

Additional Science A A220

and

**Biology (A230),
Chemistry (A330) &
Physics (A340)**

Advisory Guidelines for marking of Investigations

Skills Assessment

Aspect	2 marks	4 marks	6 marks	8 marks	
	Look for the way the candidate has approached the task	Uses simple equipment and measurements	Routine task + limited range of data collected	Straightforward task + wide range of data collected	Complex, multi-step task + high levels of precision + reliable data
S(a)	Simple measurement or comparison task, based on straight-forward use of simple equipment.	Routine task requiring only limited precision or range of data to be collected.	Straightforward task of limited complexity, but requiring good precision or a wide range of data.	Complex task requiring high levels of precision/reliability in the data collected.	
	Follows given technique	Selects and uses basic equipment	Selects and uses techniques for standard procedure	Explores and justifies apparatus/technique	
S(b)	Follow a given technique, but with very limited precision or reliability.	Select and use basic equipment to collect a limited amount of data.	Select and use techniques and equipment which are appropriate for the range of data required.	Justify the choice of equipment and technique to achieve data which is precise and reliable.	
	Uses structured worksheets	Task closely defined by teacher + carried out independently	Defines task from teacher brief + carries it out independently	Justifies task + shows signs of a different approach from rest of class	
S(c)	The task has been set by the teacher and/or is based on specific, task-related structured worksheets.	The task is closely defined by the teacher, but is carried out with little further guidance.	The task is defined by the candidate from a more general brief, then carried out independently.	The topic is reviewed by the candidate to justify a choice of task. The work is completed independently.	
	Little attempt to control factors	Identifies some factors to control, awareness of fair testing	Identifies the majority of factors to control	Describes how factors have been controlled	
C(a)	Little or no care has been taken to identify or control outside influences.	Identifies some factors which may affect the outcomes and need to be controlled or accounted for.	Identifies the majority of factors which may affect the outcomes and need to be controlled or accounted for.	Reviews factors which might affect the outcomes and describes how they have been controlled or accounted for.	
	Limited data collected	Adequate range but few checks	Data covers relevant range + includes repeat measurements	Preliminary work to establish range + handles anomalies	
C(b)	The data is very limited in amount (e.g. isolated individual data points, with no clear pattern), covering only part of the range of relevant cases/situations, with no checking for reliability.	An adequate amount or range of data is collected, but with little or no checking for reliability.	Data is collected to cover the range of relevant cases/situations, with regular repeats or checks for reliability.	Values tested are well-chosen across the range, with regular repeats and appropriate handling of any anomalous results. Preliminary tests are used to establish the range.	
	Poor use of apparatus + poor quality data	Satisfactory use of techniques + variable quality data	Sound techniques + good quality data	Preliminary work to explore technique/apparatus to obtain best quality data + excellent practical skills	
C(c)	Little care evident in use of apparatus. Data generally of low quality.	Use of techniques and apparatus generally satisfactory. Data of variable quality, with some operator error apparent.	Sound techniques in use of apparatus/ equipment. Data of generally good quality.	Consistent precision and skill shown in use of apparatus/ equipment. Where appropriate, checks or preliminary work are included to confirm or adapt the apparatus or techniques to ensure data of high quality.	

