:

*"These diseases are felt in a painful degree as early as the age of 25 and they gradually increase between this age and 35. They terminate in a comparatively early death."* (A local doctor, 1842).

*"A pallid earthy complexion, sunken eyes and such extreme emaciation that the skin sometimes appears to be pasted to the bones of the face. The symptoms are harbingers of a chronic incurable consumption"* (1830).

*"Those who have long worked in the mines have a prematurely old appearance, a stooping gait, and an anxious expression of countenance. They are thin pale and sallow, and have peculiarly dingy complexions. The men often have the appearance of being thoroughly worn out and decrepit"* (1864).

*"I see colliers who are old, but I cannot find an old (lead) miner".* (Mold Coroner Peter Parry, 1864).

*"I have seen men that I would say were not fit to crawl out of bed or over the door, still going to their work and doing a days labour"* (Mold surgeon Robert Parry 1864).

*"When a miner gets up about 40 years of age he is not worth the snap of a finger."* (Welsh mine captain, 1864).

### Accidents

Fatalities underground, at least in the latter years of the industry, were not as high as one might expect. In the 40 years from 1873 there were 22 deaths in the mines of Halkyn Mountain. Typical causes were falling rock, blasting, falling from ladders or falling down shafts. A young lad at Rhosesmor in 1860 was climbing the ladders one lunch-time when he fell just 2 yards from the surface and was killed. The worst recorded accident in a local lead mine was in 1862 at Bryn Gwilog Mine, near Moel-y-Crio. Miners broke into old flooded workings and 16 were killed. Their ages ranged from 14 to 66. Seventeen men were working at the '120 yard level' when water burst through from old workings on the same vein. The flood killed sixteen but Edward Powell was able to find a ladder and hauled himself up a guide rope to safety. The accident left 10 widows and 25 children. At a meeting, the Marquis of Westminster opened a fund with £100 and the Bryngwilog Mine Company gave £200. By the end of the meeting the fund had risen to £700.

At a subsequent enquiry the company was cleared of guilt as no mine plans of the old workings were available to the company.

*1867: Four miners were killed at Deep Level Mine, Halkyn when a collapse was followed by an inrush of water. Those killed were named as John Martin aged 42, Thomas Evans aged 31, George Jones aged 35 and George Hayes aged 21.*

Further accidents are described in reports by Mines Inspectors:

*1877 September 5th. Halkyn Deep Level Mine. Thomas Harris, aged 54, miner.*

*The stone lining of a shaft which the deceased and others were sinking came down on him (The Duke of Westminster sent the man's widow £10).*



*1886 September 13th. Halkyn Mine. William Jones, aged 26, blacksmith.*

*A large underground cavern had been discovered at Halkyn Mine and the agent made use of a small boat to explore it. After he went away, a blacksmith, who I am told, had never been in a boat before, jumped in out of pure curiosity, and when a little way from the shore of the underground pond foolishly stood up in his frail craft, which capsized and he was drowned. He had married at Halkyn three years earlier and left three daughters.*

This cavern was first discovered in Powell's Lode beneath Rhosesmor at a height of about 60 metres above sea level. The depth of the lake was not to be discovered until 45 years later when the cavern was broken into at sea level. Even then, the depth of the lake extended at least another 60 metres below sea level.

*1896: East Halkyn Mine. Isaac Stealey aged 24. Was killed when his head struck against the roof as he was being drawn up seated on a wagon. He was riding in contravention of orders.*

*1899: East Halkyn Mine. Richard Edwards, aged 50, timberman. While repairing an inclined shaft, he somehow fell to the bottom, a distance of 25 yards. Killed on the spot.*

The above two accidents appear to refer to a shaft just west of Rhosesmor Vicarage. It was called a Plim Shaft which carried men to surface in metal skips. It was closed down due to instability a few years later.

Accidents during the early years were fairly frequent as a result of either primitive practices or carelessness. Many were due to falls of ground or collapses. Conditions improved very little until the mid 1800s when several Royal Commissions were set up to look into the state of the industry. One such commission enquired about Children in Mines in 1842. As part of this enquiry, deaths in mines were studied and amongst the names are local children who died underground....

- *Francis Carrington, aged 13. Died at Halkyn (Deep Level) Mine.*
- *William Lloyd, aged 13. Died at Halkyn (Deep Level) Mine.*
- *Joseph Davies, aged 13. Died at Halkyn (Deep Level) Mine.*
- *John Evans, aged 10. Died at Hendre Mine.*

### Strikes & unrest

1623: The ancient Mining Laws were abolished by Richard Grosvenor. As already mentioned, a court case followed which resulted in victory for the Grosvenors and the mining laws were extinguished. The ordinary miner would have had poor legal representation in the face of the Grosvenor family who, even then, were both wealthy and influential. Although much bitterness was caused at this time, no records exist of strikes or other action being taken by miners.

1822: Whilst mining was carried out by small groups of individuals, miners were their own masters. But with the arrival of mining companies, relationships between managers and miners could at times deteriorate. By 1822 the Grosvenors mines at Pant-y-go had been in difficulty. They called in John Taylor, the well-known Cornish mining engineer to attempt to improve matters.



Taylor brought in other Cornish mine captains and enforced strict new rules for miners.

These rules were seen by the miners as unfair and impossible to comply with. A particular complaint against the company was that insufficient timber was being supplied for shoring. The miners wrote a petition which was sent to Parliament which mention the following:

*“Respecting Thomas Williams the Underground Agent, he has refused us with a proper supply of timber and we could mention several instances where the miners lives have been endangered by it and your lordship has suffered an unnecessary loss by the works not being properly timbered..... and if we complain, instead of a redress we have a volley of curses”.*

1850: The most bitter disputes were over attempts to change the long-standing 6 hour day to one of 8 hours. The men were well aware of the problems of lead poisoning and chest disease, and considered 6 hours to be more than enough, particularly in mines with poor ventilation as at Pant-y-go. Some Flintshire mines had already introduced 8 hour days by 1850, but when Taylor tried to introduce it at Pant-y-go Mine, it met with strong opposition. A group of 500 miners ransacked managers houses whilst local police were powerless to act. The following week troops were called in and ringleaders were arrested for riot, but no-one would give evidence against them.

1866: “Taylor & Sons” purchased the lease on Pant-y-go mine and again tried to introduce the 8 hour day. This led to several hundred men marching to Pant-y-go and calling a strike. One week later a detachment of the 86th Regiment arrived to regain control together with constables with drawn cutlasses. The Mine Agent addressed the crowd who went home without further incident.

Miners claimed that an 8 hour day would double the already poor mortality rate, but Taylor claimed that nearly all local mines were losing money and they could not afford a 6 hour day. He also claimed *“Miners were old at 40 due to the extra work they did, not as workers in my mine”*. The miners were able to demonstrate that only 18 of 388 miners actually worked their own mines.

