

GCE GEOLOGY 2016

Marking Scheme for GL2a – 1212/01

Notes:

- This scheme shows the minimum acceptable answer(s) for each marking point. It cannot give every possible alternative so that an equivalent phrasing/drawing should be accepted. Use your professional judgement, but if in doubt, seek guidance from the e-mail address GL2a@wjec.co.uk (**quoting your name and centre number**).
 - Marking needs to take into account the quality of communication used. The nature of this paper means that continuous prose is not compulsory – answers given in note/diagram form are just as acceptable. Correct spelling of geological terms is desirable; use your professional judgement as to how close the candidate is.
 - A forward slash, /, indicates an alternative response; brackets, (), indicate a more complete response but is not awarded further credit.
 - ® is a reserved mark which must be given for full marks to be awarded.
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- **Always mark in red ink and ensure that every page has some ink on it to show that you have read it, even if no marks have been awarded.**
 - **Do not correct students' work.**
 - **Instructions for marking “ticked boxes” are given where appropriate within this marking scheme.**
 - **Put a tick close to the key word, phrase or drawing which gains each mark.**
 - **Write the total for each part-question in the margin close to the brackets showing the available mark.**
 - **Do not exceed the total for each part-question and do not re-distribute marks between sections.**
 - **Write the question total in the box at the end of each question and transfer this to the front cover.**
 - **Insert the total mark for the paper on the front cover.**

A marked and annotated example is available for download from the WJEC secure website for further guidance.

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GCE AS Geology
GL2a (1212/01) Specimens 2016

Specimen A
Slate/Shale



Specimen E
Gabbro



Specimen H
Galena



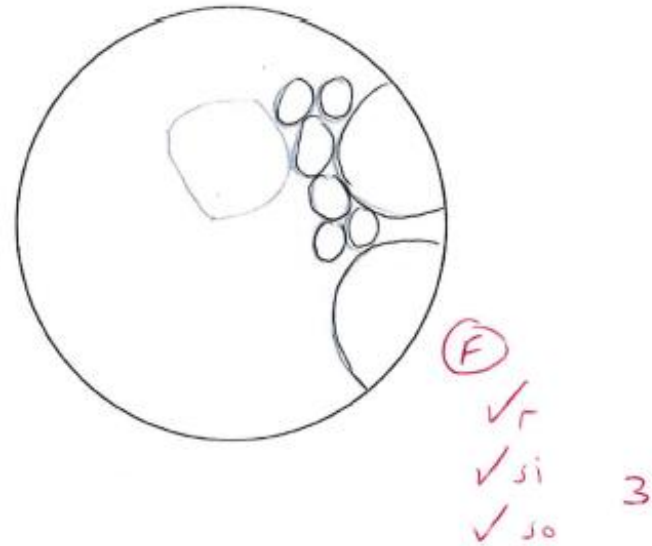
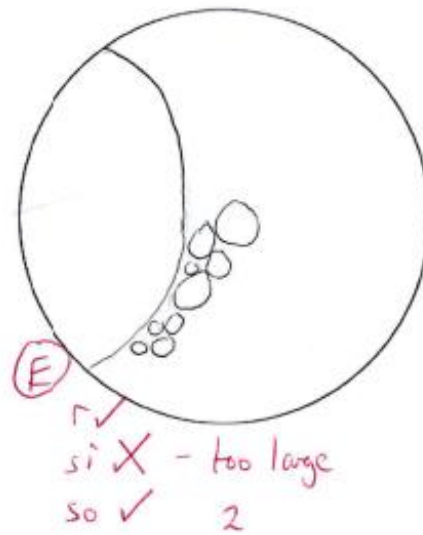
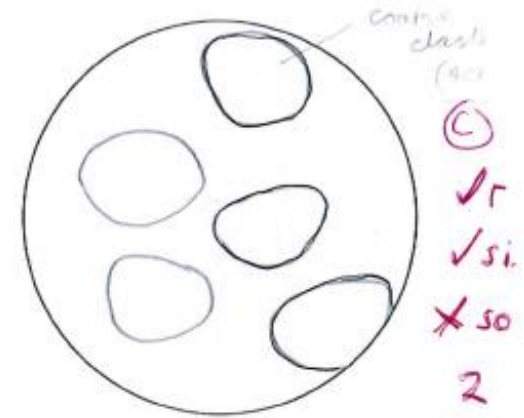
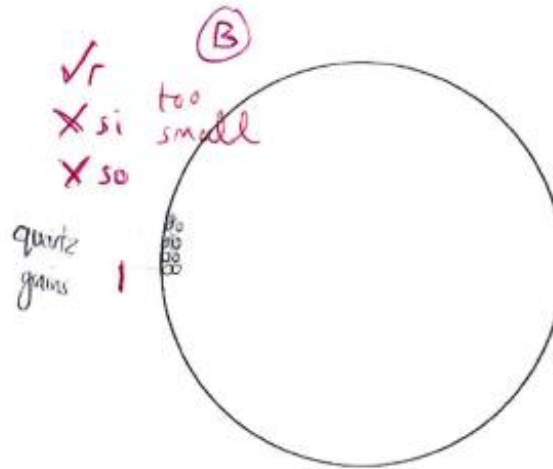
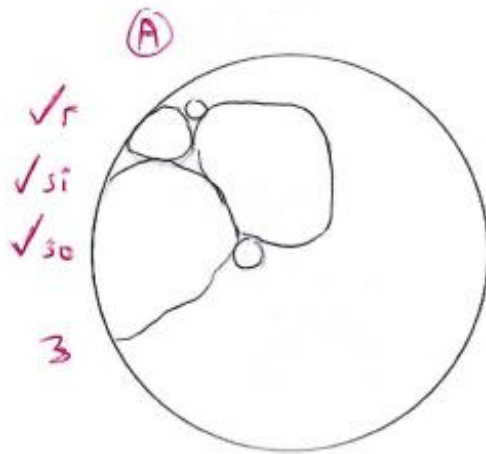
Q1	Marks	Expected Answer	Acceptable Answer	Do Not Accept
(a)	(1) (1) (1)	<ul style="list-style-type: none"> It formed by cooling at a constant rate It crystallised from a magma It formed by slow cooling 		<ul style="list-style-type: none"> If more than 3 boxes are ticked, deduct 1 mark for each box which is wrongly chosen i.e. to a minimum of 0
(b)(i)	(1) (1) (1)	<ul style="list-style-type: none"> Has 2 good cleavages at 90° Black/green or black colour Augite 	<ul style="list-style-type: none"> Any reference to 2 cleavages Brown/black Pyroxene 	<ul style="list-style-type: none"> It has a green or grey colour Dark Prismatic Any reference to a lustre (vitreous/glassy etc.)
(b)(ii)	(1)	<ul style="list-style-type: none"> Olivine 		
(b)(iii)	(1)	<ul style="list-style-type: none"> Peridotite 		
	Total 8			

