



GCSE MARKING SCHEME

SUMMER 2025

**GCSE
SCIENCE (DOUBLE AWARD) - UNIT 5**

3430U50-1 AND 3430UE0-1

About this marking scheme

The purpose of this marking scheme is to provide teachers, learners, and other interested parties, with an understanding of the assessment criteria used to assess this specific assessment.

This marking scheme reflects the criteria by which this assessment was marked in a live series and was finalised following detailed discussion at an examiners' conference. A team of qualified examiners were trained specifically in the application of this marking scheme. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners. It may not be possible, or appropriate, to capture every variation that a candidate may present in their responses within this marking scheme. However, during the training conference, examiners were guided in using their professional judgement to credit alternative valid responses as instructed by the document, and through reviewing exemplar responses.

Without the benefit of participation in the examiners' conference, teachers, learners and other users, may have different views on certain matters of detail or interpretation. Therefore, it is strongly recommended that this marking scheme is used alongside other guidance, such as published exemplar materials or Guidance for Teaching. This marking scheme is final and will not be changed, unless in the event that a clear error is identified, as it reflects the criteria used to assess candidate responses during the live series.

GCSE SCIENCE (DOUBLE AWARD) UNIT 5 – CHEMISTRY 2

SUMMER 2025 MARK SCHEME

GENERAL INSTRUCTIONS

Marking rules

All work should be seen to have been marked.

Marking schemes will indicate when explicit working is deemed to be a necessary part of a correct answer.

Crossed out responses not replaced should be marked.

Credit will be given for correct and relevant alternative responses which are not recorded in the mark scheme.

Extended response question

A level of response mark scheme is used. Before applying the mark scheme please read through the whole answer from start to finish. Firstly, decide which level descriptor matches best with the candidate's response: remember that you should be considering the overall quality of the response. Then decide which mark to award within the level. Award the higher mark in the level if there is a good match with both the content statements and the communication statements.

Marking abbreviations

The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

cao	=	correct answer only
ecf	=	error carried forward
bod	=	benefit of doubt

FOUNDATION TIER ONLY QUESTIONS

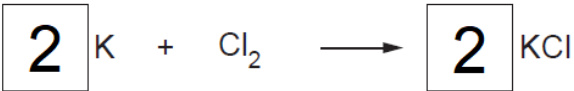
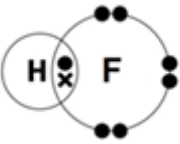
Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
1	(a)	(i)		2 ☒ 6 ☐ 7 ☐ 13 ☐		1		1		1
		(ii)		sodium hydrogencarbonate is a strong acid ☐ sodium hydrogencarbonate is a weak acid ☐ sodium hydrogencarbonate is a strong alkali ☐ sodium hydrogencarbonate is a weak alkali ☒		1		1		1
		(iii)		green accept any shade of green e.g. light green / dark green	1			1		1
	(b)	(i)	I	decomposition ☐ electrolysis ☐ addition ☐ neutralisation ☒		1		1		1

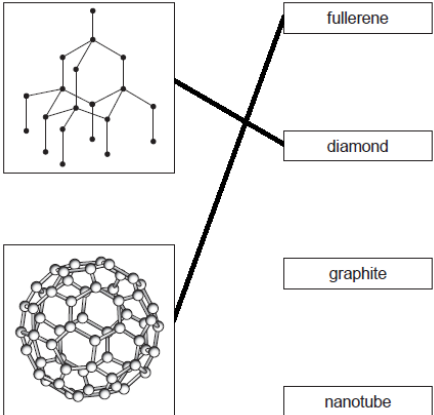
Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
			II	HNO₃ ☐ HCl ☒ H₂SO₄ ☐ H₂O ☐	1			1		
			III	CaCl ☐ CaCl₂ ☒ Ca₂Cl ☐ Ca₂Cl₂ ☐		1		1		
		(ii)		pH changes from 12 to 7 ☒ pH changes from 4 to 10 ☐ pH changes from 2 to 7 ☐			1	1		1
				Question 1 total	2	4	1	7	0	5

