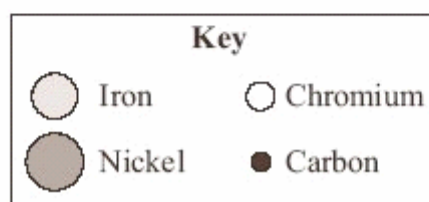
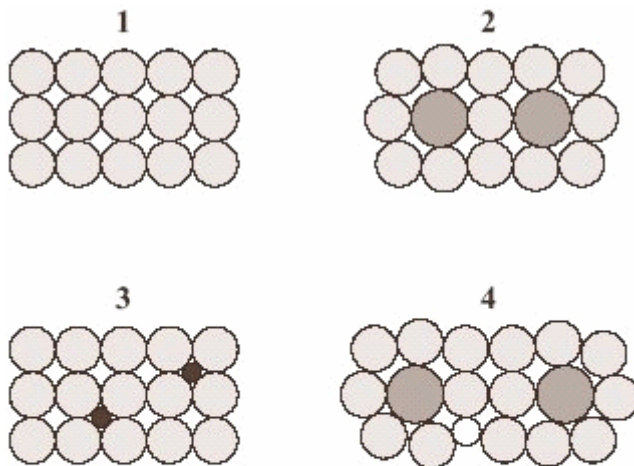


**Alloys**

1. The diagrams show the arrangement of atoms in a pure metal and in some alloys. The different circles represent atoms of different elements.



### Put key beside atoms

Match statements, **A**, **B**, **C** and **D**, with the diagrams **1 – 4**.

- A** It is a pure metal.
- B** It is the alloy that contains only two metals.
- C** It is a carbon steel alloy.
- D** It is the alloy that contains the largest number of different elements.

2. In each part choose only **one** answer.

Alloys often have more useful properties than pure metals.

**A** Mixtures of metals are called . . .

- 1 alloys.
- 2 catalysts.
- 3 compounds.
- 4 ores.

**B** One metal mixed with iron to make stainless steel is . . .

- 1 aluminium.
- 2 calcium.
- 3 chromium.
- 4 potassium.

**C** Low carbon steel is . . .

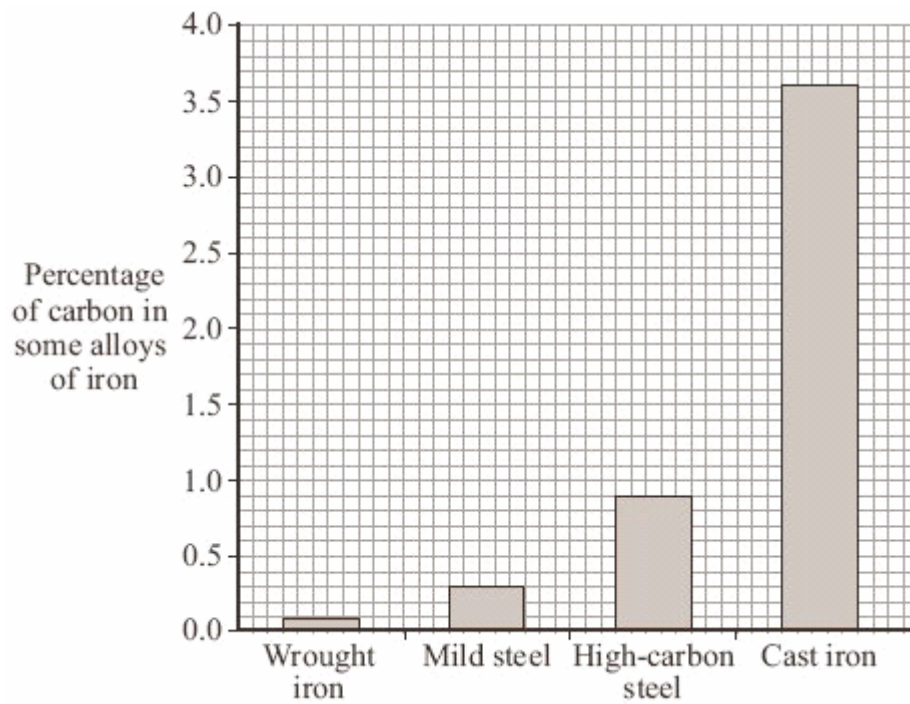
- 1 easily shaped.
- 2 hard.
- 3 resistant to corrosion.
- 4 resistant to staining.

3. Solder is an alloy of lead and tin. The table shows how the percentage of tin affects some of the properties of solder.