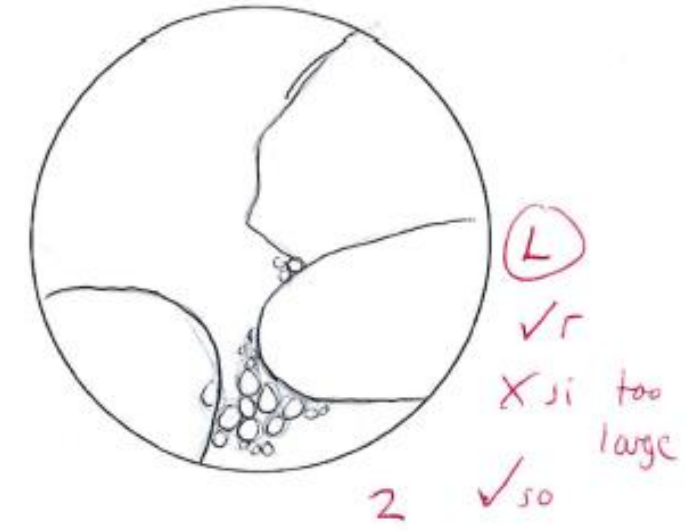
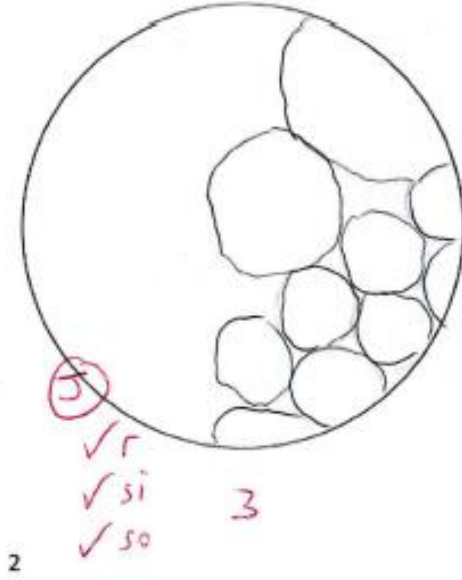
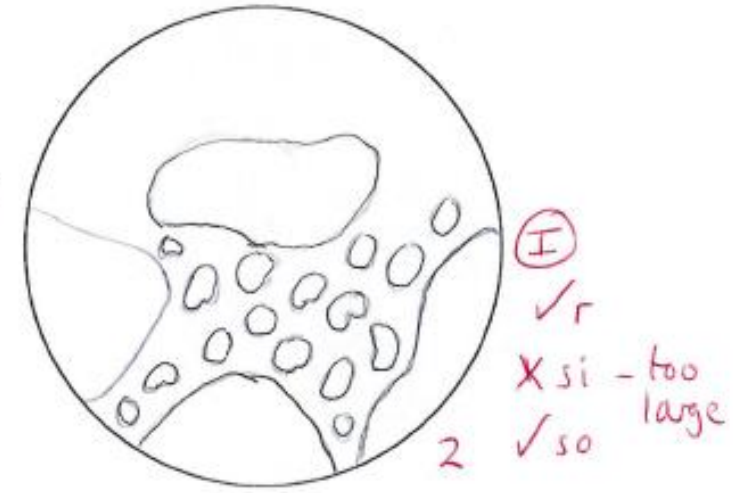
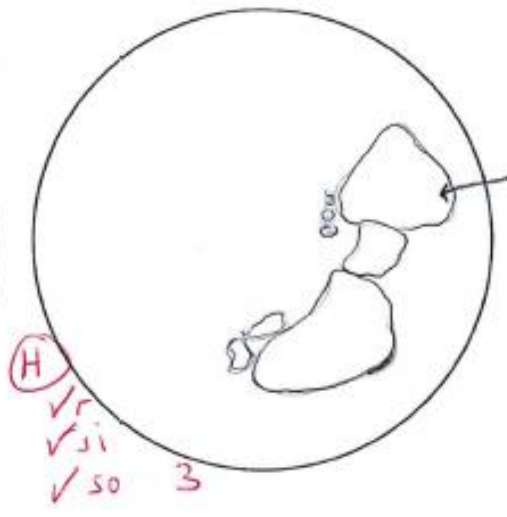
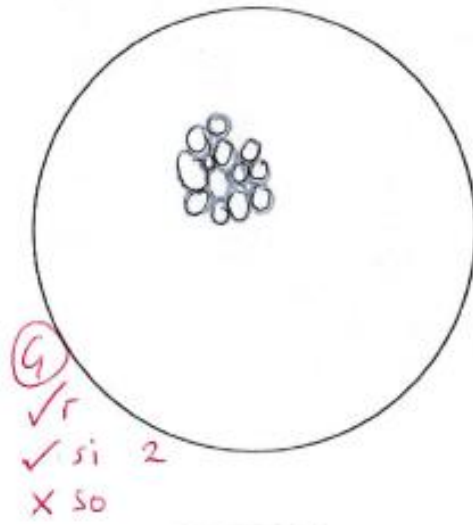
Q2	Marks	Expected Answer	Acceptable Answer	Do Not Accept
(a)	(1)	<ul style="list-style-type: none"> Lava flow and sill (need both for one mark) 		<ul style="list-style-type: none"> Only 1 correct answer The 2 correct answers if more than 2 boxes ticked
	(1)	<ul style="list-style-type: none"> Concordant or equivalent 		<ul style="list-style-type: none"> Linear (or any reference to shape)
(b)(i)	(1)	<ul style="list-style-type: none"> Columnar joints 	<ul style="list-style-type: none"> Cooling joints 	<ul style="list-style-type: none"> Joints
(b)(ii)	(1)	<ul style="list-style-type: none"> Cooling 		
	(1)	<ul style="list-style-type: none"> Contraction towards cooling centres 	<ul style="list-style-type: none"> Contraction or shrinkage 	
(c)		<p>Any two x (1) from:</p> <ul style="list-style-type: none"> Weathered/reddened upper surface/ eroded or brecciated upper surface or equivalent Included fragments of lava/igneous rock in the rock above or evidence of looking for this evidence No baked margin in the rock above or reference to looking for this evidence at the top 	<p>Credit any correct answers even if surrounded by multiple other answers which do not gain credit such as concordant or baked margin at the base etc.</p> <ul style="list-style-type: none"> Only one baked margin/only baked margin below Vesicles/amygdales Fine-grained 	<ul style="list-style-type: none"> No xenoliths/included fragments from rock above within the lava flow Concordant Reference to a baked margin below the lava flow unless it is clearly implied that it is the only baked margin/that there is not one at the top (simply not labelling one at the top is not enough) Xenoliths/included fragments from rock below or only xenoliths/included fragments from rock below in the lava flow Any reference to chilled margins Any reference to modern weathering and erosion/link to the loose rock fragments Pinching out/thinning out
	Total 7			

