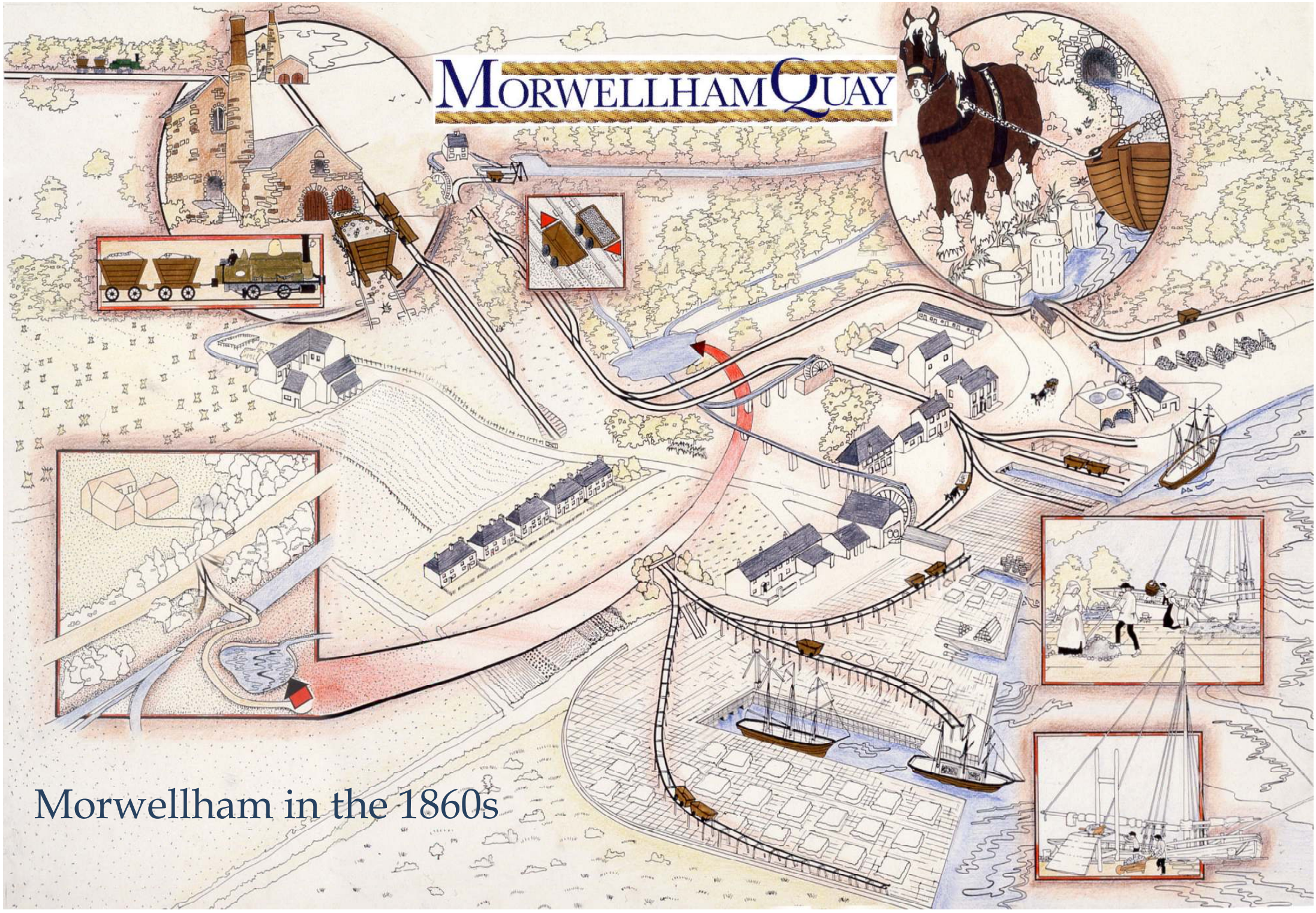
MORWELLHAM QUAY

The busiest time for Morwellham Quay was during the 1860s, when the mines in the Tamar Valley were some of the biggest in Europe.

Activity Book



Morwellham in the 1860s

Activity Book - A Port for a Thousand years

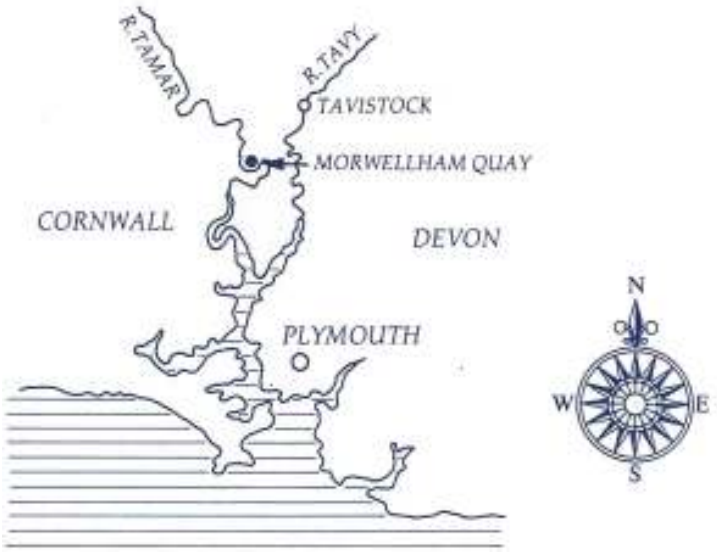
Morwellham Quay - *A Port for a thousand years*

Why Morwellham?

In the days before roads and railways, rivers provided the easiest way to transport goods and people. They were like motorways for boats.

To load goods onto the boats the land around the river needed to be flat and accessible. This flat land was used to create quays (say it like *keys*).

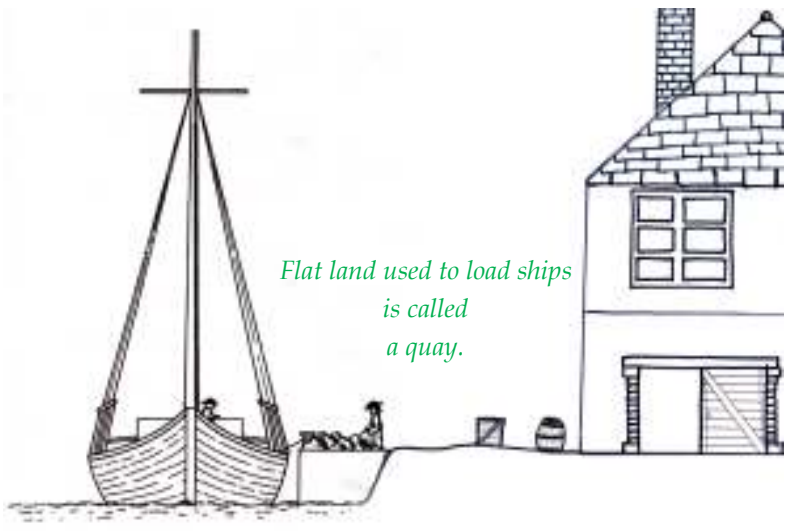
If you look across the river to the Cornish side of the Tamar from Morwellham you can see what this land was like before being developed.



