

## **L.O. to know how the Bronze Age was different to the Stone Age to explain how the smelting process was used to make bronze.**

**Task: read the information text below and then complete a flow chart to show how bronze was made.**

### **The Discovery of Metallurgy**

Imagine you lived during the late Stone Age, a time known as the Neolithic. One day, you find a shiny chunk of rock. You pick it up and take it home where you try to figure out what it is. You hit it with a hammer, expecting it to break like most of the rocks you know, but instead, you dent it. Well, that's something special!

You hit it a few more times and find you can shape it into something else, maybe into a knife. You find the edge is sharper than the stone tools you use, but it's only really good for cutting softer things because it bends. That's because your metal knife is made of copper, one of the softer metals.

Later on, your knife ends up in a fire. Maybe it got there as part of a ritual where you gave it to the gods or maybe you just forgot and left it by the cooking fire. Either way, you see that it heats up and glows brighter than any rock you've ever seen in a fire. At its brightest, it starts to melt and drip away like an icicle. When you look at it later, when the fire is out and the coals are cold, you see your shiny metal solidified into a lump, but took the shape of the small depression where it cooled. You can definitely do something with this discovery! Thus **metallurgy** was born.

### **Discovering Bronze**

With the newfound interest in metals, people began to experiment with different ways to shape it, melt it, and identify different kinds of metal. Some metals needed more heat to melt. Some were harder than others. Finally, through accident or experimentation, someone discovered that adding tin to copper made a harder metal. The combination of two metals into a new substance is called an **alloy**. With the ratio of 90% copper and 10% tin, a whole new age came to life, the Bronze Age.

### **Bronze Age facts**

The Bronze Age was a period of time between the Stone Age and the Iron Age when bronze was used widely to make tools, weapons, and other implements. Bronze is made when copper is heated and mixed with tin, creating a stronger metal than copper. Materials like wood and stone were also used for tools, but bronze was better for cutting and chopping, and was easy to shape. Archaeologists think that people became more organised in the Bronze Age, because the making of metal tools was difficult and needed certain skills. The people who had these new skills would have been important. The new metal tools were bought, sold, or traded across larger distances.

### **Early Mining**

At first, most metal used came from rocks found on the surface of the earth, in creek beds, and prying out visible rocks from the face of cliffs. As demand for bronze grew, however, people had to start finding copper and tin ore, metal in its raw and natural form, deeper in the earth. The earliest evidence for mining comes from around 4000 BCE where mine shafts were cut into hills in the Balkans. In the Sinai peninsula, we find evidence from 3800 BCE of on-site smelting in crucibles at copper mines.

## Smelting

**Smelting** is a vital step between the raw ore mined from the ground and the casting of objects from the metal. In its raw form, most metals are not found in a pure state. Often, there are veins of other rock running through it or the metal appears as flecks and flakes embedded in other rock. To separate out the metal, the ore is placed in a furnace. For copper, that furnace must reach temperatures nearly 2,000 degrees Fahrenheit. At this temperature, the copper melts and drips out of the surrounding rock. However, if the surrounding rock or other metals in the ore have a lower melting point, they will melt out first. Bronze Age miners and metalworkers quickly learned how to separate out the different metals and what use they each had, from jewellery to tools.

## Casting

Once the copper was purified, it was ready to combine with tin to make bronze. The liquid bronze was then poured into sand moulds and allowed to cool. This method was called casting and it was used to make bronze objects including swords, brooches, knives and pins. The bronze could be sharpened and made into many different shapes. It could also be melted down and remade into other objects. Its hardness meant it was especially useful for making tools for the villagers and weapons for the warriors.

### Example of a flow chart.