The strike lasted 12 months during which miners suffered badly. A handful of non-miners were taken on by the company and there was further direct action by the miners: A 2cwt boulder was thrown down the shaft causing considerable damage; Eight men working at the mine were seized, roped together and marched through Holywell and Greenfield.

Eventually the police took action. Armed with sledge hammers and crow bars, they broke into the houses of the ring-leaders and arrested them. They were charged with riot and assault at a Special Magistrates Court in Mold. The miners were marched through a crowd of 2,000 to 3,000.

One of the men arrested was William Jones from Windmill. He was given six months with hard labour. As a result, his 12 year old son Llewelyn had to leave school to begin work as a quarry labourer to keep his family. He died seven years later aged 19.

The strike ended when the men gave in and accepted the 8 hour day.

Opposition continued however and the following year several hundred men demanded a return to 6 hours due to such wet unventilated conditions in the mine.

1890: The arrival of the Halkyn Tunnel to the area had led to extraordinary profits for many mines throughout the 1880s. In 1890 miners went on strike demanding a share of this wealth requesting an increase in pay of 30%. They went back to work after a few weeks with a 10% rise.

## HISTORY

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1901: Mining began a serious decline due to a slump in ore prices and miners were asked to take a cut in wages of 10% despite the huge profits the previous year. They went on strike and again miners suffered severe hardship. The Duke of Westminster gave firewood and 700 rabbits whilst a soup kitchen was set up at Rhes-y-Cae. Two months later, ore prices had dropped further and the men returned to work accepting the 10% reduction. The decline resulted in the closure of most mines.

1934: The last strike occurred when Halkyn District United Mines attempted to move its centre of operations from Pen-y-Bryn shaft at Halkyn to Olwyn Goch shaft at Hendre. This move could not be avoided by the company which was driving the Milwr Tunnel to the south. The mine manager J.B. Richardson told the men *"You can stay out as long as you like; I have bread forever"*. The men eventually returned to work for one shilling a day less than before the strike. (See exercise 5 'Strike')

### The Kinnaird Commission

A commission into the safety of Britain's metal mines provides an insight into the life of the lead miner on Halkyn Mountain. The following are extracts of interviews with local people carried out in 1841.....

James Jones, 17, Milwr Lead Mine

*Began aged 11 as an ore washer on the surface. Works from 7am until 6pm with an hour for lunch. "The work often binds my bowels" he says referring to lead poisoning. "Our hands are constantly immersed in water and our feet are generally wet while at work". Paid 7/- a week.*

Richard Hughes, 10, Milwr Lead Mine

*Began aged 9, he gets 3/- a week and gives it all to his mother. The work tires him a little but he is never beaten and he sleeps well. Walks a mile to work. Goes to chapel regularly. "The overlooker makes us work very hard and he won't let us be idle".*

Owen Owens, Minister, Rhes-y-Cae

*"The miners are not long livers; they are subject to asthma (silicosis) and they often die early. It is a rare thing to see a miner of the age of 60".*

Edward Redfern, 15, Deep Level Mine, Halkyn

*Began aged 10 as an ore washer. At 15 his wage was 3/- a week. He could read Welsh and was learning to write. His father was a miner but broke his leg in the mine 5 years earlier and has done no work since. The father was given 3/- a week from the parish. Edward describes his clothes as "Not very good. But I have two suits. My house is not very well furnished. We have a clock and two beds, and good bed-clothes". Was taught at Lord Grosvenors School.*





John Jones, 16, Deep Level Mine, Halkyn

*Had been dressing ore for six years and was paid about 6/- a week. He was paid 2d a month to pay the doctor and he could read and write. He lives with his mother. His father was killed in the mine 13 years previously. He also lives with a brother and sister. The family lived on the wages of the two boys which totalled 10/- a week. They have a crop of potatoes which occupies their spare time in the Summer. "In the Winter I reads the bible often, help my mother and go to chapel three times every Sunday". Was taught at Lord Grosvenors School.*

Thomas Williams, aged 46 Deep Level Mine, Halkyn

*Six boys from 10 upwards, worked underground pumping in air to the mine for ventilation. Regarding silicosis "Many miners are carried off before they are 50".*

Edward Roberts, 49, Agent for Hendre Lead Mine

*"The average pay was 15/- a week for the pitmen and 12/- a week for the borers and drivers. Borers had a more responsible job and attend the mine on Sundays in case anything should go wrong with the engine and the pumps".*

*Most miners worked a six hour day at this time. In their spare time some miners were self-employed searching for ore. "Two or three or more miners will get a take-note from a proprietor of land, and sink in search of ore. These ventures are seldom successful.*

*I remember miners when they used to be little at home, when they were noisy, always quarrelling and fighting, and committing depredations of all sorts; when the Sabbath was a day of riot and drunkenness. Things are now much altered – they are orderley, well dressed, attentive to their duties and the Sabbath is well kept. This improvement is because chapels have been built in every place".*

Captain Francis Evans, Bryn Gwiog Mine, Moel-y-Crio

*"There was a custom amongst the miners that no matter what family they had, they would only give their wives 12s a week and no more. If they earned 15s a week they would pay their wife 12s and drink the rest. Farm labourers, if married, are allowed the privelege of a cow. They live a great deal better than miners".*

John Evans, aged 10, Hendre Lead Mine

*"My father is a gamekeeper but he does not live with us at home. I do not go regularly to chapel as I have very poor clothes and am ashamed of going. My mother requires all my earnings to pay for my food and won't give me clothes when I require them. Mother goes to chapel regularly but tells me to stay at home when my clothes are ragged. I say the Lord's Prayer every night and have plenty of food – bread, meat and potatoes, and bread and milk".*



James Pickering, 41 Schoolmaster at Lord Westminster's charity school, Halkyn

*"The children pay 1 shilling entrance and 1 penny a month towards fire. Some pay more if they can afford it. Lady Westminster visits and takes great interest in the education of the children. My salary is £70 a year with a rent-free house. We have about 150 children attending the school, but the boys might leave after two years to work in the mines. Most can read pretty well and write by then and they continue to attend Sunday school to keep up their knowledge".*

George Hughes, Mining Agent for Marquis of Westminster

*"We issue annual grants renewable every year on the first Monday in May. But we have very few of these smaller grants now. They are swallowed up in a great measure by the larger companies, for which leases are granted for periods of 21 years".*

*"In the smaller workings the men start from the surface. They work down from 5 and 6 down to 20, 30 and 40 yards down; if they get anything which makes it worthwhile, they go down after it. Rhosesmor is an exception, because they did not find the lead ore there till they got to 80 yards deep".*

*"It is our rule to let an area of 60 yards by 30 yards to two men. Once granted, they can renew it each year. We never take it from them as long as they wish to work it". The two men work underground until they have an accumulation of ore and then they usually get assistance to raise it. The men then dress the ore themselves and prepare it for the market".*