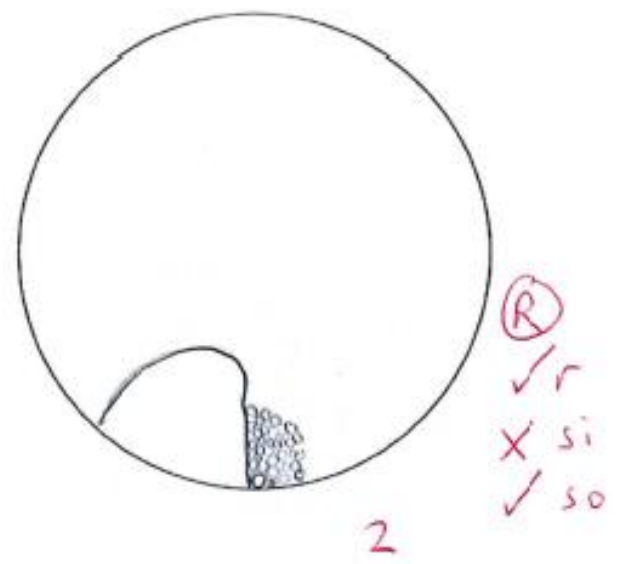
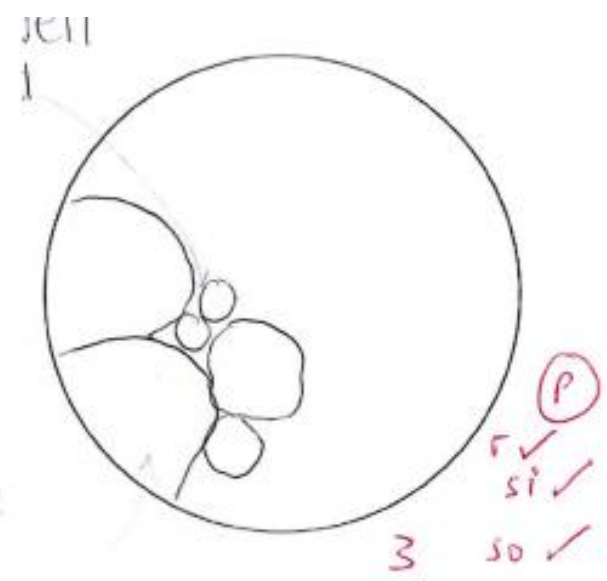
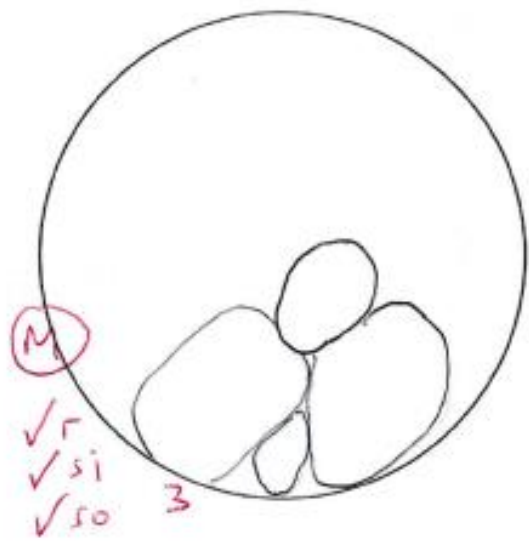
Q3	Marks	Expected Answer	Acceptable Answer	Do Not Accept
(a)(i)	(1)	<ul style="list-style-type: none"> • 2.5 mm 		
(a)(ii)	(1)	<ul style="list-style-type: none"> • Coral 		
(b)	<p>(1) r</p> <p>(1) si</p> <p>(1) so</p>	<p>Maximum 1 of the marks below available if all boundaries are interlocking i.e. drawn as crystals</p> <p>Maximum 2 marks if none of the clasts are in contact with others i.e. must be at least one contact of clasts</p> <ul style="list-style-type: none"> • Mostly rounded / sub-rounded clasts • Must contain two or more clasts within the size range 1-5 cm (appear as 0.5-2.5 cm on the diagram) • Relatively poorly sorted i.e. not all similar size (see examples) <p>See examples in mark scheme</p> <p>Please mark using ticks labelled with the corresponding letters r, si and so as shown in Marked Example</p>	<ul style="list-style-type: none"> • A range of sub-angular to rounded clasts but must have some rounded 	