Morwellham's location twenty-three miles from the sea on the river Tamar, was the highest point inland that large ships could reach. This meant that goods from West Devon and East Cornwall could be quickly transported around the world.

The monks of Tavistock Abbey first made use of Morwellham a thousand years ago, transporting goods to and from Plymouth. Unfortunately, in 997AD the river was used by Vikings, to invade Tavistock and sites in the area.

Morwellham was kept by the monks for several hundred years until 1536, when Henry VIII dissolved all the monasteries in England and gave their land to wealthy families, like the Earls of Bedford, who were given Morwellham.



But access to the river was not the only reason Morwellham was such a useful port…

The hills around Morwellham contained ores of valuable metals; like copper, tin, silver and lead. From about 1200 A.D. men began to mine the metal ores, but the steep hills and bad roads made it difficult to transport. Pack horses were used but they were slow and couldn't carry much of the heavy ore.

Ore is the term given to the rock in which the metal has formed.

So Morwellham's quays were used to load the ore onto ships, allowing it to be transported around the world.

As well as shipping goods out (exporting), the river was used to bring supplies in to the region (importing) to keep the mines working. Imported goods were: coal, iron, gunpowder, lime and timber.

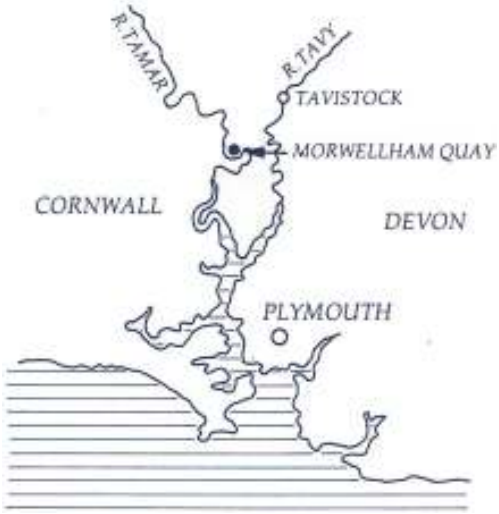
Question 1.

The people who lived in this Abbey used Morwellham as a port a thousand years ago. Who were they?

- [ ] Vikings
- [ ] Monks
- [ ] Druids
- [ ] Romans

Question 2.

If you are standing on the quayside at Morwellham, which direction would you travel to reach the sea?



- [ ] North
- [ ] East
- [ ] South
- [ ] West

Question 3.

Who took the land away from the Abbey and gave it to the Earls of Bedford?

- [ ] Henry V
- [ ] Henry VI
- [ ] Henry VII
- [ ] Henry VIII

Question 4.

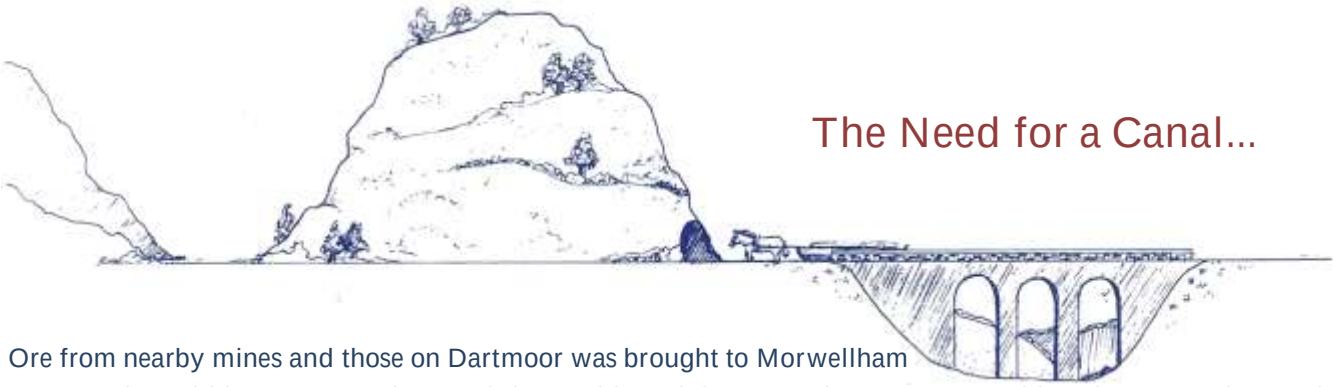
What is an ore?

- [ ] Something used to row a boat
- [ ] A rock containing metal
- [ ] A pack horse
- [ ] A boat

A Port for a Thousand years - QUESTIONS

Activity Book - Bringing Goods to the Port

Bringing Goods to the Port

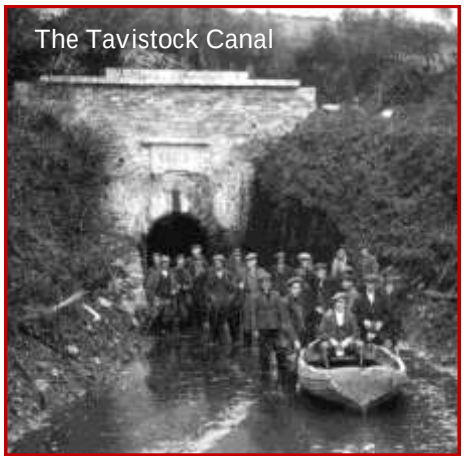


The Need for a Canal...

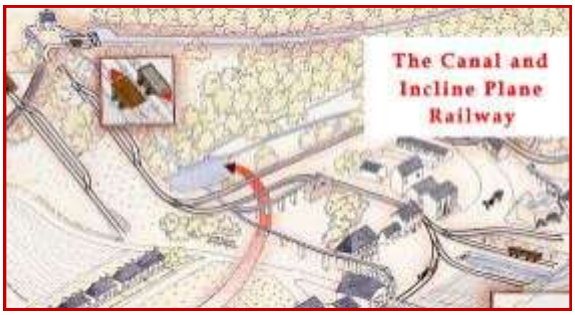
Ore from nearby mines and those on Dartmoor was brought to Morwellham Quay, so it could be transported around the world. Pack horses and carts were used but they were slow and expensive.