*"It is these small ventures that are the worst ventilated, where perhaps 4 or 6 men are working on their own. There was an instance here the other day; Two men were working in the bottom of a shaft but the air was very bad, so that they could hardly breathe., but they had heard from somebody that if they had a stove in the shaft it would cause a better ventilation. They took a stove down to the bottom of the shaft, and of course it had not been there above three or four minutes before they both fell senseless at the bottom of the pit".*

*"The miner works for 6 hours". The Grosvenor family tried introducing an 8 hour day but "There has been a great strike about the overworking in our district; they will only work for 6 hours. In other places I find that they work for 8 hours. The 6 hours includes the changing and embraces the going down and coming up as well".*

*"Some miners have a piece of land attached to their cottages. A great many have stolen a bit of the common from time to time, and they keep a cow. The common is of great assistance in keeping a cow, they make use of the piece they have taken (perhaps an acre or two) for the purpose of getting grass for the cow in the winter, and in the fine part of the year they turn the cow upon the open common for which they pay nothing".*

*"We cover many abandoned shafts every year. We covered the whole of them over a short time ago, but the boys about there take delight in knocking them down, and it is fine fun for them".*

George Boden, 34, manager of Long Rake Mine near Rhes-y-Cae

*He employed 26 men at Long Rake in 1841 with no boys or females. "My workers are generally poor, the average wage being 12/- a week. There may be a son or two in each family earning up to 7/- a week.*



*These wages together with a crop of potatoes, which almost every family has, together with what they can make by keeping a few sheep and an ass on the waste or common, allow them to live tolerably comfortable. Some however are very poor and out of employ”.*

*“Many miners join Temperance Societies and there is a vast deal less drinking than there was even two years ago. There are two public houses in the neighbourhood, but I think they might close, they get but little business. After work I see them cutting turf for fire, gathering manure, planting or hoeing potatoes. There are not many idlers and I think them well-conducted, steady people, and bear poverty and hardship without much grumbling. They are certainly more hardy than the English and live more temperately. Miners are affected with complaints of the chest. Many are affected as early in life as 26. They generally die of asthma and few live to the age of 50 if they continue to work in the mines”.*

Most of those interviewed stated that they were well treated and that conditions were good. They also stated that children were not sent to work underground until the age of about 15. It seems however that at the Enquiry, they may not have been entirely free to express their opinions openly. Details available elsewhere give the impression that many boys worked underground from the age of 9 or 10 and the condition of some miners housing was worse than stated.



## Key Stage 3

### Halkyn Mountain and the Industrial Revolution: An Introduction.

Many of the changes brought about by the Industrial Revolution can be seen on Halkyn Mountain. Each of the following units takes a theme and traces the process and impact of industrialisation, particularly during the late 18th and 19th Century.

A.H.Dodd in his book 'The Industrial Revolution in North Wales' describes Halkyn as experiencing 'Mushroom growth during the Industrial Revolution'. However Halkyn Mountain was not exceptional. The same changes were taking place throughout North Wales and, indeed, Britain as a whole.

The focus for industrial growth on Halkyn Mountain was mining and quarrying. The units that follow concentrate on the mining of lead.

#### **Four themes are examined in detail.**

- Firstly, the changes that take place in the actual mining of the lead – from the small scale exploitation of lead in evidence since Roman times, to the large scale mining that could be witnessed on Halkyn Mountain until the closure of the last mine in the 1987.
- Secondly, the working conditions experienced by the miners are investigated by way of a number of fascinating sources.
- Thirdly, the theme of Protest is examined, with special reference to the bitter strike of 1866-7.
- Finally, the lives of those that made their living from Halkyn Mountain is investigated; the sources contrast the lives of land owners, the mine managers, and those that worked underground.

Taken as a whole the sources offer an intriguing glimpse into the powerful impact of the Industrial Revolution on the lives of the people that lived on the Halkyn Mountain during this important period of change.



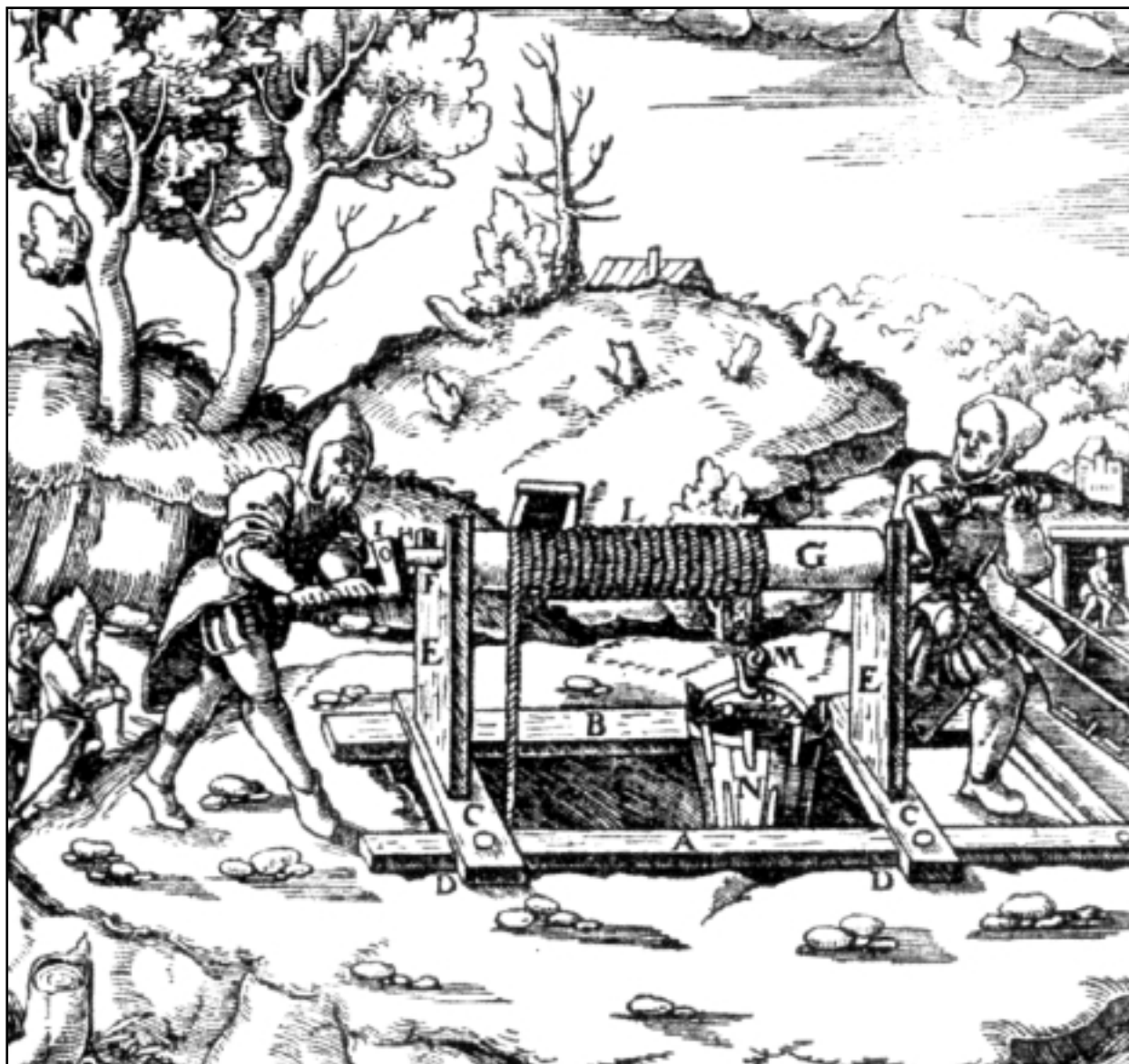
*Stone'bee-hive' over old shaft*



## Exercise 1

### How does the mining of lead change on Halkyn Mountain during the Industrial Revolution?

Source A





Source B



## Tasks

1. From Source A try to work out what is happening in the picture.
2. From Source B, try to work each out what each of the figures is doing.
3. Which century do you think these pictures may be from?