	Displays limited results after help given	Bar charts or significant errors in graphs	6: Correctly scaled and labelled axes; correctly plotted points; good quality lbf 5: poor quality aspects or dot-to-dot	+	In addition to 6, draws range bars or draws scatter graph
I(a)	Display limited numbers of results in tables, charts or graphs, using given axes and scales.	Construct simple charts or graphs to display data in an appropriate way, allowing some errors in scaling or plotting.	Correctly select scales and axes and plot data for a graph, including an appropriate line (normally a line of best fit) or construct complex charts or diagrams (e.g. stacked histograms, species distribution maps).	Additionally, indicate the spread of data (e.g. through scatter-graphs or error bars) and give clear keys for displays involving multiple data-sets.	
	Select individual results as a basis for conclusions.	Carry out simple calculations e.g. correct calculation of averages from repeated readings.	Use mathematical comparisons between results to support a conclusion	Use complex processing to reveal patterns in the data e.g. statistical methods, use of inverse relationships, or calculation of gradient of graphs.	
	Compares individual results	Calculates averages or changes in e.g. mass	Uses results in formulae/equations	+	Further processing to find patterns
	Notes differences	Qualitative trend	Quantitative trend	+	Takes into account the scatter in the data
I(b)	Note differences between situations/cases, or compares individual results.	Identify trends or general correlations in the data	Describe formal or statistical relationships within the cases/situations studied	Review the extent of, or limitations to, formal conclusions in relation to the scatter evident in the data.	
	No relevant science	Explains trend/conclusion using some scientific ideas		C grade SKU	A grade SKU
I(c)	Link the outcomes to previous experience or 'common sense'	Relate the conclusion to scientific ideas/explanations.	Justify the conclusion by reference to relevant scientific knowledge and understanding.	Use detailed scientific knowledge to explain all aspects of the given conclusion.	
	Comments on method of data collection	Identifies problems in method related to accuracy or range	Appropriate improvements to method outlined	+	More detail + justification
E(a)	Make a relevant comment about how the data was collected and safety procedures	Comment on the limitations to accuracy or range of data imposed by the techniques and equipment, used.	Suggests improvements to apparatus or techniques, or alternative ways to collect the data, but without sufficient practical detail.	Describe in detail improvements to the apparatus or techniques, or alternative ways to collect the data, and explain why they would be an improvement.	
	Comments on accuracy but no reference to data	Notes presence or absence of outlier(s)	Relates reliability to scatter in repeats + scatter around lbf	+	More detail + accounts for anomalies
E(b)	Make a claim for accuracy or reliability, but without appropriate reference to the data.	Note the presence or absence of results that are beyond the range of experimental error.	Use the general pattern of results or degree or scatter between repeats as a basis for assessing accuracy and reliability.	Consider critically the reliability of the evidence, accounting for any anomalies.	

	<p>confidence level in conclusion linked to: technique and data + precision of apparatus, range covered, reliability of data + weaknesses in data and need to collect further data and/or refer to other sources</p>			
E(c)	Relate judgement of the reliability (or otherwise) of the conclusions only to techniques used, not to data collected.	Link confidence in the conclusion to the apparent reliability of the data collected.	Discuss the precision of apparatus and techniques, the range covered and reliability of data to establish a level of confidence in the conclusions.	Identify weaknesses in the data and give a detailed explanation of what further data would help to make the conclusions more secure.
	<p>Key features of method missing Aim + main features described Procedures clearly described All aspects considered + procedures in detail</p>			
P(a)	The purpose/context of the investigation is not made clear. Key features of experimental procedures are omitted or unclear.	The purpose of the work is stated. Main features of the work are described, but there is a lack of detail.	There is a clear statement of the question/task and its scope. Practical procedures are clearly described.	All aspects of the task are reviewed. Practical procedures are discussed critically and in detail.
	<p>Data recorded but some missing, labelling poor, most units missing Data recorded, labelling unclear, units incorrect All raw data clearly recorded but some units missing All data fully + clearly recorded to appropriate degree of accuracy</p>			
P(b)	Major experimental parameters are not recorded. Some data may be missing.	Most relevant data is recorded, but where repeats have been used, average values rather than raw data may be recorded.	All raw data, including repeat values, are recorded.	All relevant parameters and raw data including repeat values are recorded to an appropriate degree of accuracy.
	Labelling of tables is inadequate. Most units are absent or incorrect.	Labelling is unclear or incomplete. Some units may be absent or incorrect.	All quantities are identified, but some units may be omitted.	A substantial body of information is correctly recorded to an appropriate level of accuracy in well-organised ways.
	Observations are incomplete or sketchily recorded.	Recording of observations is adequate but lacks detail.	Observations are adequate and clearly recorded.	Observations are thorough and recorded in full detail.
	<p>Poor quality spg + little science Variable quality spg+ limited science Generally sound spg+ appropriate science Almost faultless spg + full and effective use of science</p>			
P(c)	Spelling, punctuation and grammar are of generally poor quality. Little or no relevant technical or scientific vocabulary is used.	Use of appropriate vocabulary is limited. Spelling, punctuation and grammar are of very variable quality.	Appropriate scientific vocabulary is used. Spelling, punctuation and grammar are generally sound.	There is full and effective use of relevant scientific terminology. Spelling, punctuation and grammar are almost faultless.