So, in 1803 construction of the Tavistock Canal was started.
Canals are man-made 'rivers'. They are built on level land to transport goods easily in boats.

Where the land is not level it must be made so. Engineers build a special bridge called an aqueduct to carry the canal over a valley. Tunnels to carry it right through big hills. Cuttings carry it through little hills.


The Tavistock Canal

The Tavistock Canal was built by the engineer John Taylor and was completed in 1816. The canal is 4.5 miles (7.2km) long and winds around the sides of several hills. It crosses aqueducts and cuts through the hills of Morwell Down through a tunnel 1.5 miles (2.4km) long, ending 240 feet above Morwellham.

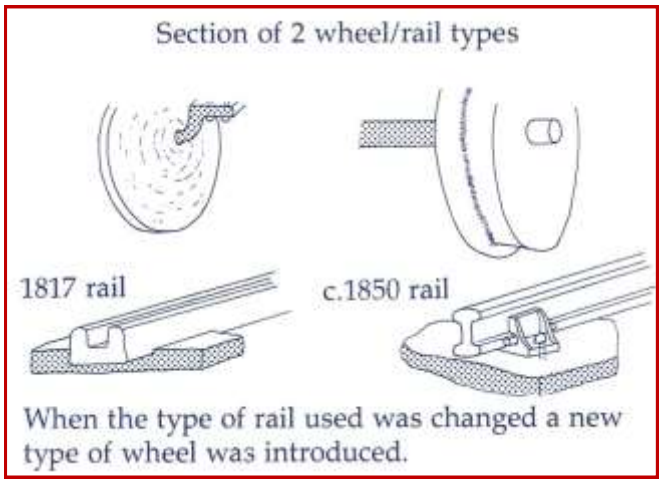


...and a railway.

On the 1868 plan of Morwellham Quay (page 2) you can see the Tavistock Canal above the village. To get goods down into Morwellham a railway was built - called an *Incline Plane Railway* - and was powered by a waterwheel at the canal. The rails came down the hill and into the port near the Ship Inn, where it fanned out towards the limekilns, the medieval dock and the manganese mill.

The rails that you see here on the ground are a reconstruction of a type of rail introduced probably in the 1850's to replace an earlier type of rail, which was laid in 1816.

Opposite the Ship Inn you will see original examples of the earlier type of rail (the earliest railway in Devon). They were discovered having been buried and forgotten for over 100 years.



The distance between the rails is called 'standard gauge'. It is the same as that used today by modern railways. 'Standard gauge' was based upon the standard wagon axle, because the earliest railway wagons were built by farm wagon builders.

Bringing Goods to the Port - QUESTIONS

Question 1.

In which year was the construction of the Tavistock canal started?

- [ ] 1790
- [ ] 1800
- [ ] 1803
- [ ] 1810

Question 2.

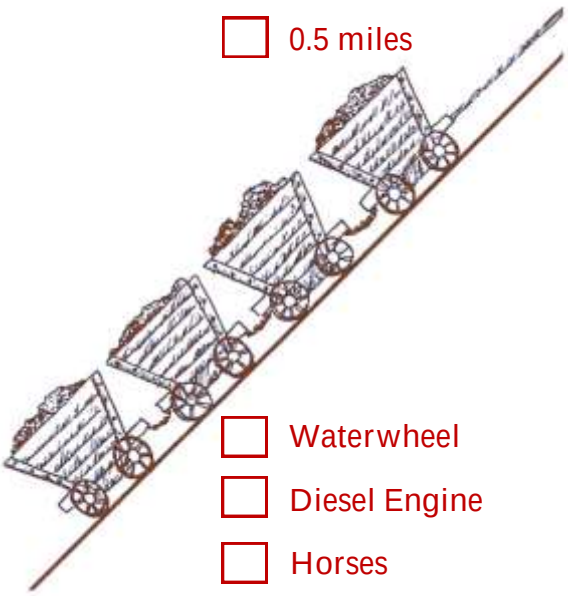
What is the bridge called over which water (like a canal) flows?

- [ ] Viaduct
- [ ] Aquaduct
- [ ] Suspension
- [ ] Arched

Question 3.

How long was the canal's tunnel through Morwell Down?

- [ ] 2 miles
- [ ] 1.5 miles
- [ ] 1 mile
- [ ] 0.5 miles



Question 4.

What powered the incline plane railway?

- [ ] Waterwheel
- [ ] Diesel Engine
- [ ] Horses
- [ ] Manpower

The People of Morwellham

From the census (a government survey) taken in 1861 we know that there were over 240 people living at Morwellham Quay. Around the Port you will see people dressed in clothing similar to that which would have been worn here then.

The Assayer—James Medlen (1796-1875)

The assayer's job was to assess the quality of copper ore and determine how much copper it contains.

The assayer at Morwellham was a man named James Medlen. He worked in a laboratory (pictured) next door to Copper Ore cottage, where he lived with his wife and children. James was also the Harbour Master, or *Wharfinger*, responsible for selling the ore to the *ore buyers*, who came with the ships. James was well paid - about £200 per year (over £100,000 by today's standards) and employed apprentices to help him with his work.

James Medlen worked at Morwellham for fifty-four years - longer than the lifespan of a miner.

The Cooper—William Hillman

In 1868 the cooper was Mr. Hillman. He worked in the Cooper's shop, making barrels or casks. Coopers earned about £60 per year.

The casks were used to store Manganese from the Manganese Mill, as well as Arsenic. The Arsenic

casks were lined with purple paper so people knew they contained Arsenic.

The Blacksmith—William Isbel

In 1868 the Blacksmith was Mr. William Isbell. He lived in one of the Bedford Cottages.

One of the most important members of the community, the blacksmith made all the metalwork needed for the village, the farm, the mines and the ships; including

hooks, signs, ironworks, gates, fencing, chains, hinges, staples, boot scrapers, shovels, rakes, forks, fire grates, fireplace tools, nails and 'S' links. He would also make and fit shoes for the horses. The blacksmith earned about £1 per week.

The Chandler's Shop after Jane Martin. Early 1900s - now a tea shop.

The Shopkeeper —Jane Martin

Miss Jane Martin was a ship's chandler and tea dealer in Morwellham. Chandlers sold candles, ropes, and all the things that were needed on board a ship. Jane Martin also sold flour and tea.