Source C



**Virgula Divinatoria.**

This is the thing much talked of amongst Miners and others, and if there be such virtue in a hazel rod, it must be of excellent use for the discovery of mines, some I know speak with great confidence of it, asserting its power, others laugh at it, as vain and foolish

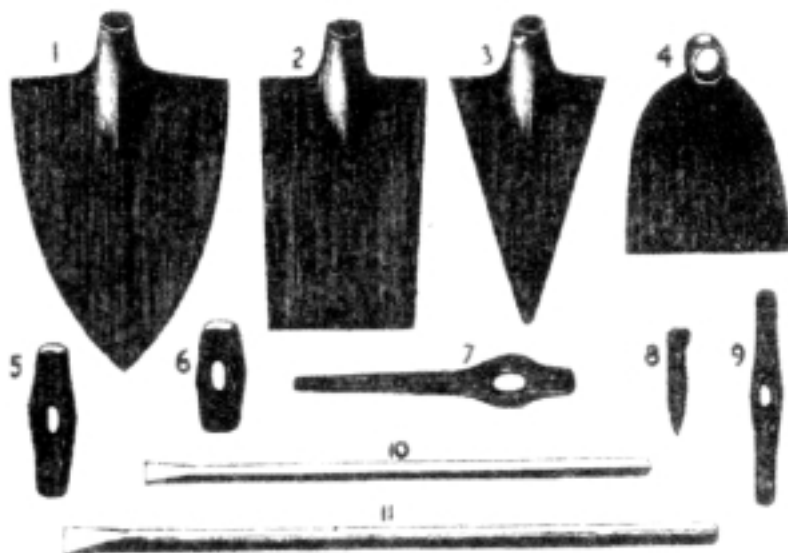
Extract from a Miners Dictionary by William Hooson, 1747

**Task**

4. What is being discussed in this source?
5. What links can you see between this source and either source A or B

Source D

**Mining Tools**



Mining tools from a 19th century sales catalogue



## HISTORY

### Source E



### Description

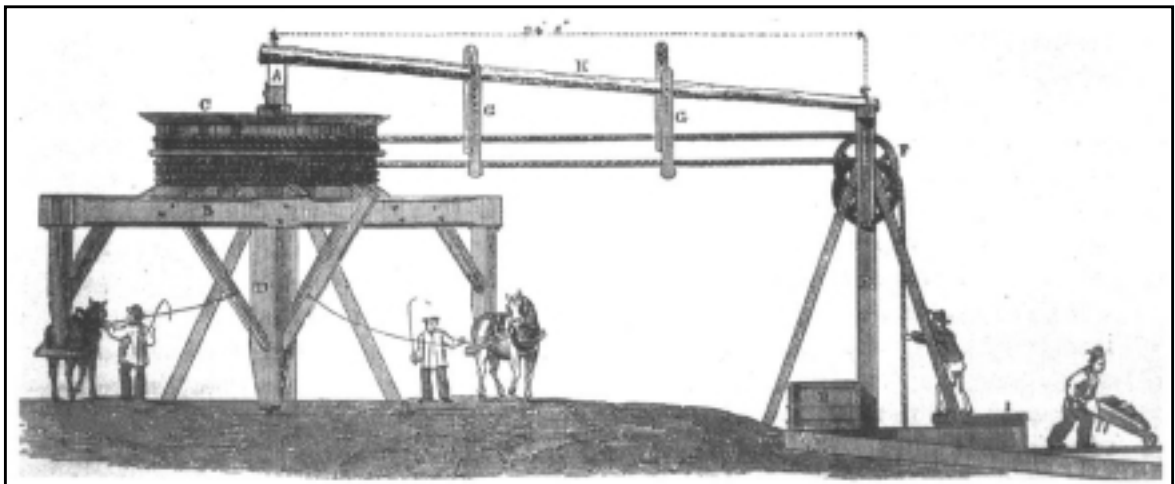
- Spanish Hoe.
- Steel gad, for wedging off large pieces of stone.
- Mallet, for beating borers 10 and 11
- Bulling shovel, used for dressing ores
- Cobbing hammer, used by girls in mines for breaking ores
- (Two items in picture) Borers, for making holes in rocky ground to receive the charge of powder for blasting.
- Miners' shovel – sharp point, made of iron or steel
- Miner's pick, with steel head, for driving gad.
- Miners' shovel made of iron or steel with square point.

Description of the tools shown in Source D.

### Task

6. Match the description of the tools in Source E with the picture of the tools in Source D.
7. Is there any evidence in Sources D and E to suggest that the mining of lead has changed from that shown in Sources A and B?

### Source F



This is a diagram of a Horse Whim. It would have been a common sight on Halkyn Mountain during the early part of the Industrial Revolution.

8. Try to describe what is happening in the picture.
9. Can you find a link between this source and another in this exercise. Explain your answer.



