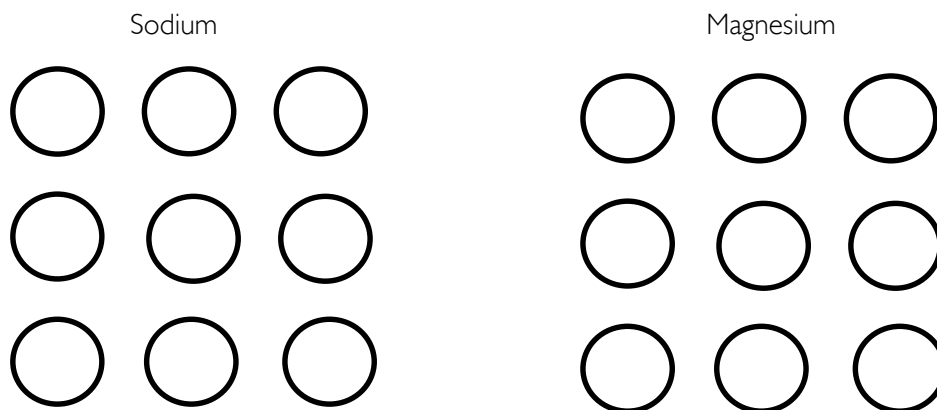




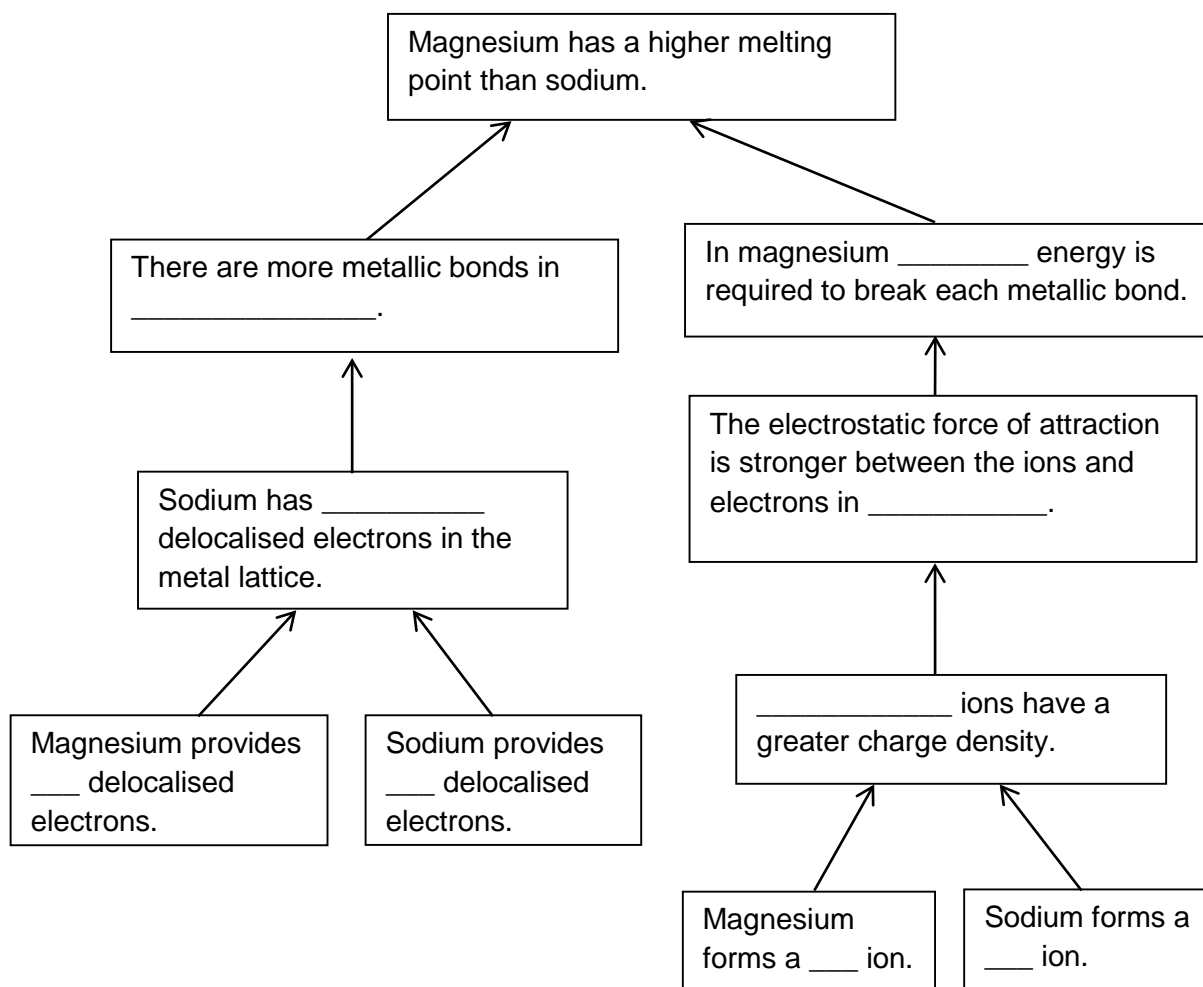
Metallic Bonding

Metallic bonding is found in metals. The bond is the force of attraction between the metal ion and the outer shell electrons which have been lost and are delocalised.