(c)	(1)	<p>Age relationships:</p> <ul style="list-style-type: none"> Evidence: D overlies C or D younger than C or equivalent 		<p>Statements that are correct but then contradicted elsewhere in the answer e.g. rock D overlies rock unit C...rock unit D is older than rock unit C</p>
	(1)	<ul style="list-style-type: none"> Evaluation: so clasts in D <i>could</i> come from C based on age or linked to D overlying or C underneath 		<p>An evaluation where it is not clear whether it refers to the composition evidence or age evidence</p>
	(1)	<p>Mineralogy:</p> <ul style="list-style-type: none"> Evidence: clasts in D are composed of quartz and implication that C does not contain quartz or C is limestone/contains calcite and implication that D is not limestone/ does not contain calcite 		
	(1)	<ul style="list-style-type: none"> Evaluation: based on composition the statement is false 		
	Total 9			

Marked examples of Figure 3b







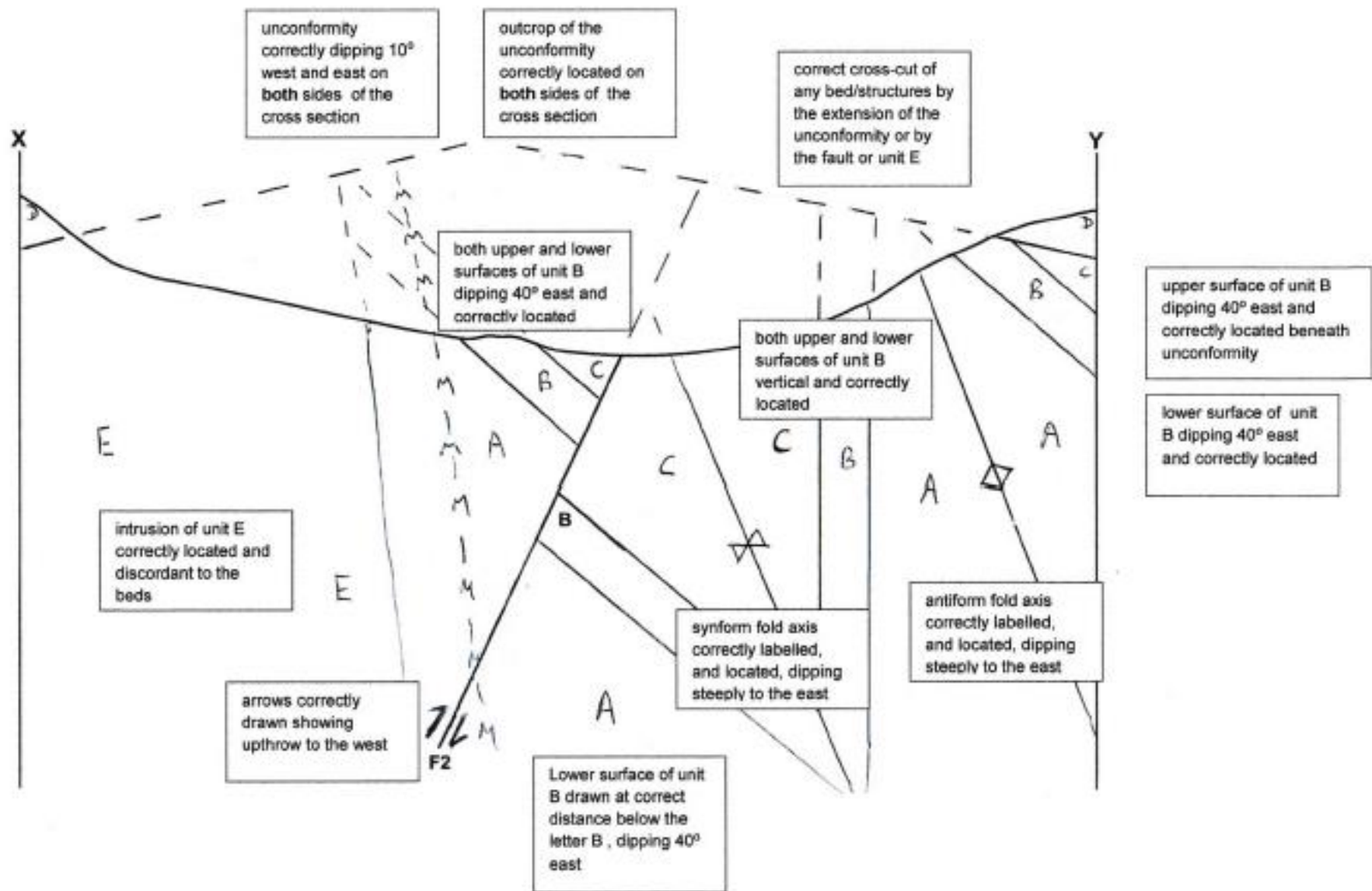
Q4	Marks	Expected Answer	Acceptable Answer	Do Not Accept
(a)	(1)	<ul style="list-style-type: none"> No (lateral) displacement of vertical rock unit (B) 	<ul style="list-style-type: none"> Vertical rocks not moved sideways or "not all rocks moved sideways" 	<ul style="list-style-type: none"> No lateral displacement of rocks (must state vertical rocks or not all rocks displaced sideways/laterally)
	(1)	<ul style="list-style-type: none"> Distance between the limbs/ width of outcrop of rock unit A changes across the fault 	<ul style="list-style-type: none"> Downthrow symbol on fault plane / there is a downthrow side to the north or equivalent 	<ul style="list-style-type: none"> Any reference to APT Reference to upthrow or downthrow without qualification
(b)	(1)	<ul style="list-style-type: none"> North-east of the fault 		
	(1)	<ul style="list-style-type: none"> Reverse 		
	Total 4			