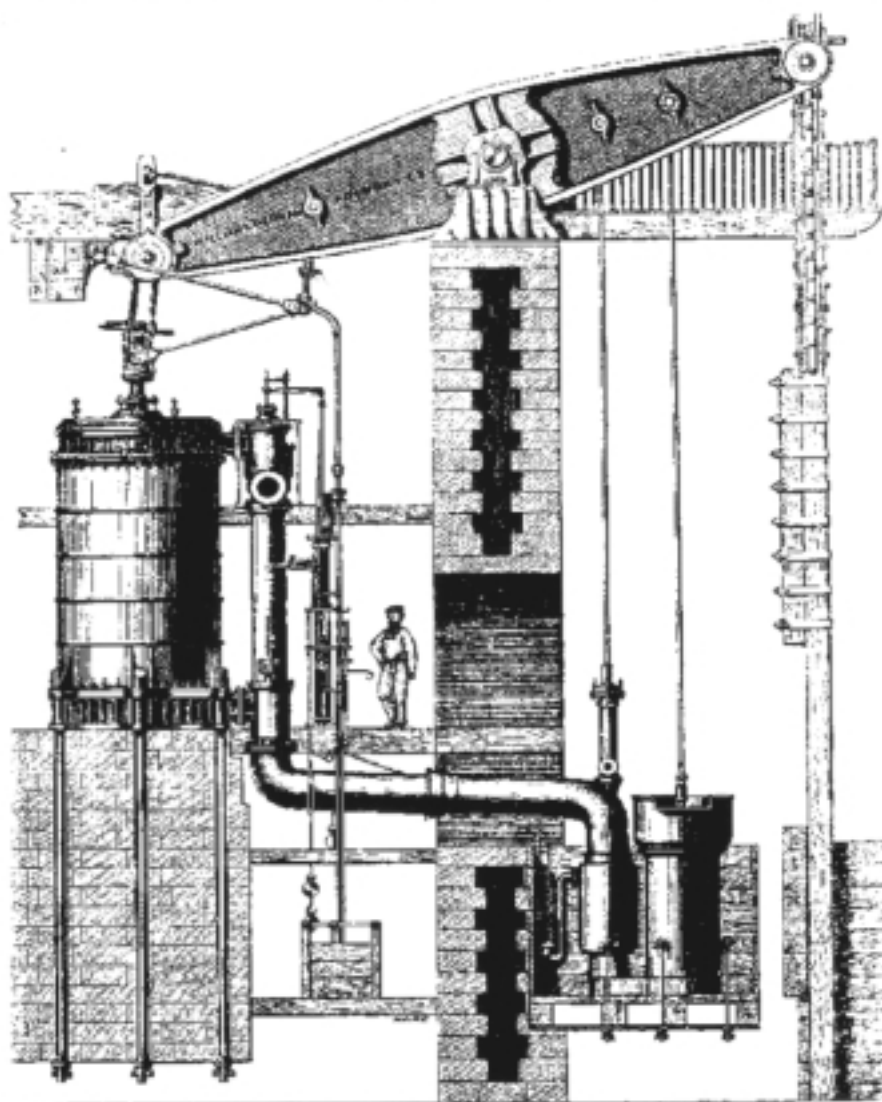
Source F

*'I am one of the last men that would advise his Lordship to have a Steam Ingen if it could be helped but I am afraid the ground cannot be worked without one'.*

Letter from Peter Jones to Lord Grosvenor in 1817. Almost all of his letter refers to the problems of flooding.

Source G

ELEVATION OF PUMPING ENGINE.



BUILT FOR ST. DAY UNITED MINES.

A Cornish Pumping Engine.

10. How would the Cornish Pumping Engine enable the further mining of Lead on Halkyn Mountain?

11. Briefly explain how this engine worked.



## Exercise 2

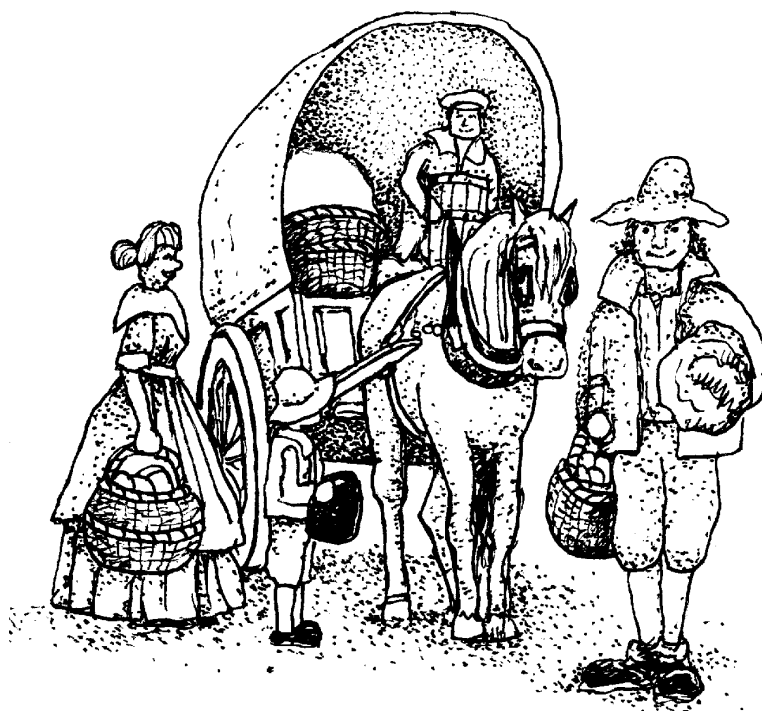
**Key Question:** How bad was life for the Halkyn Miners during the Industrial Revolution?

Opinions about the working conditions for the Halkyn Miners are divided. Many families moved to the area to work attracted by the possibility of making a lot of money. In fact one historian described the movement of people as a 'Lead Rush'. The hours worked by the Halkyn miners were also generally less than in many other parts of the country.

### Source A

In 1715 an exceedingly rich vein was discovered in a field just to the south-east of Pentre Halkyn village belonging to George Wynne of Leeswood. He brought in miners from Derbyshire. The discovery led to a 'lead rush' in the area which attracted further Derbyshire men; investors, managers and skilled miners followed by labourers. Derbyshire names such as Bagshaw, Ingleby, Harrison, Hooson, Oldfield became well-known in the area. 'Profit fever' was such that leases were granted for mining within the grounds of Halkyn Church and beneath a main road. Further large discoveries helped to secure a promising reputation for Halkyn Mountain such as at Silver rake in 1750. In 1770 a rich find at Rowley's rake (Pant-y-pwllldwr) produced ore valued at over £1,000,000. At Brynford in 1774 another mine made £100,000 in a few years. The last large discovery of the century was at Great Holway Mine in 1798 which continued to supply large quantities until 1825.

Account of the 'Lead Rush' adapted from material gathered by Bryn Ellis, a local Historian. (2004)





However other sources give a different impression.

## Source B

*"The Air is thick and muddy, making him Pant and Blow, and Sweat, with a Pain and Beating in his Head and Stomach; and when he comes to the Day into the fresh Air, he is troubled with a Giddinefs in his Head, and fometimes with Vomiting" .*

Written by a Derbyshire miner, William Hooson, who came to work the mines of Flintshire and wrote a "Miners Dictionary" in 1747

There are many sources that refer to an illness suffered by the miners known as 'bellan'.

## Source C

*"Dull skin, a clammy body with perpiration and blue gum".*

From the records of a local Doctor, 1842.

## Source D

*"These diseases are felt in a painful degree as early as the age of 25 and they gradually increase between this age and 35. They terminate in a comparatively early death."*

*"A pallid earthy complexion, sunken eyes and such extreme emancipation that the skin sometimes appears to be pasted to the bones of the face. The symptoms are harbingers of a chronic incurable consumption"*

*"Those who have long worked in the mines have a prematurely old appearance, a stooping gait, and an anxious expression of countenance. They are thin pale and sallow, and have peculiarly dingy complexions. The men often have the appearance of being thoroughly worn out and decrepit"*

From the records of a local Doctor between 1830 and 1860.

