Using materials triple only answers

1. The grease forms a barrier between oxygen and water from the air and the metal preventing them from reacting
2. The paint protects the car from oxygen and water in the air
3. Because copper is less reactive than iron
4. It is called sacrificial as you are sacrificing the zinc to save the iron
5. –
6. Nail 1
7. 2,3,4,6 as no change
8. Because atoms of oxygen and molecules of hydrogen have been added to the iron
9. Because there is no exposure to moisture (water)
10. In the scratched painted one, the metal is exposed so is not protected so will rust quicker. It makes no difference to the galvanised nail because sacrificial protection does not require complete coverage
11. Same metal composition, mass, temperature, air pressure, surface area
12. The oil creates a cap on top of the water which prevents oxygen from reacting with the water and iron
13. By galvanising it
14. Zinc as it is more reactive than iron
15. Copper, gold, silver, platinum

16. Answered in question 10 (ST correctly points out that the mass should actually increase as the sacrificial metal would react and increase in mass. Take it up with the exam board.)
17. Layers of metal ions with delocalised electrons between them. Electrostatic attraction between ions and electrons.
18. Contains atoms with different sizes which disturb/distort the layers
19. Because the distorted layers cannot slide over each other
20. Too brittle
21. It will corrode
22. Stainless steel, resistant to corrosion
23. Sacrificial protection would prevent the hull from corroding
24. Lower carat is harder and cheaper
25. Bronze is resistant to corrosion but the wood will biodegrade over time
26. 37.5%
27. 14.4
28. –
    a. High carbon is harder than low carbon steel
    b. Giant covalent structure, strong bonds between carbon atoms
29. –
    a. A substance that allows a greater rate of reaction

b. High surface area to volume ratio

30. –

a. Splitting apart a compound using electricity
b. Because it is more reactive than carbon
c. An ore is a material containing enough metal in it to be economically worthwhile extracting the metal
d. So that the ions can be freed to move (and a current can flow/conduct electricity)
e. O_2 is produced which can react with the carbon anode to produce CO_2.
f. $2Al_2O_3 \rightarrow 4Al + 3O_2$

   Cathode: $4Al^{3+} + 12e^- \rightarrow 4Al$

   Anode: $6O^{2-} \rightarrow 3O_2 + 12e^-$

31. Just the mirror image of the line
32. Glass bottles are renewable because there are vast amounts of sand, plastic bottles are not as they are made from crude oil which will run out
33. So that we don't use non-renewable resources/raw materials, so it isn't sent to landfill, reducing energy costs for making new items and producing the raw materials
34. Magnetism
35. High temperature requires more energy which affects the overall LCA
36. 500, 1000, 2000, 3000
37. Strong covalent bonds between atoms

38. SiO_2 is a giant covalent structure with strong bonds between atoms that require a lot of energy to break, CO_2 is simple molecular and has weak intermolecular forces that require less energy to break
39. Borosilicate glass
40. Because the chains are packed closer together
41. moles = 62/30 = 2.1
42. 2.1x2 moles carbon atoms = 4.2
    4.2 moles of atoms = 4.2 x $6.022x10^{23}$ atoms = $2.489x10^{24}$
43. –

	advantage	Disadvantage
ceramic	High melting point, unreactive	Brittle, heavy
Low carbon steel	High melting point, easy to shape, good conductors of heat	Corrode, dent and deform easily
High carbon steel	High melting point, good conductor of heat	Corrodes, brittle, can be difficult to shape
18-carat gold	Very unreactive, excellent conductor of heat, easy to shape	Soft, expensive