Answers	Marks	Examiner's tips
1 a) i) Fe^{2+}	**4**	This is always the species with the most positive E value (which is reduced itself).
ii) F_2O		
iii) Fe^{2+} Cl^-		If you write more than two answers, then you start to lose marks. Also remember 'positive potentials oxidise others'.
b) i) emf = $E^\ominus_{right} - E^\ominus_{left}$ $= 1.52 - 0.77 = 0.75$ V	**6**	
ii) $Fe^{2+} \rightarrow Fe^{3+} + e^-$		At the negative electrode there is an oxidation reaction.
iii) It decreases. The equilibrium or reaction shifts to the right-hand side. The electrode potential for Fe^{3+}/Fe^{2+} becomes less positive.		Accept: 'in favour of more Fe^{3+}'.
2 a) Zn	**1**	This is always the species with the most negative *E* value (it is oxidised itself).
b) i) Fe^{2+}	**2**	
ii) Cl_2		
c) i) The standard electrode potential: 1.25 V	**3**	Remember that: $E_{cell} = E_{right} - E_{left}$
ii) $Tl^{3+} + 2Fe^{2+} \rightarrow 2Fe^{3+} + Tl^+$		One mark for a balanced equation and one for the correct direction.
3 a) i) MnO_4^-/Mn^{2+} has a more positive $E^\ominus$ value than Cl_2/Cl^- and will oxidise Cl^- to Cl_2.	**4**	You can use the *E*-values to explain if you want to, for both parts.
ii) NO_3^-/HNO_2 has a more positive $E^\ominus$ value than Fe^{3+}/Fe^{2+} and so will oxidise Fe^{2+} to Fe^{3+}.		

Answers				Marks	Examiner's tips
	b)	**i)**	0.5 V	**3**	Remember that $E_{cell} = E_{right} - E_{left}$
		ii)	$2Mn^{2+} + 8H_2O + 5S_2O_8^{2-} \rightarrow 10SO_4^{2-} + 2MnO_4^- + 16H^+$		One mark is given for a balanced equation and one is for having SO_4^{2-} and MnO_4^- on the right-hand side of the equation.
4	**a)**		1.00 mol dm^{-3}; 100 kPa	**2**	This is part of the definition, so learn these conditions.
	b)	**i)**	0.43 V	**4**	Remember that $E_{cell} = E_{right} - E_{left}$
		ii)	$2Br^- \rightarrow Br_2 + 2e^-$		Remember oxidation is at the left-hand half cell, which is the half cell with the lower *E* value.
			$2BrO_3^- + 10Br^- + 12H^+ \rightarrow 6Br_2 + 6H_2O$		One mark is given for all the correct species and one mark for balancing the equation. Accept: $BrO_3^- + 5Br^- + 6H^+ \rightarrow 3Br_2 + 3H_2O$ which is half of the other equation.