Complete the diagrams below to show the charges on the ions and the delocalised electrons:



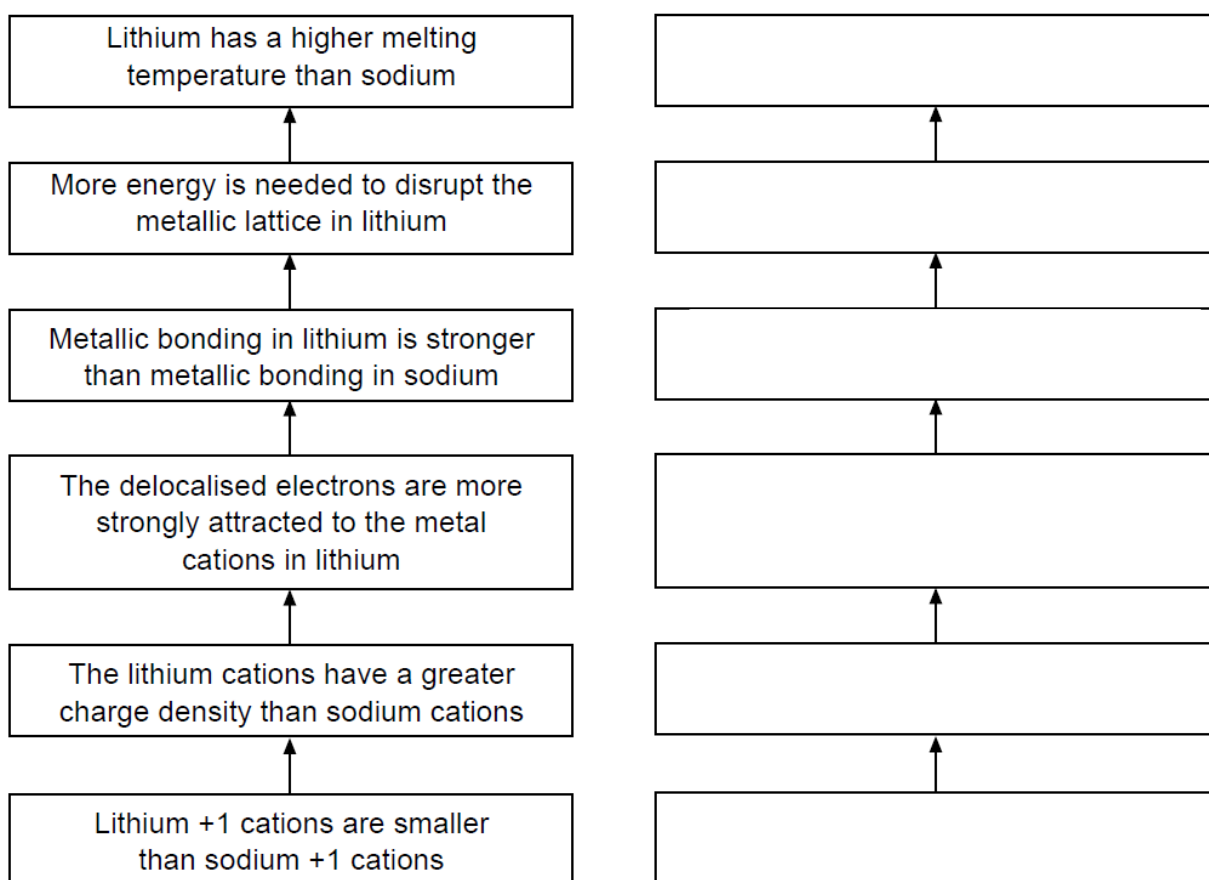
Use the diagrams above to complete the flow diagram below:





Write an explanation for the difference in melting point between sodium and magnesium below:

Use the example below to design a flow diagram which explains the relative melting points of magnesium and calcium on the right.





Properties of Metals

- **High melting and boiling points**

This is due to the strong electrostatic attraction between the positive metal ions and the delocalised electrons.

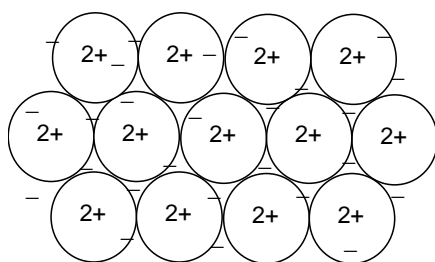
- **Conduct electricity when solid**

The delocalised electrons can move so when a voltage is applied they are able to transfer charge.

- **Malleability and ductility**

The metallic bonds are constantly breaking and reforming as the electrons are moving. This means that if the shape of the metal is changed the positive metal ions will slide over each other and they will reform metallic bonds with other electrons.

Metallic structures



copper metal (Cu)

True or false?

- | | | |
|---|---|--|
| T | F | The metal is held together by the attraction between the copper ions. |
| T | F | Copper has a high melting point because there are strong forces of attraction between the copper ions and the free moving outer shell electrons. |
| T | F | The metal conducts electricity because the copper electrons are free to move. |
| T | F | Copper has a high melting point because there are lots of strong covalent bonds to break. |
| T | F | Copper can be bent because the layers of copper ions can slide relative to each other. |