

Exam Revision

Criterion A

- i. explains scientific knowledge
- ii. apply scientific knowledge and understanding to solve problems set in familiar and unfamiliar situations
- iii. analyse and evaluate information to make scientifically supported judgments.

This is going to examine your knowledge. You should be able to recall definitions of keywords, use key terminology in answering questions and be able to apply your knowledge into abstract situations.

Examples

State Hess's law.

Describe exothermic and endothermic reactions.

Explain bond breaking and bond formation in terms of exothermic & endothermic reactions.

Deduce the relative stabilities of reactants and products using enthalpy level diagrams.

Criterion B

- i. explain a problem or question to be tested by a scientific investigation
- ii. formulate a testable hypothesis and explain it using scientific reasoning
- iii. explain how to manipulate the variables, and explain how data will be collected
- iv. design scientific investigations.

This will be examining your ability to plan an investigation. You should be able to create a research question and hypothesis, identify IV, DV and 3 CVs. Units need to be included and correct measuring equipment.

You need to be able to write a step by step method outline how you would carry out an investigation.

Long Question

Example

Design an investigation to study the effect of temperature on rate of reactions. In your investigation, you should include:

- an identification of the independent, dependent and control variables
- a hypothesis that your method will test
- how you will manipulate the variables
- a list of equipment you will use
- a description of your method
- how you will ensure your method is safe

Mark scheme:

	1	2	3	4
Variables	Variables are connected to the problem	Independent <i>or</i> dependent variable <i>and</i> one control variable identified	Independent <i>and</i> dependent variable <i>and</i> one control variable identified	Independent <i>and</i> dependent variable <i>and</i> at least two control variables are identified
Hypothesis	formulates a hypothesis connected to the variables but not explicitly linked to the variables with no explanation	formulate a testable hypothesis correctly linked to the variables (no explanation)	formulate a testable hypothesis correctly linked to the variables and with correct scientific explanation	
Manipulation of variables / method	attempt at a method but detail is insufficient for another student to follow	partial method is described but detail is insufficient for another student to follow	method is described and could easily be followed by another student	method is described with fine detail and could easily be followed by another student
Data collection	plans to repeat at least three trials <i>or</i> measures over a range of at least 15 °C	plans to repeat at least three trials at <i>and</i> measures over a range of at least 15 °C		
Safety	A relevant comment relating safety	A relevant comment relating to safety and corrected linked to the specific hazard		

Short Questions

Usually you are given a description of an investigation and asked questions about it

Examples

Outline the problem (research question) being tested in this investigation

Suggest a suitable hypothesis for this investigation

State the independent variable

Identify the dependent variable

State two things which need to be controlled in the investigation

Explain how the student kept the investigation fair

Criterion C

- present collected and transformed data
- interpret data and explain results using scientific reasoning
- evaluate the validity of a hypothesis based on the outcome of the scientific investigation
- evaluate the validity of the method
- explain improvements or extensions to the method.

This will be examining your ability to process and evaluate data. There are 3 types of questions you could get.

1. Questions involving graphs/calculations/tables linked with data.

Example

Calculate the mean average of the data.

Present the transformed data in a graph. (Transformed data is the average you calculated)

Temperature of solution/ $^{\circ}\text{C}$	Volume of gas / cm^3					
	Trial number					
	1	2	3	4	5	Average
10	5.1	5.0	5.5	5.4	5.5	
20	10.0	10.2	10.2	10.5	10.4	
30	15.1	15.0	15.4	15.4	15.4	
40	20.0	20.2	20.4	20.4	20.2	
50	25.1	25.2	25.0	25.6	30	

Calculate average:

$$\frac{T1+T2+T3+T4+T5}{5}$$

Drawing graph:

Make sure you include:
Correct scale of axis, correct choice of line/scatter/curve/bar, labelled axis, correct plotted points, units, title.

2. Drawing conclusions from data

Examples

State a trend in the data

Explain a scientific reason for the increase in volume of gas collected with temperature.

Comment on the validity of the hypothesis based on the data.

Identify any anomalous data.

3. Evaluating a method

Examples

Based on the method presented, **describe** one strength and one weakness related to the method's design.

Outline two improvements to the investigation. **Justify** your answer.

State an extension to this method that would benefit the investigation.

Criterion D

- i. explain the ways in which science is applied and used to address a specific problem or issue
- ii. discuss and evaluate the various implications of using science and its application to solve a specific problem or issue
- iii. apply scientific language effectively
- iv. document the work of others and sources of information used.

This will be examining your ability to apply your scientific knowledge into real life situations. You will usually get a long answer essay style question and some short answer questions.

Examples

Long Question

Consider an alternative is to be found for the traditional “egg yolk” emulsifier in Mayonnaise.

Discuss and evaluate the impact of the preferred alternative to egg yolk and explain your reasoning. In this extended piece of writing you should support your answer with scientific explanations considering:

- What are the advantages and disadvantages of the emulsifier chosen?
- The impact of this on the environment and/or the economy or any other factor with a linked consequence.
- A concluding appraisal.

Marking scheme:

	1	2	3	4
Evaluation	A statement relating to the topic identified in the question	A statement relating to the topic identified in the question	More than one statement relating to the topic identified in the question including a positive and negative impact	More than one statement relating to the topic identified in the question including a positive and negative impact and a possible alternative where suitable
Factor 1	A statement of factor impact	More than one statement of factor impact	Positive and negative statements of factor impacts	
Factor 2	A statement of factor impact	A statement of factor impact with a linked consequence	Positive and negative statements of factor impacts with a linked consequence.	
Conclusion	Appraisal given	Appraisal linked to previous impacts giving writers opinion		