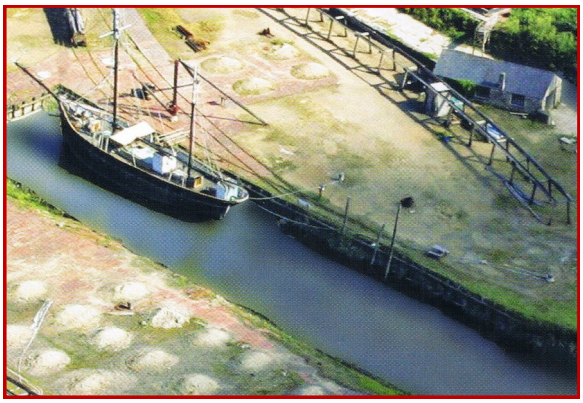
The Chandler's Shop restored

Her business was very successful, because in the 1860's Jane was able to buy eight shares in the schooner *Ariel*, an indication that she had some spare capital to invest.

It may have been as a result of this investment that she met her future husband, Henry Allport, who was a master mariner and a ship owner in his own right. Despite making what would have been considered a good marriage, Jane continued to run the business.

Question 1.

What is another name for a Habour Master?



- [ ] Chandler
- [ ] Wheelwright
- [ ] Wharfinger
- [ ] Cooper

Question 2.

Select two types of cask.

- [ ] Calf
- [ ] Firkin
- [ ] Cast
- [ ] Barrel

Question 3.

What did Jane Martin's shop become after she left?

- [ ] Fishmonger
- [ ] Butcher
- [ ] Tea Shop
- [ ] Post Office

Question 4.

Which of these would a Blacksmith NOT make?

- [ ] Miners' tools
- [ ] Hinges
- [ ] Coffins
- [ ] Chains

Activity Book - The People of Morwellham, part 2

The People of Morwellham Quay

The Miners

The miners worked in the mines belonging to Devon Great Consols. Most of them lived in the surrounding villages and towns. Records show that some of the miners had to walk up to fifteen miles to get to work in the morning (or evening, depending on their shift). Those who lived a long way from Morwellham would often sleep in the woods on the hill instead of walking home.

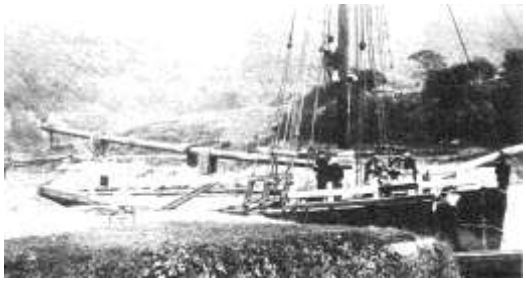
The School Teacher - Elizabeth Rundle

Morwellham's village school was founded in the 1830's by Elizabeth Rundle, the wife of one of the owners of the company which leased the quays and harbours here from the Duke of Bedford.

She was paid around £50 per year and also received a free hot meal every day, provided by The Ship Inn. Children did not have to go to school; they were sent by their parents, who had to pay a penny per week for each child and often couldn't afford to send them.

A School Board was set up in the 1870's to oversee schooling in the Tavistock area, and a new school room just across the courtyard was opened in 1874, paid for by the Duke of Bedford.

The Tamar Barge Captain—Captain Adams



In 1868 one of the Tamar Barge Captains was Captain Adams. He and his family lived at 1, Morwellham Cottages. He carried cargoes between Plymouth and Morwellham. The Tamar Barge 'Edith' in the picture was owned by the Adams family.

Morwellham's Most Famous Visitors.

Queen Victoria

Queen Victoria visited Morwellham in 1856, on her way to Endsleigh, the home of The Duke of Bedford. She came up the river by paddle steamer.

Isambard Kingdom Brunel

Brunel came here whilst working on the Albert Bridge in Plymouth. He sketched the manganese mill. His drawing can be found on the plaque in front of the waterwheel.

William Morris

William Morris was a share-holder in Devon Great Consols. He is most famous for his wallpapers, art and poetry.

The People of Morwellham, part 2 - QUESTIONS

Question 1.

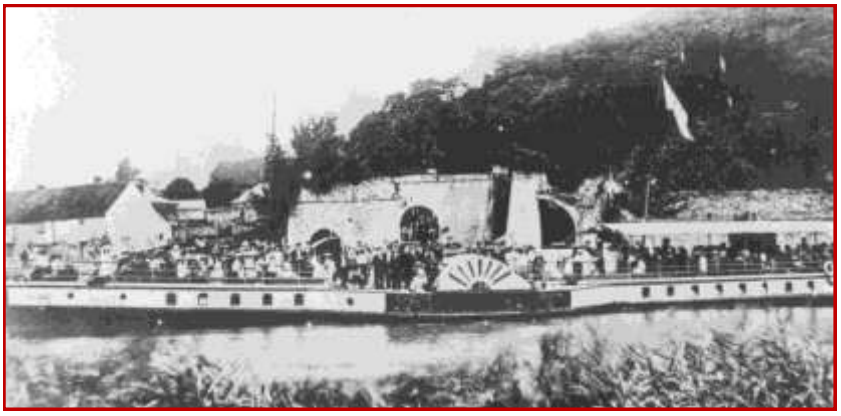
Which of these people earned the most money at Morwellham?

- ☐ Assayer
- ☐ Cooper
- ☐ Blacksmith
- ☐ School Teacher

Question 2.

Who visited Morwellham by paddle steamer?

- ☐ Queen Victoria
- ☐ King George III
- ☐ Vikings
- ☐ Monks



Question 3.

Who lived at Endsleigh?

- ☐ James Medlen
- ☐ Isaac Richards
- ☐ Captain Adams
- ☐ The Duke of Bedford

Question 4.

Who might you find sleeping in the woods at night?

- ☐ Children
- ☐ Lime Burners
- ☐ Miners
- ☐ The Duke of Bedford

Activity Book - The Garlandstone

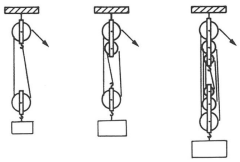
The Garlandstone

The 'Garlandstone' was built by a ship-builder called James Goss between 1903 and 1908, a mile downstream from here at a place called Calstock. She is similar to some of the ships which brought cargoes to and from Morwellham Quay. The Garlandstone is a type of ship known as a Ketch, which refers to her "ketch rig" of sails.

The following pieces of equipment can be found on the ship:

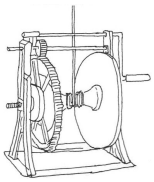
Pulleys

(sometimes called blocks and tackle)



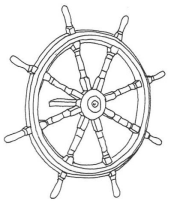
The Windlass

A type of winch used to help sailors raise the anchor or heavy sails.



