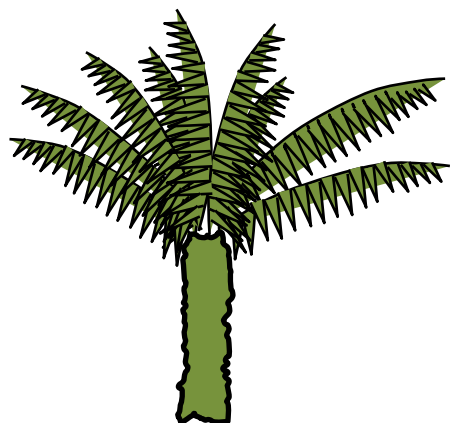


WHAT IS COAL?



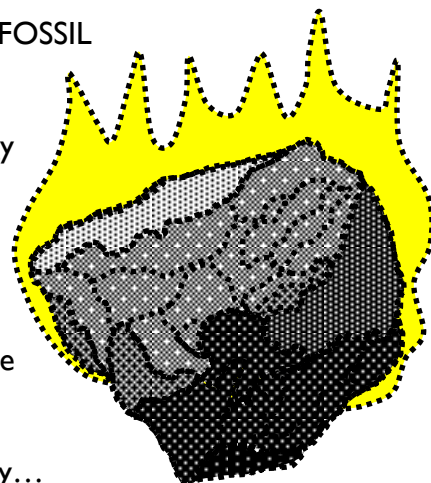
How many of you know what COAL is? Some of you will have seen it or touched it and some of you might even have a coal fire in your house, but just what is it and why is it so important in the story of steam engines?

Around 300 million years ago, even before the time of the first dinosaurs, when plants such as tree ferns (left) and reeds died, they fell down on to the wet, swampy ground in layers and lay underwater.

As the Earth's surface changed and the sea levels rose higher and higher, these plants were pressed down hard by more layers of material dumped on top by the sea tides. The plants much later became solid, with quite a lot of the water being squeezed out. The result is what we call PEAT, which is still quite soft and moist. In some cases, while more heavy sand was added on top, deep down beneath the surface, the sponge-like peat was squeezed even further until nearly all of the water was forced out and it became rock hard.

The end result is the COAL that we use today and it is known as a FOSSIL FUEL because it is made from things which were once alive!

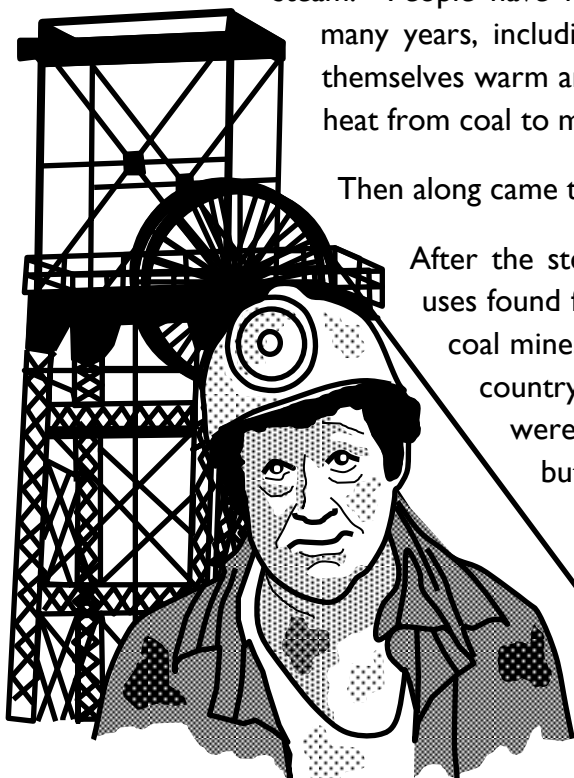
Why is coal so important? It is made of plants which took in energy from the Sun all those millions of years ago. When we burn it, that energy is released in the form of heat and this can boil water and make steam. People have found countless uses for coal for many years, including essential uses such as keeping themselves warm and cooking food as well as using the heat from coal to make metal tools and weapons.