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)		<u>iron oxide</u> carbon iron carbon dioxide			1	1		
		(ii)		award (1) for any of following - to remove impurities - to remove sand - to produce slag	1			1		
	(b)			B			1	1		
	(c)			MgO + Cu award (1) for each correct product formula accept formulae the wrong way round ignore any attempt at balancing		2		2		
				Question 2 total	1	2	2	5	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)			hand warming gel pack self-heating can <u>instant cold pack</u>			1	1		
	(b)			less than / the same as / <u>more than</u> ignition / <u>activation</u> / bond	2			2		
	(c)	(i)		temperature at the end $\Rightarrow$ 28 (1) change in temperature $\Rightarrow$ 7 (1) no ecf possible do not accept change of -7		2		2	2	2
		(ii)		679 kJ + 864 kJ ☐ 679 kJ $\times$ 864 kJ ☐ 679 kJ - 864 kJ ☒ 679 kJ $\div$ 864 kJ ☐		1		1		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iii)		put a lid on the beaker ☐ cover the beaker with aluminium foil ☐ use a digital thermometer ☒ use a polystyrene cup instead of the beaker ☐			1	1		1
				Question 3 total	2	3	2	7	2	3

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)		 potassium ion chloride ion (2,8,8) (2,8,8) award (1) for charge – accept +1/1+ award (1) for electronic structure		2		2		
		(ii)				1		1		
	(b)			 accept all electrons shown as dots or crosses		1		1		
	(c)	(i)	I	antibacterial	1			1		
			II	reflect UV rays	1			1		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(ii)		award (1) for any of following - do not know the <u>long-term</u> effects (of using them) - may enter the food chain - can be absorbed through the skin / can be inhaled neutral answers dangerous / harmful do not know the effects (of using them)	1			1		
	(d)				2			2		
				Question 4 total	5	4	0	9	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)	I	C_3H_8 accept numbers in any position	1			1		
			II	covalent ignore any reference to simple / molecular / giant	1			1		
		(ii)		C_nH_{2n} ☐ C_nH_{2n+2} ☒ C_nH_{2n-2} ☐ C_nH_{3n} ☐	1			1		
		(iii)		<pre> H H H H H H — C — C — C — C — C — H H H H H H </pre> all bonds must be shown all hydrogens represented as H accept a correctly drawn isomer		1		1		

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
	(b)	(i)	monomers (1) many (1) polymers (1)	3			3		
		(ii)	$\begin{array}{c} \text{H} & \text{H} \\ & \\ \text{C} = & \text{C} \\ & \\ \text{H} & \text{H} \end{array}$ $\begin{array}{c} \text{H} & \text{Cl} \\ & \\ \text{C} = & \text{C} \\ & \\ \text{H} & \text{Cl} \end{array}$ $\begin{array}{c} \text{Cl} & \text{Cl} \\ & \\ \text{C} = & \text{C} \\ & \\ \text{H} & \text{H} \end{array}$ $\begin{array}{c} \text{H} & \text{H} \\ & \\ \text{C} = & \text{C} \\ & \\ \text{H} & \text{Cl} \end{array}$ ☐ ☐ ☐ ☒		1		1		
	(c)	(i)	orange to colourless ☒ colourless to orange ☐ orange to cloudy ☐ cloudy to orange ☐	1			1		1

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(ii)		188 (2) if incorrect award (1) for any of following $(2 \times C) + (4 \times H) + (2 \times Br)$ $(2 \times 12) + (4 \times 1) + (2 \times 80)$ $24 + 4 + 160$ ecf possible from arithmetic error		2		2	2	
				Question 5 total	7	4	0	11	2	1

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6				Indicative content - fuel, heat and oxygen are required for fire to burn - removal of fuel, heat or oxygen from a fire will put it out Method 1 - forest fires / heathland fires ⇒ fuel is removed so the fire goes out Method 2 - house fires / bonfires ⇒ heat is removed so the fire goes out Method 3 - chip pan fires / small fuel fires / burning person ⇒ oxygen is removed so the fire goes out there is no credit for describing method e.g. using fire breaks, spraying water from a hose or using a damp tea towel credit other suitable examples of fires that are extinguished using the methods shown in the photographs e.g. using foam to remove oxygen from a burning aeroplane	6			6		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				5-6 marks Clear understanding of the fire triangle; appropriate examples and good understanding of the three methods <i>There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</i> 3-4 marks Basic understanding of the fire triangle; appropriate examples and understanding of two methods <i>There is a line of reasoning which is partially coherent, largely relevant, supported by some evidence and with some structure. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</i> 1-2 marks Reference to one or two firefighting methods and/or one or two examples where they are used <i>There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with very little structure. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</i> 0 marks <i>No attempt made or answer worthy or any credit.</i>						
				Question 6 total	6	0	0	6	0	0