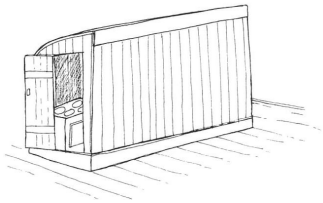
The Ship's Wheel

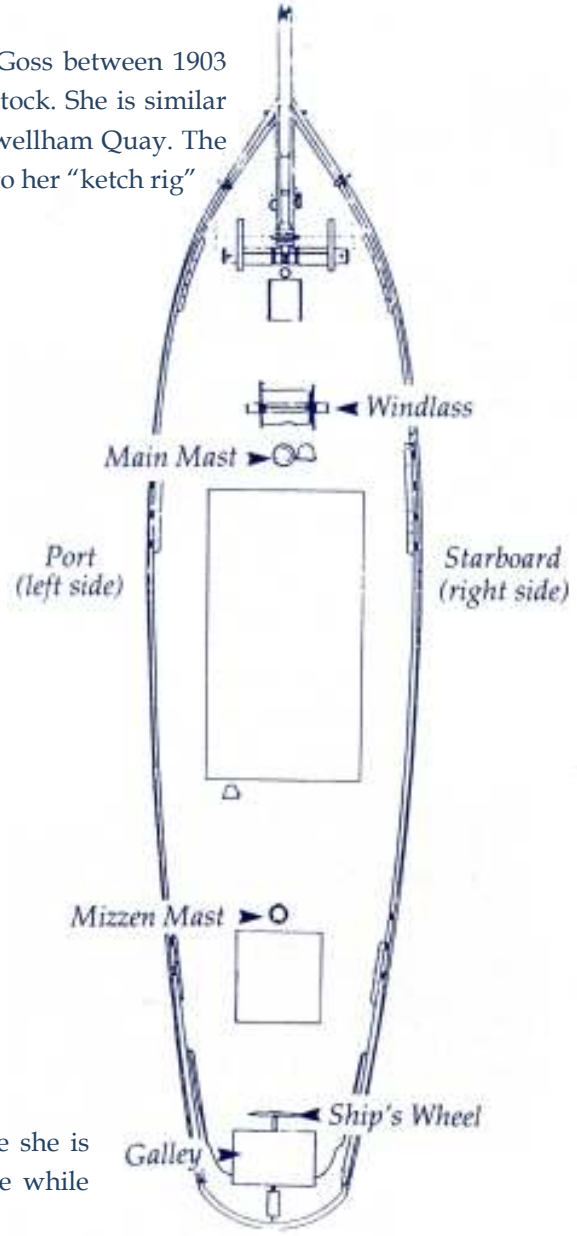
Used to steer the ship.



The Galley

This is where the crew cooked their meals.

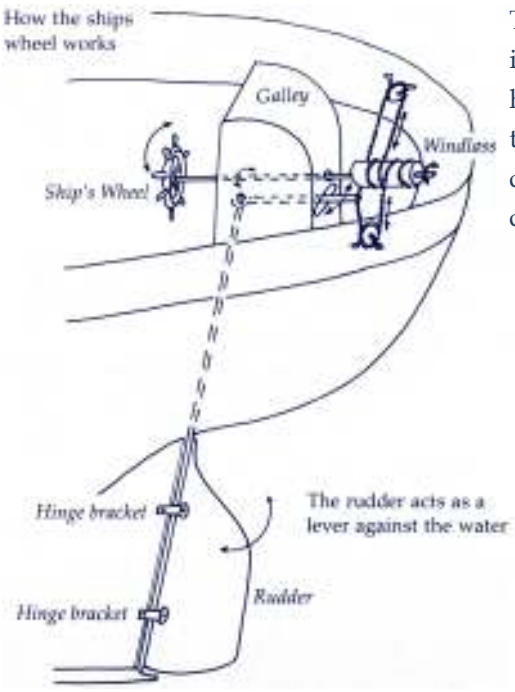




The blunt end at the back of the ship is known as the stern.

The 'Garlandstone' has no sails raised at the moment because she is 'laid up'. (That doesn't mean she's ill!) She is being kept here while work is carried out to make her seaworthy again.

When she was a working vessel the 'Garlandstone' could carry cargoes weighing up to 100 tonnes. Ships which could carry up to 300 tonnes called at Morwellham Quay.



The deck (the boards you stand on) is made from pitch pine, imported from Florida. The large area below deck is called the hold. This is where the cargo was stored. It was lowered through the hole in the deck (called the cargo hatch) which was then covered over with wooden planks, and waterproof cloth called canvas.

The Garlandstone being built.

Question 1.

Where was the Garlandstone built?

- [ ] Tavistock
- [ ] Calstock
- [ ] Plymouth
- [ ] Wales

Question 2.

How many tonnes of cargo could she hold?

- [ ] 50 tonnes
- [ ] 75 tonnes
- [ ] 100 tonnes
- [ ] 300 tonnes

Question 4.

What type of wood is the deck made from?

- [ ] Oak
- [ ] Pitch Pine
- [ ] Mahogany
- [ ] Teak

Question 3.

What was the surname of the family who built The Garlandstone?

- [ ] Hoss
- [ ] Boss
- [ ] Floss
- [ ] Goss

The Garlandstone - QUESTIONS

Activity Book - The Waterwheel

The Waterwheel

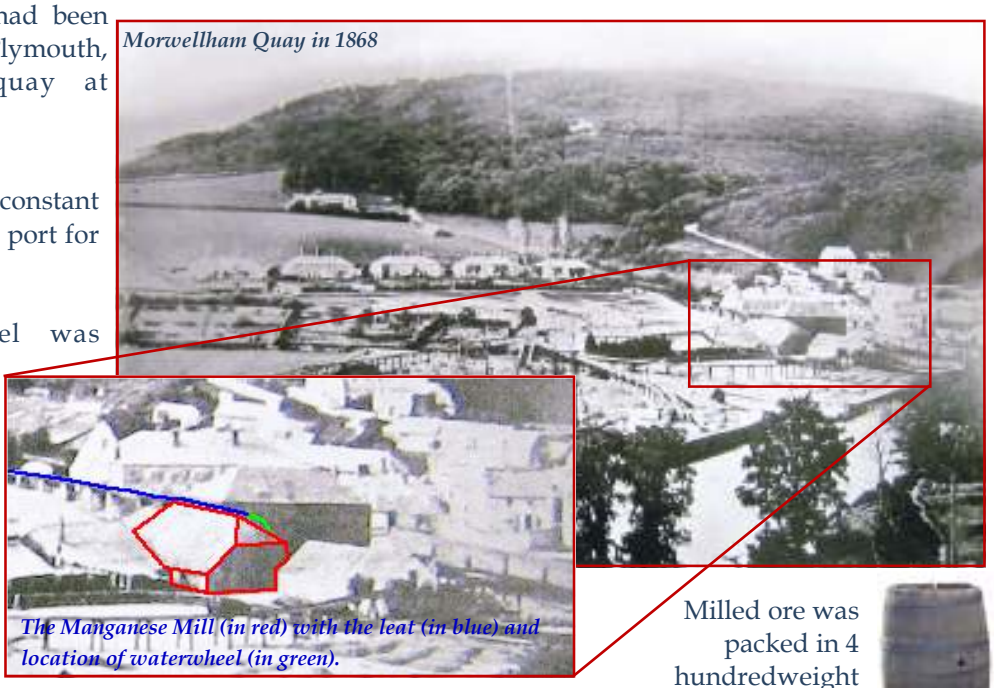
The waterwheel at Morwellham was used to turn the millstones in the manganese mill.