Then along came the steam engine in the 18th Century...

After the steam engine was invented, and as more and more were built and uses found for them, they needed greater supplies of coal. Thousands of deep coal mines (winding gear and miner pictured left) were dug up and down the country to extract the valuable coal within. Eventually most of the supplies were exhausted. In Scotland all of the deep coal mines are now shut but coal mining still takes place in many other countries in the world.

Although the burning of coal is now regarded as a major cause of world pollution, it is still used in many power stations in the UK and the rest of the world to make electricity. Also, heritage railways like the Bo'ness and Kinneil Railway still need hundreds of tons of coal each year to keep steam trains running.

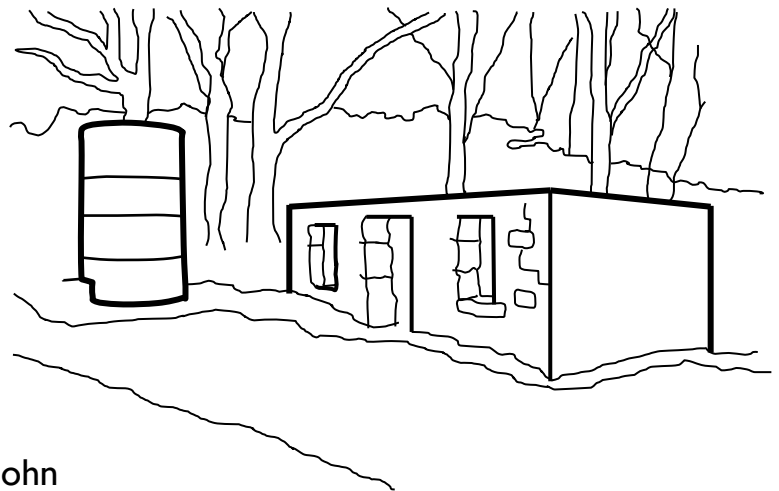




JAMES WATT LOCAL HERO

James Watt was one of the pioneers of steam power, and his improvements to the steam engine began in a small cottage in the grounds of Kinneil House, near Bo'ness!

Watt realised that the existing steam engines wasted most of their energy. He knew how he could improve the design to get more work from the same amount of coal.



Watt was helped by a man called John Roebuck, who owned Kinneil House and gave Watt £1000 and the use of a cottage on the estate to help him in his experiments.

THE RUINS OF THE COTTAGE TODAY
(The cylinder is part of his equipment)

The cottage he chose was away from the public and near to Gil Burn (a local stream). Watt's experiments at Kinneil were only partly successful because of lack of engineering expertise in the area and he achieved his improvements after teaming up with Matthew Boulton, an industrialist from Birmingham.