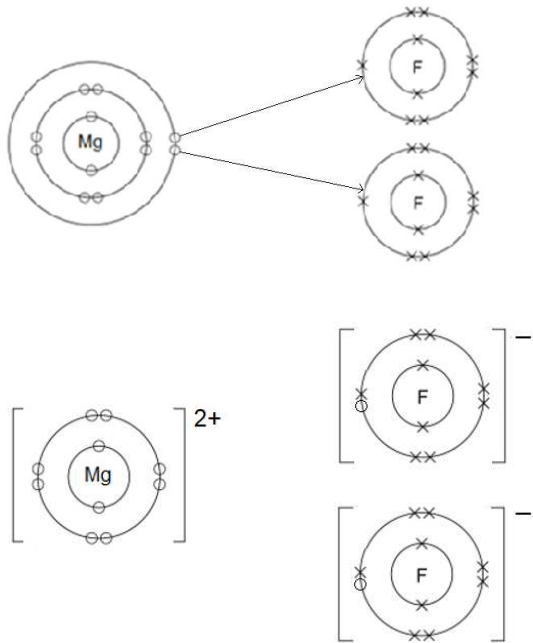
COMMON QUESTIONS

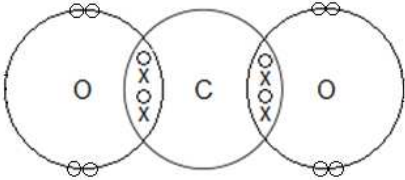
Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7/1	(a)	(i)		displacement neutral answers – redox / competition	1			1		
		(ii)	I	award (2) for all six points plotted correctly award (1) for any four or five points plotted correctly - tolerance $\pm\frac{1}{2}$ small square award (1) for straight line from origin		3		3	3	3
			II	accept any value in the range 4.1-4.2 ecf possible from incorrectly plotted graph			1	1	1	1
			III	18 accept any value in the range 17.5-18.5 no ecf possible			1	1	1	
	(b)			2 Al + 3 CuSO ₄ → Al ₂ (SO ₄) ₃ + 3Cu award (1) for reactant formula award (1) for balancing – mark independently of formula		2		2		
				Question 7/1 total	1	5	2	8	5	4

Question				Marking details			Marks available																											
							AO1	AO2	AO3	Total	Maths	Prac																						
8/2	(a)			<table><tr><th>Statement</th><th>True</th><th>False</th></tr><tr><td>Electric cars are the better choice for all drivers that commute around busy city centres</td><td></td><td>✓</td></tr><tr><td>The availability of government grants means the buying cost of electric cars is less than the cost of similar petrol cars</td><td></td><td>✓</td></tr><tr><td>Drivers of petrol cars also suffer range anxiety</td><td>✓</td><td></td></tr><tr><td>Petrol cars cost less to run per mile on motorways when compared to electric cars</td><td>✓</td><td></td></tr><tr><td>There is an equal choice of range and models of both electric and petrol cars</td><td></td><td>✓</td></tr><tr><td>Electric cars require service and maintenance</td><td>✓</td><td></td></tr></table>			Statement	True	False	Electric cars are the better choice for all drivers that commute around busy city centres		✓	The availability of government grants means the buying cost of electric cars is less than the cost of similar petrol cars		✓	Drivers of petrol cars also suffer range anxiety	✓		Petrol cars cost less to run per mile on motorways when compared to electric cars	✓		There is an equal choice of range and models of both electric and petrol cars		✓	Electric cars require service and maintenance	✓					3	3		
				Statement	True	False																												
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				There is an equal choice of range and models of both electric and petrol cars		✓																												
				Electric cars require service and maintenance	✓																													
award (3) for all correct award (2) for any four/five correct award (1) for any two/three correct																																		
	(b)			award (1) for any of following - produce no carbon dioxide / greenhouse gases whilst driving - produce no carbon dioxide / greenhouse gas emissions - zero exhaust emissions neutral answers produce no carbon dioxide / greenhouse gases don't use fossil fuels award (1) for <u>any sensible reference</u> to indirect source of carbon dioxide / use of fossil fuels related to production or use e.g. - energy used in production of the car / battery - materials transported across the world to make the car / battery - electricity used to charge the battery may come from a gas power station - some electric cars are hybrid / use fossil fuels for part of the journey						2	2																							