Manganese was discovered in 1774 and was mined in West Devon from around 1815. It was used in glass-making (for colourising and de-colourising), in cotton mills (for bleach-making) and in steelmaking (for hardening iron).

The Tavistock manganese mines were the best in Britain and were located 10 miles (16km) north of Morwellham in the parishes of Milton Abbot, Marystow, Coryton and Brentor. The Chillaton and Hogstor mine surpassed all others in depth and productiveness.

Most of the manganese produced was transported by horse and cart to the mill at Morwellham. Then, once ground and packed into casks, it was dispatched by river to various industrial users around Britain.

The construction of the *leat* to power the waterwheel is believed to have occurred in 1817 after the opening of the Tavistock canal. By 1819, 1335 tons of powdered manganese ore had been dispatched by river to Plymouth, from the manganese quay at Morwellham.



Morwellham Quay in 1868

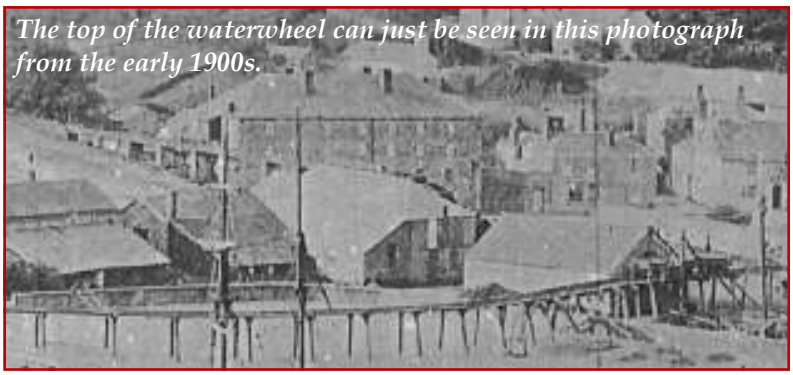
The manganese mill was a constant factor in the life of the small port for at least half a century.

The original waterwheel was removed and relocated to Devon Great Consols' arsenic refinery in the 1920s. In 1973, an abandoned 32ft wheel was salvaged from china clay workings at Headon Down, Cornwood and installed in the original wheelpit.

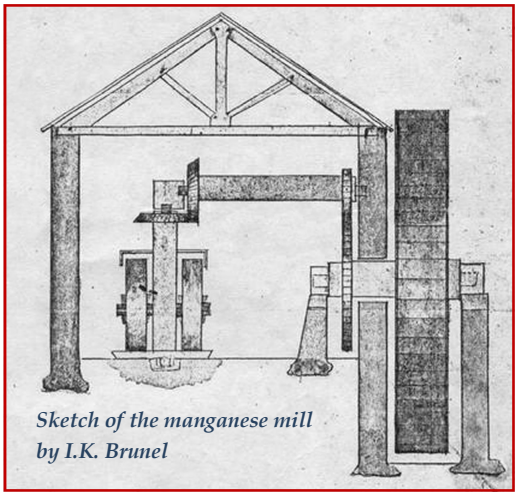
The Manganese Mill (in red) with the leat (in blue) and location of waterwheel (in green).

Milled ore was packed in 4 hundredweight (192kg) casks.

The famous engineer, Isambard Kingdom Brunel, visited during the 1850s and sketched the machinery.



The top of the waterwheel can just be seen in this photograph from the early 1900s.



Sketch of the manganese mill by I.K. Brunel

Question 1.

What is the name given to the channel which supplies water to the waterwheel?

- ☐ Leak
- ☐ Leat
- ☐ Canal
- ☐ River

Question 2.

Which manganese mine surpassed all others in depth and productiveness?

- ☐ Gunnislake & Callington
- ☐ Tavistock & Mary Tavy
- ☐ Chillaton & Hogstor
- ☐ Gulworthy & Chipshop

Manganese Ore

Question 3.

By 1819, how many tons of powdered manganese ore had been dispatched by river to Plymouth, from Morwellham?

- ☐ 1335 tonnes
- ☐ 1334 tonnes
- ☐ 1333 tonnes
- ☐ 1332 tonnes

Question 4.

In which of these industries is manganese NOT used?

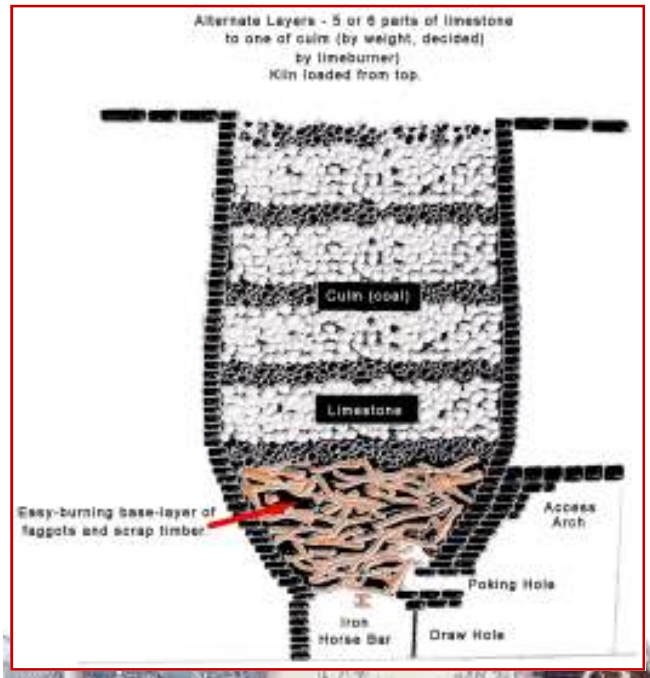
- ☐ Glass-making
- ☐ Textile Bleaching
- ☐ Strengthening Iron
- ☐ Soap-making

Lime Kilns

What are they?

These large buildings were special ovens, used to burn limestone. They were built in about 1770.

