Quantitative Chemistry Multiple Choice Questions Higher
Answer Sheet

Set 1	Set 2	Set 3
1. A	1. A	1. C
2. C	2. C	2. D
3. A	3. C	3. A
4. D	4. D	4. B
5. A	5. D	5. C
6. C	6. B	6. A
7. A	7. B	7. C
8. B	8. C	8. C
9. C	9. A	9. C
10. B	10. A	10. B
		Bonus. D

Workings for Calculations
Set 1

2. $M_r = (12 \times 2) + (1 \times 4) + (80 \times 2) =$ **188**

4. mass = $2 \times 85 =$ **170g**

5. M_r of $CO_2 = 12 + (16 \times 2) = 44$

   number of moles of $CO_2 = \frac{22}{44} =$ **0.5**

7. M_r of $CaCO_3 = 40 + 12 + (16 \times 3) = 100$

   number of moles of $CaCO_3 = \frac{2.5}{100} = 0.025$

   M_r of CaO= 40 + 16 = 56

   mass of CaO = $0.025 \times 56 =$ **1.4g**

9. M_r of $NaHCO_3 = 23 + 1 + 12 + (16 \times 3) = 84$

   percentage by mass of oxygen = $\frac{(16 \times 3)}{84} \times 100 =$ **57%**

10. $\frac{100}{1000} = 0.1 dm^3$

    mass = $40 \times 0.1 =$ **4g**

Set 2

2. $M_r = 27 + ((16 + 1) \times 3) =$ **78**

4. M_r of $Cl_2 = 35.5 \times 2 = 71$

   mass $= 2 \times 71 =$ **142g**

5. M_r of $H_2SO_4 = (1 \times 2) + 32 + (16 \times 4) = 98$

   number of moles of $H_2SO_4 = \frac{147}{98} =$ **1.5**

7. number of moles of $NH_3 = \frac{34}{17} = 2$

   ratio of N_2 to NH_3 = 1:2

   number of moles of $N_2 = \frac{2}{2} = 1$

   mass of $N_2 = 1 \times 28 =$ **28g**

9. number of moles of $Fe = \frac{14}{56} = 0.25$

   ratio of Fe to Fe_2O_3 = 2:1

   number of moles of $Fe_2O_3 = \frac{0.25}{2} = 0.125$

   M_r of $Fe_2O_3 = (56 \times 2) + (16 \times 3) = 160$

   mass of $Fe_2O_3 = 0.125 \times 160 =$ **20g**

10. volume $= \frac{15}{300} = 0.05 dm^3$

    $0.05 \times 100 =$ **$50 cm^3$**

Set 3

1. $2Na + Cl_2 \longrightarrow 2NaCl$

   M_r of $Cl_2 = 35.5 \times 2 = 71$

   number of moles of $Cl_2 = \frac{42.6}{71} = 0.6$

   ratio of Cl_2 to NaCl = 1:2

   number of moles of NaCl = $0.6 \times 2 = 1.2$

   M_r of NaCl = 23 + 35.5 = 58.5

   mass of NaCl = $1.2 \times 58.5 =$ **70.2g**

2. maximum theoretical mass = $\frac{22}{0.8} =$ **27.5g**

4. M_r of desired product from equation = $3 \times 2 = 6$

   total M_r of reactants from equation = 16 + 18 = 34

   atom economy = $\frac{6}{34} \times 100 =$ **17.6%**

5. $\frac{500}{1000} = 0.5dm^3$

   concentration = $\frac{5}{0.5} =$ **$10mol/dm^3$**

7. number of moles of $CuSO_4 = 0.15 \times 0.2 = 0.03$

   mass = $0.03 \times 159.5 =$ **4.79g**

8. $\frac{30}{1000} = 0.03dm^3$

   number of moles of NaOH = $0.20 \times 0.03 = 0.006$

   ratio of HCl to NaOH = 1:1

   $\frac{25}{1000} = 0.025dm^3$

   concentration of HCl = $\frac{0.006}{0.025} =$ **$0.24mol/dm^3$**

10. M_r of $CO_2 = 12 + (16 \times 2) = 44$

    number of moles = $\frac{264}{44} = 6$

    volume = $6 \times 24 =$ **$144dm^3$**

Bonus Challenge Question

M_r of Na_2SO_4 = (23 × 2) + 32 + (16 × 4) = 142

number of moles of Na_2SO_4 = $\frac{10.65}{142}$ = 0.075

ratio of $NaHCO_3$ to Na_2SO_4 = 2:1

number of moles of $NaHCO_3$ = 0.075 × 2 = 0.15

M_r of $NaHCO_3$ = 23 + 1 + 12 + (16 × 3) = 84

mass of $NaHCO_3$ = 0.15 × 84 = **12.6g**