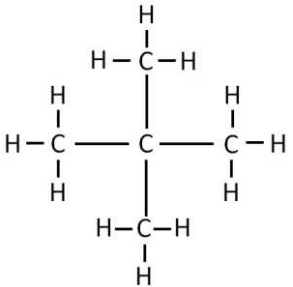
Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)			4 (2) credit with no working accept £0.04 if incorrect award (1) for any of following $\frac{1200}{30000} / 0.04$ $\frac{1200}{10000}$ $\frac{1200}{90000}$		2		2	2	
				Question 8/2 total	0	2	5	7	2	0

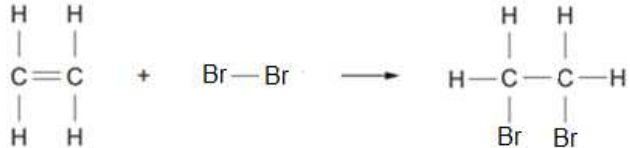
HIGHER TIER ONLY QUESTIONS

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)			 arrows showing transfer of one electron from magnesium to each of the fluorine atoms (1) octets in magnesium and both fluoride ions (1) charges on all ions $\Rightarrow$ Mg^{2+} and two F^- (1) if no marks credited for products diagram award (1) for correct electronic structure and charge for either magnesium or fluoride		3		3		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(b)			metallic substances have delocalised / free / moving <u>electrons</u> (to carry the charge when solid) (1) award (1) for either of following - the <u>ions</u> in ionic substances are free / able to move in the molten state or when they are dissolved - the <u>ions</u> in ionic substances are in fixed positions / cannot move in the solid state	2			2		
	(c)	(i)		 two shared pairs between both carbon and oxygen atoms (1) octet on all three atoms (1) accept dots and crosses as shown or all dots / crosses do not credit any diagram which suggests ionic bonding		2		2		
		(ii)		weak <u>intermolecular</u> forces / weak bonds <u>between molecules</u> (1) neutral – weak bonds do not accept reference to bonds <u>within</u> molecules little energy/heat needed to overcome the forces between molecules / to separate molecules (1) must be some reference to weak forces/bonds for second mark to be awarded neutral – little energy/heat needed to melt it	2			2		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(d)	(i)		antibacterial / antiviral / antifungal	1			1		
		(ii)		award (1) for any of following • can easily be absorbed into the body / blood • can enter the body through the skin • can be inhaled do not know the <u>long-term effects</u> (1) neutral answers do not know their effects / impact can cause harm	2			2		
				Question 3 total	7	5	0	12	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)	I	C_nH_{2n+2}	1			1		
			II	award (1) for any of following - all the carbon-carbon bonds are single bonds - there are no carbon-carbon double bonds - each carbon atom is bonded to 4 other atoms neutral answers each carbon atom is bonded to the <u>maximum</u> number of other atoms bonds between carbon and hydrogen are single bonds	1			1		
		(ii)	I	award (1) for either of following - compounds with the same (molecular) formula but different structures / different structural formulae / different arrangement of (carbon) atoms - compounds with the same number of carbon and hydrogen (atoms) but different structures / different structural formulae / different arrangement of (carbon) atoms	1			1		
			II				1	1		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(b)	(i)	I	award (1) for either of following (bromine water) goes from orange to colourless (bromine water) is decolourised / goes colourless must state or clearly imply a change neutral answers goes from orange to clear changes colour	1			1		1
			II	 award (1) for Br—Br / Br ₂ award (1) for product accept Br drawn in any position on each carbon do not accept both bromine atoms on the same carbon neutral answer – C ₂ H ₄ Br ₂		2		2		
			III	addition (reaction) do not accept 'additional'	1			1		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(ii)		C=C bond (in propene molecules) breaks / splits (1) monomers / propene molecules join together to form a long chain (1) $\left[\begin{array}{cc} \text{H} & \text{H} \\ & \\ -\text{C} & - & \text{C}- \\ & \\ \text{H} & \text{CH}_3 \end{array} \right]_n \quad (1)$ accept repeating without brackets and n	2	1		3		
	(c)	(i)		464 (3) if incorrect credit each correct step in working $2 \times 805 = 1610$ (1) $3466 - 1610 = 1856$ (1) $\frac{1856}{4}$ (1) ecf possible		3		3	3	
		(ii)		2648 / +2648 do not accept -2648			1	1	1	
				Question 4 total	7	6	2	15	4	1