Q5	Marks	Expected Answer	Acceptable Answer	Do Not Accept
		<p>For the evaluation and reason marks, credit the reason not the evaluation, but must have the evaluation correct to gain credit for the reason</p> <p>Colour result</p> <ul style="list-style-type: none"> • Lead grey colour <p>Evaluation/reason of colour</p> <ul style="list-style-type: none"> • False: not pyrite because pyrite has a bronze yellow or gold colour or equivalent / pyrite is not lead grey or grey <p>Hardness result</p> <ul style="list-style-type: none"> • Scratches with a steel pin or scratches with a copper coin or scratches with a finger nail <p>Evaluation/reason of hardness</p> <ul style="list-style-type: none"> • False: recognition that pyrite does not scratch with/is harder than a steel pin or copper coin or finger nail 	<ul style="list-style-type: none"> • Credit a correct test result even if it only appears in the reason box not the test result box • Grey or silver colour <p><i>Due to the natural variability of galena samples accept:</i></p> <ul style="list-style-type: none"> • Scratches with a steel pin but not a copper coin • Scratches with a copper coin but not a finger nail 	<ul style="list-style-type: none"> • Reference to streak result of galena • It is galena • The result of a streak test for pyrite • Just stated hardness of galena on Mohs' hardness scale • Does not scratch with a steel pin • Does not scratch with a copper coin without reference to scratching with a steel pin • Just stated hardness of pyrite on Mohs' hardness scale
	Total 4			

