Practice Problems - Significant Figures

1. a) $\frac{(4.034)(2.0)}{(2.57)(6.44)} = [0.487468884] \approx 0.49$ (2 sig figs)

b) $\frac{(4.034\times10^{-6})(2.0\times10^{3})}{(2.57\times10^{-8})(6.44\times10^{-4})} = [4.87468884\times10^{8}] = 4.9\times10^{8}$ (2 sig figs)

c)

	3.	2	4	2			cm	3 decimal places		
	0.	6	4	1	7		cm	4 "	"	Smallest # decimal places
	7.	1	9	7			cm	3 "	"	
+	0.	0	0	3			cm	3 "	"	
	11.	0	8	3	7		cm			
		✓	✓	✓	×					

$\therefore$ 11.084 cm

d) Set all inputs to the same exponent (any will work). I find that the simplest is the one that matches the answer, without worrying about the sig figs. Before you start writing your work, punch the data into a calculator: $[6.6e741\times10^{-24}]$. So set all exponents to 10^{-2}

	6.	5	7	4			$\times10^{-24}$ kg	3 decimal places	$\Rightarrow$ smallest #	
	0.	0	8	8	6		$\times10^{-24}$ kg	4 "	"	
	0.	0	0	4	23		$\times10^{-24}$ kg	5 "	"	
+	0.	0	0	0	5	8	$\times10^{-24}$ kg	5 "	"	
	6.	6	6	7	4	1	$\times10^{-24}$ kg			
		✓	✓	✓	×	×				

$\therefore 6.667\times10^{-24}$ kg

e) $\frac{48.72 \times 10^3 \text{ J/mol}}{8.314 \text{ J/mol·K}} \left(\frac{1}{423.7\text{K}} - \frac{1}{398.2\text{K}} \right)$

(4SF) (4SF) (4SF) (4SF)

$= (5859.9952\text{K})(-2.360160 \times 10^{-3}\text{K}^{-1} - 2.511300 \times 10^{-3}\text{K}^{-1})$ 4SF / 3 decimals

$= (5859.9952\text{K})(-0.151140 \times 10^{-3}\text{K}^{-1})$ 3 decimals

4SF — now only 3 SF

$= [-0.88568818] = -0.886$

You have lost a S.F. because of the subtraction step.

f) $\ln(x) = 8.74$; $x = e^{8.74} = [6.2478957 \times 10^3]$

2 decimals

∴ 2 SF allowed $= 6.2 \times 10^3$

g) $-\log(6.782 \times 10^{-4}) = -[-3.1686422]$

4 SF ∴ 4 decimals allowed

$= 3.1686$