Section A:

1. Metals can become corroded.

   Explain what the term 'corrosion' means.

   _____

   _____

2. Match each key word with the correct definition.

Electroplating	Zinc is used as a sacrificial metal to prevent the corrosion of iron.
Sacrificial protection	Adding a thin layer of metal to an object using electrolysis.
Greasing	The corrosion of iron.
Rusting	Adding a slippery substance to a metal to create a barrier to prevent contact with water and oxygen.
Galvanise	When a metal contains a coating of a more reactive metal so that it is protected from corrosion.

3. State the **two** substances that must be present for iron to rust.

   1. _____   2. _____

4. An iron gate was painted to prevent rusting.

   Explain how painting can be used to prevent the iron gate from rusting.

   _____

   _____

5. Magnesium is attached on the outside of a steel submarine because...

   Tick (✓) **one** box.

   A. it reacts with the steel to prevent corrosion. ☐

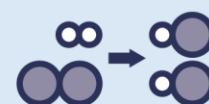   B. it is more reactive than steel, so prevents corrosion. ☐

   C. it is a form of electroplating to prevent corrosion. ☐

6. A coating of copper will not sacrificially protect iron from corrosion.

   Explain why using your knowledge of the reactivity series.

   _____

   _____

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Section B

1. Electroplating is a technique for preventing corrosion.

   Describe how to electroplate a steel spoon with silver.

   Draw a labelled diagram.

   _____
   _____
   _____
   _____

2. Some airplane parts are made from aluminium and are not coated

   Suggest a reason why they do not corrode.
   _____
   _____
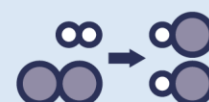   _____

3. Grease is often added to metal bike chains to prevent corrosion.

   Explain how greasing prevents corrosion of a bike chain.
   _____
   _____

4. Explain why copper does not easily corrode.
   _____
   _____

5. State a similarity and a difference between galvanising and sacrificial protection techniques for preventing corrosion.

   Similarity_____
   _____
   Difference_____
   _____

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Section C

A student used the following method to investigate the best technique for preventing rusting of iron.

1) Measure the mass of a piece of iron using a balance
2) Place the untreated iron into an open test tube containing water
3) Leave for 1 week
4) Measure the final mass of the iron
5) Repeat steps 1 to 4 with:
   o iron covered in grease
   o galvanised iron
   o painted iron.

The results are shown below.

Condition	Starting Mass (g)	Final Mass (g)	Change in mass (g)	Percentage change (%)
Untreated	2.74	2.98	+ 0.24	8.8
Grease	2.91	3.01		
Galvanised	2.80	2.82		
Painted	2.67	2.78		

1. State a control variable for this experiment.

   _____

2. State the resolution of the balance that was used. _____ g

3. Complete the gaps in the results table by:
   (a) calculating the change of mass for each condition
   (b) calculating percentage change of mass for each condition.

4. Explain why measuring the change in mass allows the student to compare the extent of rusting.

   _____
   _____

5. Write a conclusion for these results.

   _____
   _____
   _____
   _____