Q6	Marks	Expected Answer	Acceptable Answer	Do Not Accept
(a)	(1) (1) (1) (1) (1) (1) (1)	<p><i>Due to the natural variability and availability of the samples, if the candidate has interpreted the sample as slate accept:</i></p> <ul style="list-style-type: none"> • It has a slaty cleavage • It has a crystalline texture • It is the product of regional metamorphism <p><i>If the candidate has interpreted the sample as shale accept:</i></p> <ul style="list-style-type: none"> • It formed under water • It is well sorted • It formed under low energy conditions 		<ul style="list-style-type: none"> • If more than 3 boxes are ticked, deduct 1 mark for each box which is wrongly chosen to a minimum of 0 • Combinations of answers from the list for slate and the list for shale
(b)	(1) (1) (1)	<ul style="list-style-type: none"> • Location T • Chialstolite indicates contact metamorphism or chialstolite forms in a metamorphic aureole • Of slate/shale 	<ul style="list-style-type: none"> • Chialstolite cannot form in limestone / marble or in igneous rocks (or gabbro and rock unit B) i.e. justification of why it is not all of localities V, W, X, Y or Z 	<ul style="list-style-type: none"> • chialstolite indicates metamorphism • of rock A
	Total 6			

Q7	Marks	Expected Answer	Acceptable Answer	Do Not Accept
(a)	(1) (1)	<ul style="list-style-type: none"> • Antiform APT trending N–S located in rock unit A to east of vertical bed symbol • Synform APT trending N–S located anywhere within the western/left outcrop of rock unit C 	<ul style="list-style-type: none"> • APTs that do not extend the whole height of the box • If both fold axes show correct location but have incorrect symbols award one mark 	<ul style="list-style-type: none"> • Any APT running along a boundary between rock units • APT within rock unit A but on or to the west of the vertical bed symbol
(b)	(1) (1) (1)	<ul style="list-style-type: none"> • Folding of rock units A-C happened before the faulting of rocks units A-C • The axial planes in rock units A-C dip to the east • Folding was caused by compression from the east and west 		<ul style="list-style-type: none"> • If more than 3 boxes are ticked, deduct 1 mark for each box which is wrongly chosen to a minimum of 0
	Total 5			

Q8	Marks	Expected Answer	Acceptable Answer	Do Not Accept
	12	<p><i>Candidates are asked to complete a sketch cross-section not to construct, so the mark scheme allows for some variations in dips/positions of beds</i></p> <p>Use the annotated cross-section as the mark scheme</p> <p>Each “box” is worth one mark</p> <p>Key points</p> <ul style="list-style-type: none"> • There is no credit for drawing the edge of the metamorphic aureole • Cross-cut by the unconformity or the fault or the pluton above ground surface must show that it cuts off at least one feature below 	<ul style="list-style-type: none"> • Approximate dip values for fold limbs (30-50°) and (85-90°) • Approximate dip values for the unconformity(5-15°) • Unconformity, igneous body and bed outcrops within approximately 6 mm of correct location on the surface 	<ul style="list-style-type: none"> • Any dip values outside the ranges stated in acceptable answers • Vertical APTs of folds or APTs that do not approximately bisect fold limbs • A cross-cut of the unconformity or the fault or the pluton above the ground surface if it does not accurately show that it cuts off at least one feature below
	Total 12			



Q9	Marks	Expected Answer	Acceptable Answer	Do Not Accept
	<p>(1) u</p> <p>(1) a</p> <p>(1) d</p> <p>(1) f</p> <p>(1) e</p> <p>(1) i</p> <p>(1) c</p> <p>(1) t</p>	<p>Points must be explicitly labelled / annotated /written, not simply drawn</p> <p>No diagram credit a maximum of 4 marks</p> <p>Any five x (1) from:</p> <ul style="list-style-type: none"> • Correctly located and labelled unconformity / plane of unconformity (i.e. the boundary between rock units) • Idea that there are older rock units below unconformity or younger rock units above unconformity • Differences in dip angle / direction either side of unconformity • Folding / tilting of lower rock units prior to deposition of upper units • Erosion surface or erosion of lower rock units • Specific reference to included fragments of rocks below unconformity within the rocks above • Cross-cutting / discordant relationships labelled / annotated / discussed • The idea that a time gap / hiatus has occurred in the deposition / formation of rocks <p>Please mark using ticks labelled with the corresponding letters e.g. u, a, d, f, e, i, c and t as shown in Marked Example</p>	<p><i>Credit answers even if the box that has been ticked does not match the answer given</i></p> <ul style="list-style-type: none"> • Reference to unconformity where there is no angular discordance e.g. heterolithic unconformity 	<ul style="list-style-type: none"> • A named field location • Marks for concepts that are drawn but not labelled / annotated / written • An unconformity labelled within the upper or lower rock unit • Reference to time gap / hiatus without reference to "of deposition" or equivalent i.e. do not credit the terms "time gap" or "hiatus" without qualification
	Total 5			