QUESTIONS

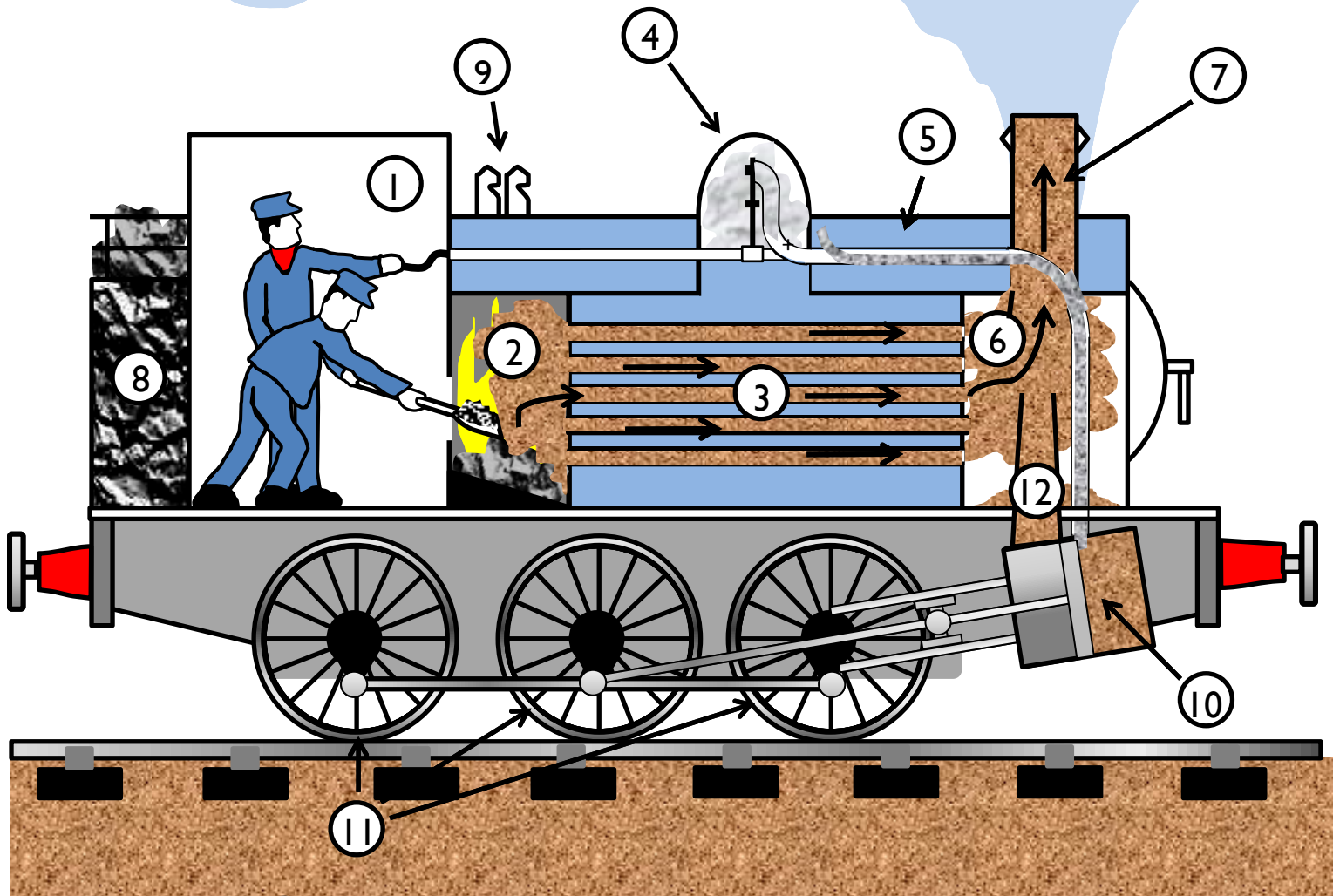
Why do you think Watt needed somewhere away from the public to experiment?

Why did he have to be near a source of water?

Why did he have more success in Birmingham than on Kinneil Estate?

THE POWER OF STEAM!

What's in a Steam Locomotive?



- | | |
|---------------|-------------------------------|
| 1. Cab | 7. Chimney |
| 2. Firebox | 8. Coal Bunker |
| 3. Boiler | 9. Whistle |
| 4. Steam Dome | 10. Cylinder |
| 5. Water Tank | 11. Driving Wheels and Motion |
| 6. Smokebox | 12. Blastpipe |

S3

THE MUSEUM OF SCOTTISH RAILWAYS

Activity Sheets

THE STORY OF STEAM!

How a steam engine works

The sentences below have been jumbled up. Read them carefully and then number them in the correct order from 1 to 5 to tell the story of how a steam locomotive works!

The steam from the boiling water in the boiler moves the pistons backwards and forwards.

The moving pistons make the wheels go round and the engine moves forwards.

First of all, the fireman lights the fire in the firebox.

Finally, when the steam has done its job, it escapes up the chimney and makes a “chuff, chuff” sound.

Hot air and gases in the firebox heat the water in the boiler and make it boil.

S4

THE MUSEUM OF SCOTTISH RAILWAYS

Activity Sheets