Loading and tending the kilns was very hard and hot work. According to the 1861 Census (a census is a count of the population carried out for the Government) the Limeburner at Morwellham was a man named James Wilton. The Census also showed that James' son, Samuel Wilton, aged 12, was a labourer at the Limekilns.



James and Samuel would have needed to load each limekiln with 67 tonnes of limestone and 16.5 tonnes of coal (the same as 1.5 Tamar Barge loads).

Layers of limestone and coal were packed inside and then set alight at the bottom.

As each layer burned it set light to the one above. After about eight hours of burning, the coal was consumed and the limestone was turned into a whitish powder called *calcium oxide* (CaO) better known as quicklime.

When the kilns were working it would have been very warm here. On cold nights tramps would try to sleep near the edge of the kiln. They had to be careful not to roll into the kiln!

Energy given off in the form of heat when the coal and limestone burned was not entirely wasted. It was used to heat small ovens like those built into the side of the limekilns.

Quicklime had other uses too. It was used to make: mortar/cement; a form of white paint called whitewash; and as a disinfectant.

The limestone came from Plymouth by Tamar Barge.

The display panels on the wall of the limekilns describe how the limekilns worked. Have a look at the display panels.

The steps beneath the display panels are made from limestone.

The limekilns had their own waterwheel-powered railway to get the lime and coal to the top of the kiln. The remains of this railway are buried beneath the ground in front of the lime kilns.

Activity Book - Lime Kilns

Question 1.

How many tonnes of limestone were needed for each limekiln?

- ☐ 64 tonnes
- ☐ 65 tonnes
- ☐ 66 tonnes
- ☐ 67 tonnes

Question 2.

Where did the limestone come from?

- ☐ London
- ☐ Plymouth
- ☐ Exeter
- ☐ Tavistock

Question 3.

What was used to bring the limestone to Morwellham?

- ☐ Long Barge
- ☐ Short Barge
- ☐ Barge Pole
- ☐ Tamar Barge

Question 4.

Which of these is NOT a use for Quicklime?

- ☐ Mortar
- ☐ Making bread
- ☐ Whitewash
- ☐ Disinfectant

The Copper Mine

An ore chute above Bath's Quay

The footpath to the station.

The incline plane railway which brought ore down to the port of Morwellham had a spur which came along the footpath you have just walked along.

Ore from the trucks was dropped into *ore chutes* from here. It would fall down onto the quayside below and then be loaded onto ships.

The railway which takes visitors into the mine was built in the 1970s.

The locomotives (locos) were built during the 1950s and 1960s for tunnelling projects. At Morwellham they are used to pull the coaches of visitors through the mine.

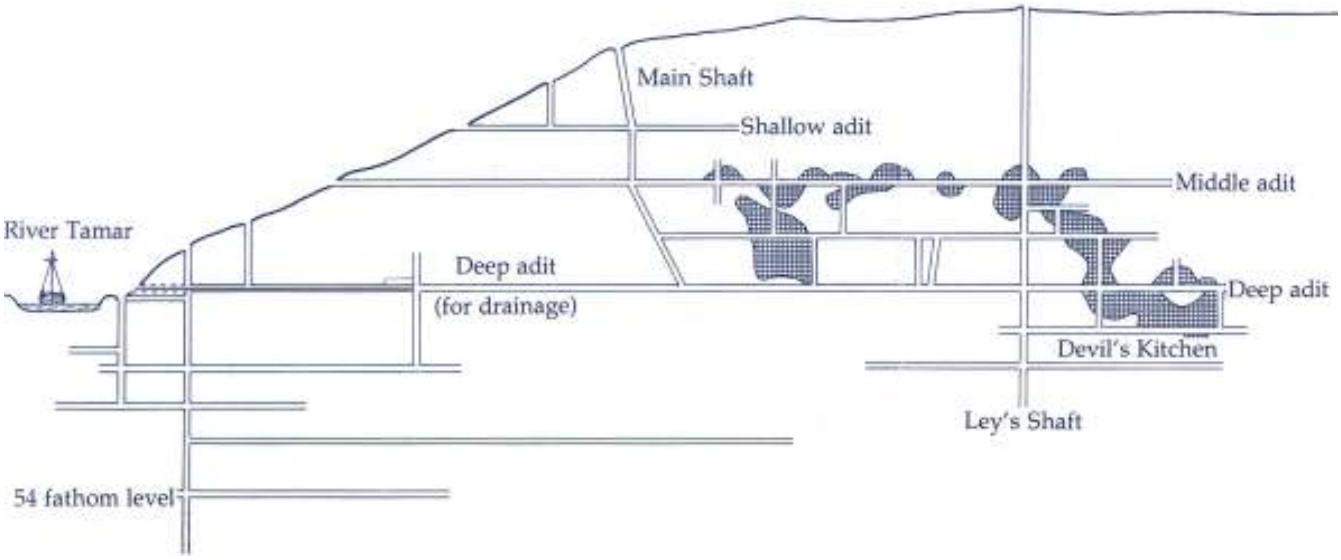
Look at the names of the locos - they are named after the mines around the Tamar Valley.

Each loco is powered by a large battery.

There are eight levels to the George & Charlotte mine. The Victorian miners had to climb down a series of ladders to get to the level they were working on, but don't worry, we put in the railway to save you the effort!

The mine train enters the mine through the portal of a level called "Deep Adit" - an adit is a level of the mine which naturally drains water. Deep adit needed to be widened to make room for the mine train. The miners worked in much more cramped conditions

You can see from the plan below that there are three adits in this mine.



Question 1.

What is the name of the quay on which the ore was dropped through the *ore chutes*?

- [ ] Sink's Quay
- [ ] Tap's Quay
- [ ] Toilet's Quay
- [ ] Bath's Quay

Question 2.

What is the name given to a level of the mine which naturally drains water?

- [ ] Adit
- [ ] Subit
- [ ] Divit
- [ ] Mulit

Question 3.

What is the entrance to the mine called?

- [ ] Portal
- [ ] Stargate
- [ ] Doorway
- [ ] Seam

Question 4.

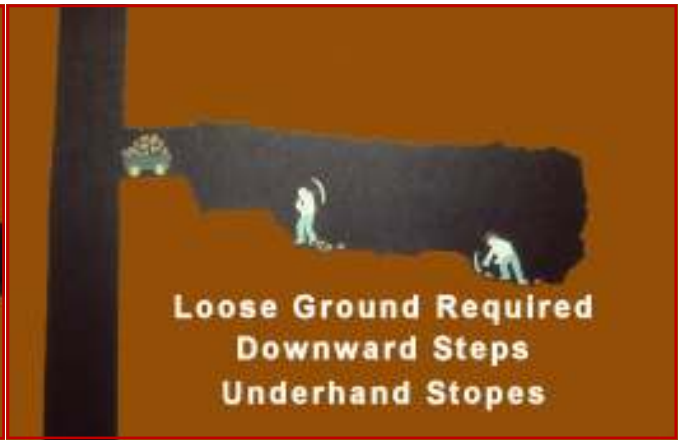
How many fathoms is the lowest level?

