

## Types of Metal

Metals are mined from the earth as ores. These ores are melted in furnaces and cleaned up to produce pure metals.

There are two classes of metals:

**Ferrous** - metals that **contain iron** and are affected by magnetism (apart from stainless steel).

**Non-ferrous** - metals that **do not contain iron** and are not affected by magnetism.

Metals can also be grouped into:

**Pure metals** - metals made up from only one chemical element e.g. copper or aluminium.

**Alloys** - metals made up from a mixture of elements, e.g. copper + zinc (brass), or lead + tin (solder)

## **Alloying**

Metals are alloyed to improve the qualities of the individual pure metals e.g. both copper and tin as pure metals are both soft metals that are easily bent and scratched. When alloyed together ( 90% copper plus 10% tin) they produce bronze which is hard, rigid and resists scratching. Bronze is used for our 'copper' coins.

In your own words describe what an Alloy is.

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What are the main differences (2) between a ferrous and non ferrous metal?

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## Ferrous Metals

NAME	PROPERTIES	USES
Cast Iron	Smooth skin with soft core, strong when compressed, self lubricating, cannot be bent or forged.	Vices, lathe beds, garden bench ends, car brake drums, etc
Mild Steel	Ductile, malleable & tough, high tensile strength, poor resistance to corrosion, easily welded.	Car bodies, washing machine bodies, nuts & bolts, screws, nails, girders, garden tools etc.
High Carbon Steel (tool steel)	Very hard, rather brittle, difficult to cut, poor resistance to corrosion.	Tool blades e.g. saws, chisels, screwdrivers, punches, knives, files, etc.
High Speed Steel	Very hard, heat resistant, remains hard when red	Drills, lathe cutting tools, milling cutters, power hacksaw blades etc.
Stainless Steel	Tough and hard, corrosion resistant, wears well, difficult to cut, bend and file.	Cutlery, sinks, teapots, dishes, saucepans, etc.

What type of metal are you making your trowel from?

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What properties would metal need to be used for drills?

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## Non-ferrous Metals

NAME	COMPOSITION	PROPERTIES	USES
Aluminium	pure metal	Good strength/weight ratio, malleable and ductile, resists corrosion. Conducts heat and electricity well. Polishes well.	Kitchen foil, saucepans, drinks cans, etc.
Duralumin	aluminium + manganese magnesium	Stronger than pure aluminium, nearly as strong as mild steel but only one third the weight.	Greenhouses, window frames, aircraft bodies, etc.
Copper	pure metal	Tough, ductile and malleable. Conducts heat and electricity well. Corrosion resistant, Polishes well.	Electrical wire, central heating pipes, circuit boards, saucepan bases.

What is duralumin made up off?

\_\_\_\_\_

Name two properties of duralumin.

1. \_\_\_\_\_

2. \_\_\_\_\_

What type of metal could be used to make taps?

\_\_\_\_\_

## Alloys

Brass	copper + zinc	Quite hard, rigid, solders easily. Good conductor of heat and electricity. Polishes well.	Water taps, lamps, boat fittings, Ornaments, door knockers.
Bronze	copper + tin	Tough, strong, wears very well, good corrosion resistance.	Coins, wheel bearings, statues boat fittings

What two metals make Brass?

\_\_\_\_\_ and \_\_\_\_\_

What two metals make Bronze?

\_\_\_\_\_ and \_\_\_\_\_

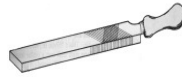
Name two properties of Bronze.

1. \_\_\_\_\_

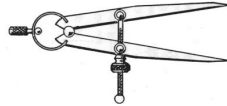
2. \_\_\_\_\_

## Name the tool

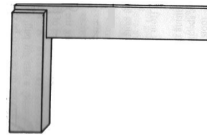
\_\_\_\_\_ are used to smooth rough edges. They are made from high carbon steel and they are heat treated so that they are tougher than the steel or other materials that they are to be applied to.



\_\_\_\_\_ are used to mark out circles and arcs on metal and also to mark equal lengths along a line.



The Engineers \_\_\_\_\_ is used to mark out metal for cutting and shaping and to test that angles are 90 degrees.



The \_\_\_\_\_ is used to draw or SCRIBE lines in the metal .



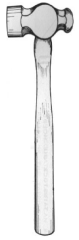
\_\_\_\_\_ are used to mark out lines parallel to an edge.



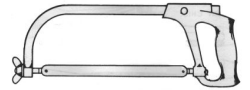
The \_\_\_\_\_ is made from mild steel with the point hardened and tempered so that it withstands impact with the material it is marking. It is normally used to mark the centre of a hole to be drilled either by hand or on the drilling machine.



The \_\_\_\_\_ is a general use hammer, the ball end is used to round the heads of the snap head rivets.



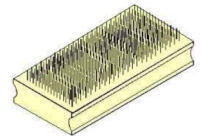
The \_\_\_\_\_ is used to cut steel and other metals.



A \_\_\_\_\_ is used to drill circular holes in metal, plastic or wood. They are made from High Speed Steel (HSS).



The \_\_\_\_\_ is used to clean the plastic or metal from the between the teeth of the file, this is called pinning.



The \_\_\_\_\_ is used when it is important not to make any marks on the metal. It is used to form the blade of the trowel.