## Source E

*"I see colliers who are old, but I cannot find an old (lead) miner"*

(Mold Coroner Peter Parry, 1864).

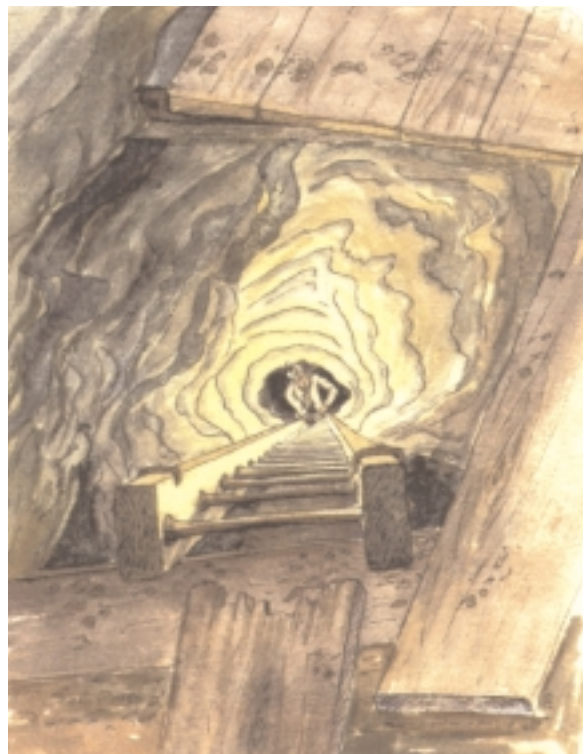


Accidents were another danger for the miners

### Source F

Fatalities underground, at least in the latter years of the industry, were not as high as one might expect. In the 40 years from 1873 there were 22 deaths in the mines of Halkyn Mountain. Typical causes were falling rock, blasting, falling from ladders or falling down shafts. A young lad at Rhosesmor in 1860 was climbing the ladders one lunch-time when he fell just 2 yards from the surface and was killed. The worst recorded accident in a local lead mine was in 1862 at Bryn Gwiog Mine, near Moel-y-Crio. Miners broke into old flooded workings and 16 were killed. Their ages ranged from 14 to 66. Seventeen men were working at the '120 yard level' when water burst through from old workings on the same vein. The flood killed sixteen but Edward Powell was able to find a ladder and hauled himself up a guide rope to safety. The accident left 10 widows and 25 children. At a meeting, the Marquis of Westminster opened a fund with £100 and the Bryngwiog Mine Company gave £200. By the end of the meeting the fund had risen to £700. 1867: Four miners were killed at Deep Level Mine, Halkyn when a collapse was followed by an inrush of water. Those killed were named as John Martin aged 42, Thomas Evans aged 31, George Jones aged 35 and George Hayes aged 21.

Account of the 'Lead Rush' adapted from material gathered by Bryn Ellis, a local Historian (2004)



*Paintings by Selwyn Edwards*



## Source G

1877 September 5th. Halkyn Deep Level Mine. Thomas Harris, aged 54, miner.

The stone lining of a shaft which the deceased and others were sinking came down on him (The Duke of Westminster sent the man's widow £10).

1886 September 13th. Halkyn Mine. William Jones, aged 26, blacksmith.

A large underground cavern had been discovered at Halkyn Mine and the agent made use of a small boat to explore it. After he went away, a blacksmith, who I am told, had never been in a boat before, jumped in out of pure curiosity, and when a little way from the shore of the underground pond foolishly stood up in his frail craft, which capsized and he was drowned. He had married at Halkyn three years earlier and left three daughters.

1896: East Halkyn Mine. Isaac Stealey aged 24. Was killed when his head struck against the roof as he was being drawn up seated on a wagon. He was riding in contravention of orders.

1899: East Halkyn Mine. Richard Edwards, aged 50, timberman.

While repairing an inclined shaft, he somehow fell to the bottom, a distance of 25 yards. Killed on the spot.

All recorded by the Mines Inspectorate (set up by the government to check on the conditions worked by miners)



*Painting by Selwyn Edwards*





### Assignments.

Using the sources and the other work you have done on this topic answer the following questions.

1. Why would people travel from around Britain to work in the Halkyn Lead mines?
2. Describe in your own words the disease known as 'bellan'.
3. What might have caused the disease in the lead miners?
4. Create a 'Safety Poster' advising miners of the dangers in their work underground.
5. How bad was life for the Miners during the Industrial Revolution?
6. Which sources did you find the most useful and why?



*Painting by Selwyn Edwards*





## Exercise 3

# STRIKE!

My name is William Lloyd and I live in Brynteg Cottages, Catch, Halkyn. I am a lead miner, or at least I was before this trouble started. This is my chance to put my side of the story. The events of this year, 1866, will never be forgotten on Halkyn Mountain.

You must realise that working in the lead mines is not easy. I have lost friends in accidents and the health of lead miners suffers from the bellan. That is why we the miners jealously keep the agreement that we work 6-hours each day. The mine owners in recent years have tried to increase this to 8-hours - but we have always defeated them by standing together and fighting for our rights.