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)			award (1) for correct formula in each equation $2\text{HCl} + \text{Zn} \longrightarrow \text{ZnCl}_2 + \text{H}_2$ $2\text{HNO}_3 + \text{MgCO}_3 \longrightarrow \text{Mg}(\text{NO}_3)_2 + \text{H}_2\text{O} + \text{CO}_2$ $\text{H}_2\text{SO}_4 + 2\text{NaOH} \longrightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$ do not award credit if equation is not balanced		3		3		
	(b)	(i)		award (1) for any of following - add excess zinc carbonate powder - add zinc carbonate until there is no more fizzing - add zinc carbonate until solid remains at the bottom of the beaker to sulfuric acid (1) filter the mixture (to remove the excess) (1) final mark can only be awarded when there is reference to the zinc carbonate / powder and an acid somewhere in the answer	2		1	3		3
		(ii)		award (1) for any indication of <u>evaporation</u> over a longer period of time e.g. - allow more time (for the water) to evaporate - leave (to evaporate) over night - evaporate slowly			1	1		1

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)	(i)		award (1) for either of following $\frac{2.24}{56} : \frac{2.84}{35.5}$ 0.04 : 0.08 award (1) for either of following 1 : 2 FeCl₂ award (1) for FeCl₂ and indicating that neither student is correct Student 1 is correct ☐ Student 2 is correct ☐ Neither student is correct ☒ ecf possible e.g. award (2) for Fe₂Cl (where A_r divided by mass) and stating that neither student is correct award (1) for FeCl₂ written with no working/incorrect working and tick in the correct box do not credit tick in the correct box but with no formula written and no sensible working		2	1	3	3	

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(ii)	I	white precipitate (forms) accept white solid neutral answer – silver chloride forms	1			1		1
			II	$\text{Ag}^+(\text{aq}) + \text{Cl}^-(\text{s}) \longrightarrow \text{AgCl}(\text{s})$ ☐ $\text{Ag}^+(\text{aq}) + \text{Cl}^-(\text{aq}) \longrightarrow \text{AgCl}(\text{s})$ ☒ $\text{Ag}^+(\text{s}) + \text{Cl}^-(\text{s}) \longrightarrow \text{AgCl}(\text{s})$ ☐ $\text{Ag}^+(\text{aq}) + \text{Cl}^-(\text{aq}) \longrightarrow \text{AgCl}(\text{aq})$ ☐ $\text{Ag}^+(\text{s}) + \text{Cl}^-(\text{aq}) \longrightarrow \text{AgCl}(\text{s})$ ☐		1		1		1
				Question 5 total	3	6	3	12	3	6

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6				Indicative content Reaction 1 • coke/carbon is a fuel • reaction produces carbon dioxide • exothermic/heats the furnace $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$ Reaction 2 • carbon dioxide reacts with more coke/carbon • carbon monoxide is a reducing agent $\text{CO}_2 + \text{C} \rightarrow 2\text{CO}$ Reaction 3 • iron(III) oxide is reduced by carbon monoxide/carbon • carbon/coke also acts as a reducing agent $2\text{Fe}_2\text{O}_3 + 3\text{C} \rightarrow 4\text{Fe} + 3\text{CO}_2$ do not credit details given in the diagram	6			6		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				5-6 marks Good understanding of each reaction; correct reduction equation included <i>There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</i> 3-4 marks Basic understanding of two reactions; good attempt at one or two equations <i>There is a line of reasoning which is partially coherent, largely relevant, supported by some evidence and with some structure. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</i> 1-2 marks Basic description giving some details not included in the diagram <i>There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with very little structure. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</i> 0 marks <i>No attempt made or no response worthy of credit.</i>						
				Question 6 total	6	0	0	6	0	0

FOUNDATION TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

QUESTION	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	2	4	1	7	0	5
2	1	2	2	5	0	0
3	2	3	2	7	2	3
4	5	4	0	9	0	0
5	7	4	0	11	2	1
6	6	0	0	6	0	0
7	1	5	2	8	5	4
8	0	2	5	7	2	0
TOTAL	24	24	12	60	11	13

HIGHER TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

QUESTION	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	1	5	2	8	5	4
2	0	2	5	7	2	0
3	7	5	0	12	0	0
4	7	6	2	15	4	1
5	3	6	3	12	3	6
6	6	0	0	6	0	0
TOTAL	24	24	12	60	14	11