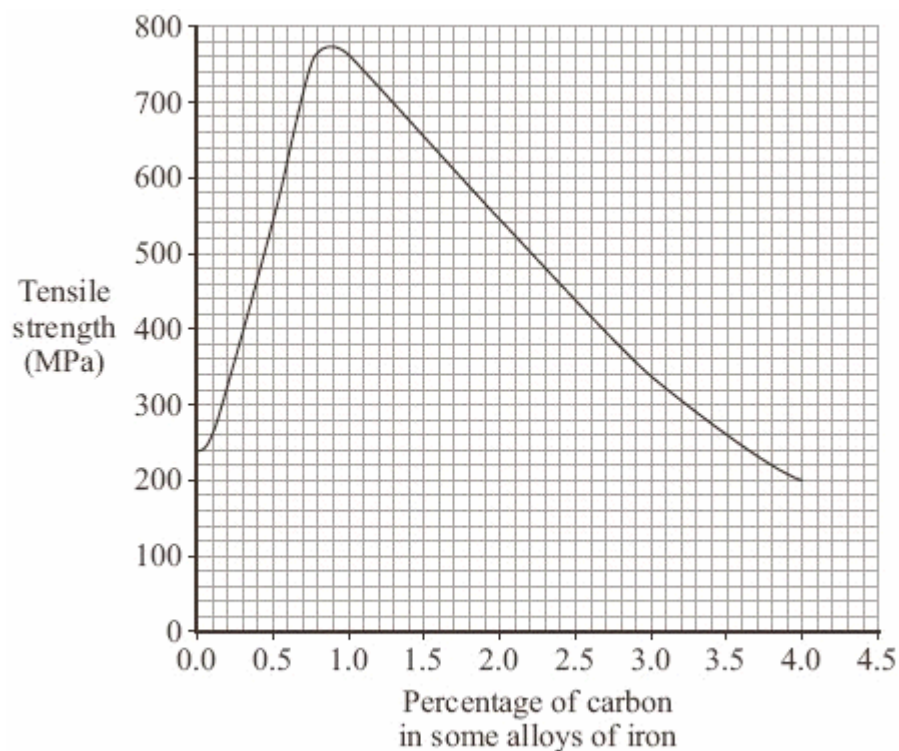
Percentage of tin	Tensile strength in MPa	Melting point in °C	Density in g per cm <sup>3</sup>
0	12	347	11.35
10	30	297	10.50
20	33	257	10.40
30	34	217	9.66
40	37	187	9.28
50	41	147	8.90
60	52	153	8.52
70	54	167	8.17

- (a) What is the density of lead in g per cm<sup>3</sup>?
- 1 8.17
  - 2 8.90
  - 3 11.35
  - 4 12.00
- (b) Increasing the percentage of tin in solder . . .
- 1 decreases the tensile strength of the solder.
  - 2 decreases the density of the solder.
  - 3 increases the flexibility of the solder.
  - 4 increases the melting point of the solder.
- (c) How could the lowest melting point of solder be found accurately?
- 1 by using a more accurate type of thermometer
  - 2 by repeating the measurements between 30 % and 50 % tin
  - 3 by increasing the number of measurements between 40 % and 60 % tin
  - 4 by increasing the number of measurements between 50 % and 70 % tin
- (d) How might the relationship between the percentage of tin in solder and the melting point of solder best be described?
- 1 The relationship is directly proportional.
  - 2 There is no relationship.
  - 3 As the percentage of tin increases, the melting point decreases steadily.
  - 4 As the percentage of tin increases, the melting point decreases, and then starts to rise.

4. The bar chart gives some information about the composition of some alloys of iron.



Tensile strength is a measure of the force needed to pull apart a piece of metal. The graph shows the tensile strength of some alloys of iron.



- (a) Which of the following best describes how the tensile strength changes as the carbon content increases?
- 1 It decreases.
  - 2 It decreases at first and then it increases.
  - 3 It increases.
  - 4 It increases at first and then it decreases.
- (b) Which alloy has the lowest tensile strength?
- 1 cast iron
  - 2 high-carbon steel
  - 3 mild steel
  - 4 wrought iron
- (c) High-carbon steel is best used to make wood-cutting tools such as chisels because . . .
- 1 it is hard and has a high tensile strength.
  - 2 it has a high tensile strength and is resistant to corrosion.
  - 3 it is easily shaped and is brittle.
  - 4 it is hard and is resistant to corrosion.
- (d) Pure iron . . .
- 1 has atoms that are arranged in distorted layers.
  - 2 has many uses because it is hard and brittle.
  - 3 is soft and easily shaped.
  - 4 is used when resistance to corrosion is important.