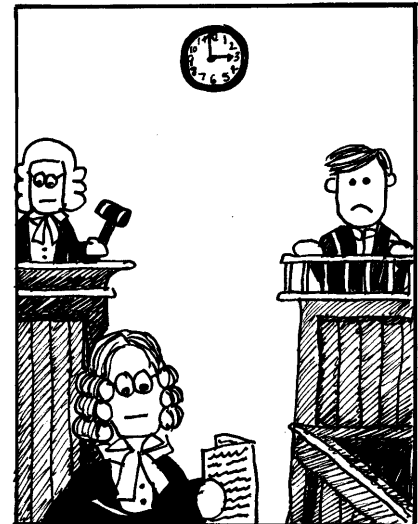
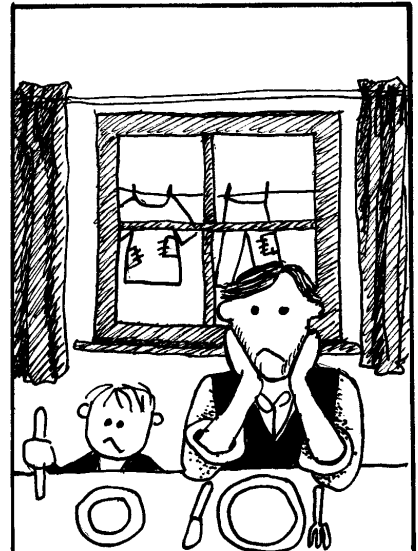
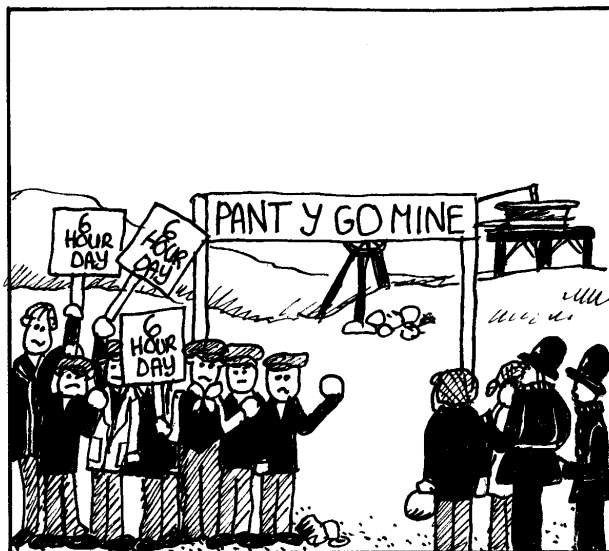
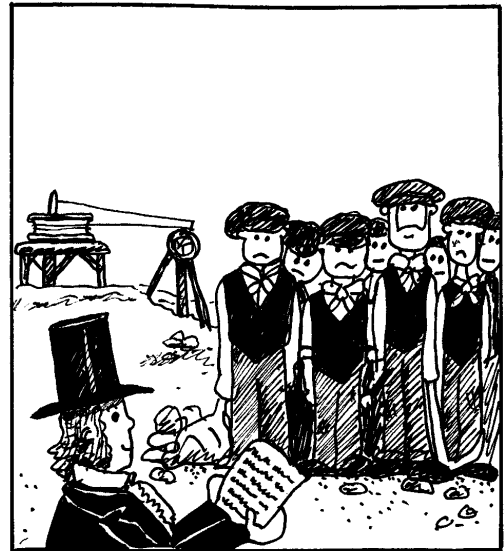
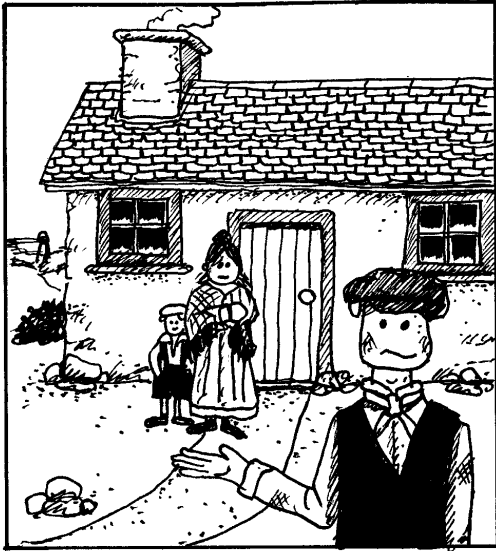
This recent trouble began in 1865 when John Taylor bought the rights to mine at Pant y Go (the biggest mine on Halkyn Mountain). It was bound to end in trouble as his father had tried to force changes on us 40 years before.

If Taylor were to be successful at Pant y Go all the other mines would follow. The Halkyn miners must defend the 6-hour day. All the men in the mines feel the same. The owners claimed that they were losing money and could not afford to keep the 6-hour day. We say that this is a point of principle and that lead mining is so dangerous to our health that to work longer would be unbearable.

We, the miners, did not cause the troubles that took place. For that we blame the Grosvenor estate and John Taylor. Our first protests were peaceful, but we, numbering hundreds of miners, were met by a strong force of soldiers and police with their cutlasses drawn.

Some 'blacklegs' [slang for strike breaker] broke the strike. Their names will never be forgotten on Halkyn mountain. Down the mines we depend upon each other. The same is true during a strike. Such was the anger against the 'blacklegs' that each day they had to be escorted to work by a large number of policemen.

I do not know who was responsible for damaging the mines. They said that a huge boulder was dropped down a shaft causing a great deal of damage. They say that £100 is being offered as a reward for information. It was nothing to do with me.





I am only interested in peaceful protest. We have petitioned Parliament about our cause. The local newspaper, the Flintshire Observer, supports our demands. We have the public sympathy.

As the strike went into a fourth and then fifth month the men became increasingly desperate. Our families were almost starving. We heard that John Taylor was bringing in men from other parts of the country to work the mines. There was bound to be violence. On May 1st 1866 along with hundreds of Halkyn miners I went to Pant y Glo to meet these 'blacklegs'. It all got very nasty. The crowd roughly captured the blacklegs. Their jackets were turned inside out and a paper sheet fixed to their backs telling the world they were 'blacklegs'. Then they were tied up and forced to march through Holywell on the way to Mostyn. The 'blacklegs' were terrified and screamed for help. We were going to put them on a ship bound for Liverpool. Hopefully they would not return to Halkyn. Before Mostyn was reached the Police arrived and the men were released.

John Taylor was outraged at this incident and was determined to get his revenge. He persuaded the authorities to send a large number of Police into Halkyn to capture those he thought were responsible for the capture and imprisonment of the 'blacklegs'. They arrived early one morning and with sledge hammers broke down the doors of our houses. We were dragged from our beds and shut up in a Mold prison cell. I am proud to say that my wife managed to bite a piece of a policeman's hand as I was taken away. On our return from Mold, having been granted bail, our fellow miners cheered us.

When we finally went to Court in Mold on June 11th I was told that three thousand people lined the streets to support me and the 13 other lead miners accused of rioting. They knew that they could never safely hold the trial in Mold, so a date was set for our full trial in Chester.



### Task

What do you think happened next.....

You should think about the following:

- The prosecution's case against William Lloyd and the other men.
- The defence made by William Lloyd and the other miners.
- The outcome of the trial.
- The outcome of the strike.

When you have completed this, your teacher will tell you what actually did happen to William Lloyd and the other miners.

What actually did happen.....

- The case against 14 miners began at the Chester Spring Assizes on 5th April 1867
- The prosecution focused on the right of the men to go to work.
- Witnesses gave evidence against William Lloyd and his fellow strikers claiming assault and kidnap.
- The defence did not try to deny the events, but claimed that William Lloyd and others were merely part of a crowd and did no more than anyone else.
- The Jury, after one and half hours, found just four of the men guilty – one of them was William Lloyd.
- William Lloyd was sentenced to 6-months hard labour.
- His imprisonment brought real hardship on his family. His son, Llewelyn aged 12, had to leave Halkyn School as a direct result. Llewelyn went to work as a labourer to bring some money into the house.
- The strike ended in December 1866, twelve months after it had started. The men had given in and agreed to work the 8-hour day.



## Exercise 4

**Key Question:** What was life like for the people living on Halkyn Mountain during the Industrial Revolution?

- The Industrial Revolution made Britain, at the time, the richest country on earth. The Lead Mines on Halkyn Mountain were, for a while, highly profitable.
- However the prosperity was not shared equally and for many life on Halkyn Mountain was a struggle against poverty.

The following sources show the variety of experiences people had living on Halkyn Mountain during the Industrial Revolution.

