

Year 10 GCSE D&T Knowledge organiser Spring Term: Metals

Threshold Concept

TC4-DT - Know the physical and working properties of different types of metal.

TC5-DT - Know the tools needed to cut, shape, join and apply finishes to metal.

TC6-DT - Understand the source origins of metal and how it is converted to workable forms.



The Big Questions:

- Where does metal come from?
- How is it made?
- What can we make with metal?
- What tools do we use for metal?

Most metals are found in the ground as ore.

All of the rocks in the picture here contain the ore for a different kind of metal. ores are dug out of the ground by mining.

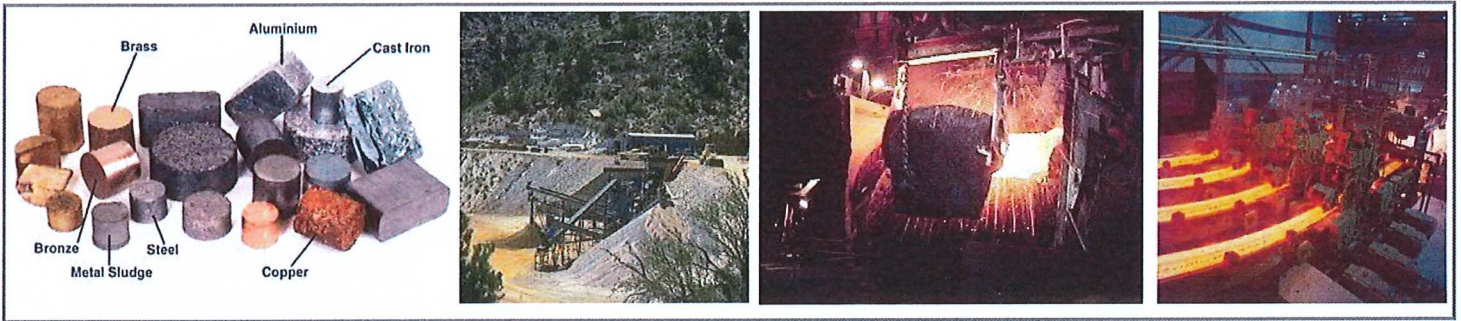


The rocks containing the ore are ground up and placed in a furnace at a very high temperature.

Inside the furnace the ore turns to pure metal and is poured out into bars called ingots.

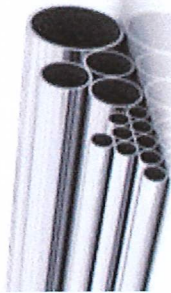
Once the metal is pure, you can use it to make things. The metal must be heated enough to make it Malleable.

These machines are making steel bars



There are 2 categories of metal: **Ferrous** and **non Ferrous**.

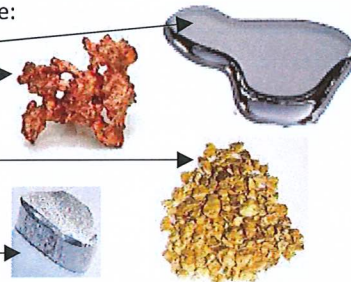
Ferrous metals contain Iron. Iron and steel are the most commonly used metals.



Non-ferrous (contain no iron)

metals include:

- aluminium
- copper
- lead
- mercury
- gold
- nickel
- tin
- zinc.



Most of the Elements on the Periodic table are metals.

H																	He																																
Li	Be	Metal										B	C	N	O	F	Ne																																
Na	Mg	Metalloid										Al	Si	P	S	Cl	Ar																																
		Unknown										Kr																																					
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr																																
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe																																
Cs	Ba	Lanthanides										Pb	Bi	Po	At	Rn																																	
Fr	Ra	Actinides										Po	At	Rn	Fr	Ra																																	
<table border="0"> <tr> <td>Lanthanides</td> <td>La</td><td>Ce</td><td>Pr</td><td>Nd</td><td>Pm</td><td>Sm</td><td>Eu</td><td>Gd</td><td>Tb</td><td>Dy</td><td>Ho</td><td>Er</td><td>Tm</td><td>Yb</td><td>Lu</td> </tr> <tr> <td>Actinides</td> <td>Ac</td><td>Th</td><td>Pa</td><td>U</td><td>Np</td><td>Pu</td><td>Am</td><td>Cm</td><td>Bk</td><td>Cf</td><td>Es</td><td>Fm</td><td>Md</td><td>No</td><td>Lr</td> </tr> </table>																		Lanthanides	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Actinides	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
Lanthanides	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu																																		
Actinides	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr																																		

Non-Ferrous metals do not contain Iron. They are pure elements and are harder to find so more expensive

Iron is extracted from the ore using a blast furnace. Once molten hot it is formed and pressed into various shapes and sizes but like most metals it is made into a range of **stock forms**.

Sheet metal in rolls or flat sheets

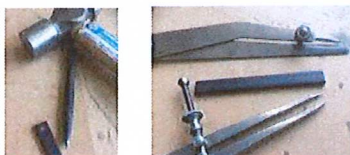
Sectional material named after the shapes: C,I,T,L and box

Flat bar round bar hex bar

square and round tube

Metal work tools include:

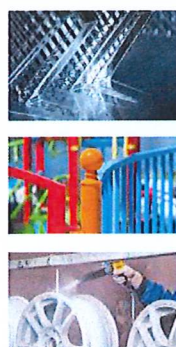
Hammers for shaping or hitting **dot punches** to make small marks.



Odd leg callipers and **dividers** are used for marking straight or curved lines. Metal is cut by hand using a **Hack saw**



Surface treatments and finishes



Some metal products that are made from **steel**, such as watering cans and lamp posts, would **rust** if they were not protected. A common process that is used to protect such products is **galvanising**. Steel products are given a zinc coating by dipping them into the molten **zinc**. **Plastic coatings** can be applied to metal to protect them and add colour by dip coating them or powder coating them

Metal Properties

Most metals have good **conductivity**. Copper has good **ductility** Stainless steel is very **durable** Gold and silver are considered precious because they are **aesthetically pleasing** but are not strong or tough. Lead has a **low melting point** Steel has excellent **tensile strength** Aluminium is **lightweight but strong**