- [ ] 44
- [ ] 54
- [ ] 64
- [ ] 74

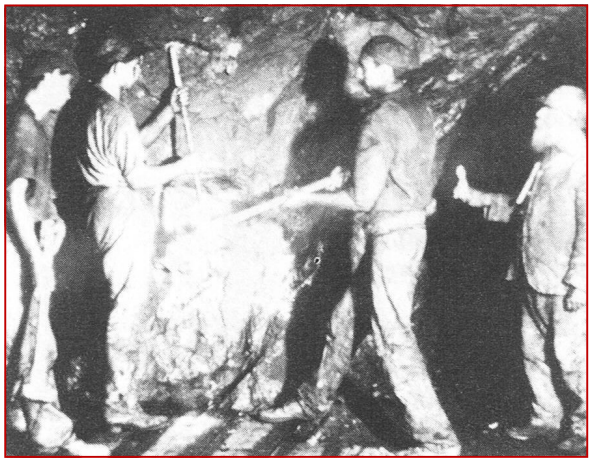
The Copper Mine - QUESTIONS

The Copper Mine, part 2

Mining the Ore



The drawings shown above illustrate two ways of removing ore. In the first drawing the miners work on a platform cutting steps into the rock above their heads, this is called *overhand stoping*. In the second drawing they dig into the floor of the tunnel and work downwards, this is called *underhand stoping*. In both cases the heavy ore stones have to be loaded into trucks.



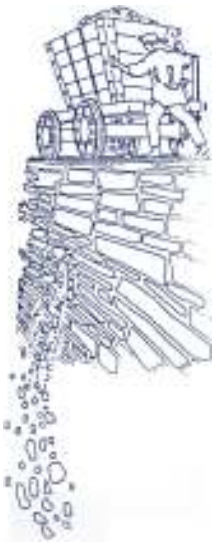
This is a picture of miners working in a mine. They are packing gunpowder into the holes they have drilled. This will then be detonated to break the copper away from the surrounding rock.

Once out of the mine the ore needs to be "dressed". Dressing the ore meant breaking it down with large hammers to remove excess rock.

The Dressing Floor.

On the dressing floor each piece of ore is sorted according to its size. The largest pieces of ore are then broken by women using sledgehammers, into pieces the size of large eggs. These women are known as *Bal Maidens,* 'Bal' being the Cornish word for mine.

Any ore containing a high percentage of copper is kept to one side and the pieces of ore retaining smaller amounts of copper are passed on to the children to refine further, until they are no larger than a marble. This process is performed by girls of seven or eight years of age, for threepence or fourpence per day (in 1855). When the price of copper is very high, the ore then moves to the Bucking table where the Bal Maidens *buck* the ore with a flat hammer until the ore looks like grains of sand. The ore is then *jigged* or shaken in water using weight and gravity to separate the copper from the waste rock.



The ore was transported from Morwellham Quay to South Wales to be smelted into copper.

Exporting the ore.

Before the railways came, the easiest way to transport the ore to South Wales was by the River Tamar, down to Plymouth, then around the bottom of Cornwall and up the Bristol Channel.

Copper is a valuable metal because it is very useful. In the 18th and 19th centuries copper was used for covering and protecting the bottoms of wooden ships and in making guns, pots, pans and coins.

Question 1.

What did the miners pack into the drilled holes to break away the rock?

- [ ] Clay
- [ ] Candle Wax
- [ ] Gun Powder
- [ ] Mud

Question 2.

How old were the children when they started work on the dressing floor?

- [ ] 7
- [ ] 10
- [ ] 13
- [ ] 16

Question 3.

Who were the Bal Maidens?

- [ ] Miners
- [ ] Sailors
- [ ] Labourers
- [ ] Women

Question 4.

By building platforms to stand on, to reach the ore above their heads, what method of mining were the miners employing?

- [ ] Overhand Stoping
- [ ] Overhead Breaking
- [ ] Overland Transporting
- [ ] Over The Hill Working

The Copper Mine, part 2 - QUESTIONS

Activity Book - The George & Charlotte Copper Mine

The George & Charlotte Copper Mine

Now that you have been through the mine...

Here's a list of adjectives:

Pleasant	Dry	Warm
Confined	Claustrophobic	
Gloomy	Frightening	Quiet
Damp	Orange	

Which ones do you think best describe the mine? *Underline them.*

Are there any which don't describe the mine? *Circle them.*

The *George & Charlotte* was just one of many mines working in this area. These mines needed constant supplies to keep them working - coal to power pumps, timber to prop up tunnels, iron to make tools and machinery.

The easiest way to transport these heavy supplies was to ship them up the River Tamar and land them at Morwellham Quay. The empty ships would then be loaded with a cargo of copper ore and sailed to South Wales.

Question 1.

Who did the Mine Train Guide say the George and Charlotte mine was named after?

- ☐ King George III & Queen Charlotte
- ☐ George Michael and Charlotte Church
- ☐ George Foreman & his friend Charlotte
- ☐ George Eliot & Charlotte Bronte

Question 2.

What was the underground waterwheel used for?

- ☐ Taking Water Out Of The Mine
- ☐ Bringing Water Into The Mine
- ☐ Running Pumps
- ☐ Running A Train

Question 3.

What was the chimney on the hill used for?

- ☐ Removing Fumes From A Steam Engine
- ☐ Removing Arsenic Fumes
- ☐ Removing Coal Fumes
- ☐ Removing Diesel Fumes

The Miners' Song

Singing songs to tell stories.

Here are the lyrics to *The Miners' Song*, a traditional folk song probably sung by the miners in the Tamar Valley.

The Miners' Song

A mining we will go my boys
A mining we will go
With picks and shovels in our hands
A mining we will go

Oh we had a strike on Monday
And ordered Mutton stew
Paid landlord Jack for nine months beer
And that was overdue

A mining we will go my boys
A mining we will go
With picks and shovels in our hands
A mining we will go

The farmers they go round the fields
Their legs tied up with straw
The miners they go underground
And never miss a flaw

A mining we will go my boys
A mining we will go
With picks and shovels in our hands
A mining we will go

Activity Book

Thank you For Visiting
Morwellham Quay.

Morwellham Quay

www.morwellhamquay.org

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