### Source A

The Grosvenor family then began acquiring other local mineral grants. In 1614 Richard Grosvenor was granted rights by the Crown which effectively gave him control of the mines. A radical move was to abolish the miners laws in 1623. This caused great conflict with Halkyn miners who claimed their historical right to mine for lead. A court case followed which resulted in victory for the Grosvenors and the mining laws were extinguished. All consequent mining has been carried out by leasing the rights to mine from the Grosvenor family. The Grosvenors today still own most of Halkyn Mountains mineral rights.

Written by mining historian, Chris Ebbs.

### Source B

It was, of course, the Grosvenor's great London estate that was the major source of the Duke's wealth.

'Taken from a 19th Century Biography



### Source C

He was everywhere received with the utmost demonstration of joy and affection: at Halkin, the miners and others in the employ of the Earl of Grosvenor, dressed in their holiday clothes, to the number of nearly seven hundred, saluted and cheered him as he passed.

'Royal Visits and Progresses to Wales' (Edward Parry, 1850). An account of the Visit of Prince Leopold (later King of Belgium) to Halkyn in 1819.



### Source D

The bride cake was the centre piece of the beautiful laid out tables. It stood 4 four feet in height, and weighed nearly one hundred pounds. Resting on a silver stand. it was formed in three tiers, and was surmounted with a vase of the most choice flowers. The first tier was encircled with a wreath of lilies and maidenhair fern; the second tier was very prettily ornamented with doves and nests, between cornucopias of flowers, and from the third tier hung festoons of flowers, with cupids interspersed. The base of each tier as wreathed in maidenhair fern, and the whole was a work of pretty ornamentation worthy of the firm of Messrs. Bolland and Sons.

This is taken from a local newspaper account of a 'Society' Wedding that took place in Halkyn Church in July 1884. The bride and groom were both from wealthy Halkyn families who had made their money from the Lead Mining industry.

### Source E

*"Some miners cottages consist of a single room from 9 to 12 feet square; others have in addition a lean-to, forming a separate place to sleep in. They are in general devoid of furniture, the roofs are wattled others are of straw, and full of large holes open to the day".*

A Government Enquiry into the Halkyn mining industry 1846

### Source F

*"Cesspools were too near houses and there were constant outbreaks of typhus and scarlet fever".*

Parliamentary Report 1864

### Source G

It was common at mines throughout Europe to provide accommodation for miners who did not live locally. At Halkyn Mountain one known barracks still survives near Pant-y-go Mine between Rhosesmor and Halkyn. Miners would normally stay in barracks during the week, for which they paid 3 pence in 1888, and returned home for the weekend.

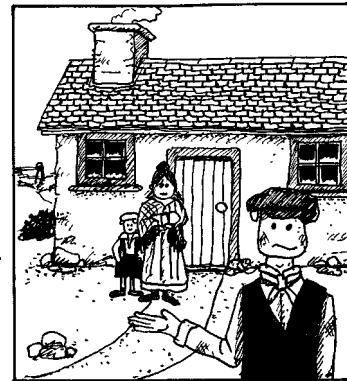
Researched by local historian, Bryn Ellis.



## Source H

*"I do not go regularly to chapel as I have very poor clothes and am ashamed of going. My mother requires all my earnings to pay for my food and won't give me clothes when I require them. Mother goes to chapel regularly but tells me to stay at home when my clothes are ragged. I say the Lord's Prayer every night and have plenty of food – bread, meat and potatoes, and bread and milk".*

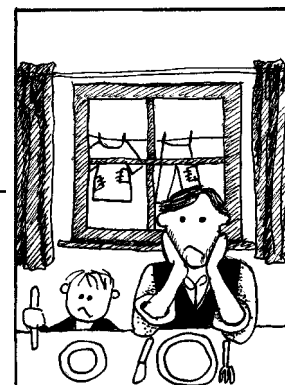
John Evans, aged 10, Hendre Lead Mine from evidence he gave to the The Kinnaird Commission in 1841



## Source I

*"The children pay 1 shilling entrance and 1 penny a month towards fire. Some pay more if they can afford it. Lady Westminster visits and takes great interest in the education of the children. We have about 150 children attending the school, but the boys might leave after two years to work in the mines. Most can read pretty well and write by then and they continue to attend Sunday school to keep up their knowledge".*

James Pickering, 41 Schoolmaster at Lord Westminster's charity school, Halkyn giving evidence The Kinnaird Commission in 1841



## Source J

*"My workers are generally poor, the average wage being 12/- a week. There may be a son or two in each family earning up to 7/- a week. These wages together with a crop of potatoes, which almost every family has, together with what they can make by keeping a few sheep and an ass on the waste or common, allow them to live tolerably comfortable. Some however are very poor and out of employ. Many miners join Temperance Societies and there is a vast deal less drinking than there was even two years ago. There are two public houses in the neighbourhood, but I think they might close, they get but little business.*

George Boden, 34, manager of Long Rake Mine near Rhes y Cae giving evidence to the The Kinnaird Commission in 1841





### Source K

*'Lord Grosvenor is building the house at great expense on a lone barren hill surrounded by lead mines and workmen's cottages with a miserable church and churchyard close by – a bleak half river half sea stretching before it with Parkgate and Hoylake as points of view. It does seem a pity to put all this expense onto a place which nobody thinks of going to but for a few days a year for Holywell races and which, when finished, Lord Grosvenor will not care a pin for'.*

The opinion of Lady Elizabeth, daughter-in-law of Lord Grosvenor, from a book entitled 'Lady Elizabeth and the Grosvenors'.



### Source L

Mine owners commonly employed agents to oversee their investments. These agents might manage the mine directly themselves (in which case they might be recorded as being both agent and manager or even company secretary), but at the larger concerns, they would commonly employ a mine manager to organise the day-to-day running of the mine.

Mine agents had a fairly elevated position in society and were responsible for the success or failure of a mine or of several mines. Mine agents were experienced men with a firm grasp of mining methods, the newest technology, finance and investment. They were consequently much respected in society and by miners in particular.

A description of the role of Mine Managers by a local historian, Bryn Ellis (2004).



## Tasks

1. Copy the outline table (taking up a page in your exercise book). Identifying which sources match each social class:

Social Class	Source	Reason
Aristocracy or upper class		
Middle or commercial class		
Working or labouring class		



**Learning point:** some members of the Grosvenor family also used the title 'Westminster'.

2. Under the following headings list what the sources tell us about the Grosvenor family:

- The source of their wealth
- Evidence of their wealth
- How they may have been viewed by others living on Halkyn mountain.

3. Using sources A, B, C, I and K find **two facts** and **two opinions** about the Grosvenor family.

4. List **six** or more examples of poverty that you can find in the sources.

5. What was life like for people living on the Halkyn mountain during the Industrial Revolution?

Use the table in question 1 to help plan this piece of writing.

Remember to include:

Introduction – "Life for people....."

Second paragraph – "The Aristocracy....."

Third paragraph – "The Middle Classes....."

Third Paragraph – "The Working Class...."

Conclusion.

**Word Box**  
(Words you can use in your piece of writing)

Poverty	Prosperity
Investments	Disease
Profit	Comparison