



Higher
Coursework
Assessment Task



Higher Environmental Science

Assignment

Assessment task

This document provides information for teachers and lecturers about the coursework component of this course in terms of the skills, knowledge and understanding that are assessed. It **must** be read in conjunction with the course specification.

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Contents

Introduction	1
Instructions for teachers and lecturers	2
Marking instructions	10
Instructions for candidates	21

Introduction

This document contains instructions for teachers and lecturers, marking instructions and instructions for candidates for the Higher Environmental Science assignment. You must read it in conjunction with the course specification.

This assignment is worth 20 marks (scaled to 30). This contributes 20% to the overall marks for the course assessment.

This is one of three course assessment components. The other components are question papers.

Instructions for teachers and lecturers

General information

This information applies to the assignment for Higher Environmental Science.

The assignment assesses the application of skills of scientific inquiry and related environmental science knowledge and understanding.

The assignment gives candidates an opportunity to demonstrate the following skills, knowledge and understanding:

- ◆ applying knowledge of environmental science to new situations, interpreting information and solving problems
- ◆ planning or designing and carrying out experiments/field work investigations to test given hypotheses or to illustrate particular effects
- ◆ recording detailed observations and collecting data from experiments/field work investigations
- ◆ selecting information from a variety of sources
- ◆ presenting information appropriately in a variety of forms
- ◆ processing information (using calculations and units, where appropriate)
- ◆ making predictions and generalisations from evidence/information
- ◆ drawing valid conclusions and giving explanations supported by evidence/justification
- ◆ evaluating experimental/field work investigations and suggesting improvements
- ◆ communicating findings/information effectively

The assignment offers challenge by requiring candidates to apply skills, knowledge and understanding in a context that is one or more of the following:

- ◆ unfamiliar
- ◆ familiar but investigated in greater depth
- ◆ integrating a number of familiar contexts

Candidates research and report on a topic that allows them to apply skills and knowledge in environmental science at a level appropriate to Higher.

The topic must be chosen with guidance from teachers and/or lecturers and must involve experimental/field work investigations.

The assignment has two stages:

- ◆ research
- ◆ report

The research stage must involve experimental or field work which allows measurements or counts to be made. Candidates must also gather data/information from the internet, books, journals and/or maps.

Candidates must produce a report on their research.

Conditions of assessment

Setting, conducting and marking the assignment

Setting

The assignment is:

- ◆ set by centres within SQA guidelines
- ◆ set at a time appropriate to the candidate's needs
- ◆ set within teaching and learning and includes experimental/field work at a level appropriate to Higher

Conducting

The assignment is:

- ◆ an individually produced piece of work from each candidate
- ◆ started at an appropriate point in the course
- ◆ conducted under controlled conditions

Marking

The report is submitted to SQA for external marking.

All marking is quality assured by SQA.

Assessment conditions

Controlled assessment is designed to:

- ◆ ensure that all candidates spend approximately the same amount of time on their assignments
- ◆ prevent third parties from providing inappropriate levels of guidance and input
- ◆ mitigate concerns about plagiarism and improve the reliability and validity of SQA awards
- ◆ allow centres a reasonable degree of freedom and control
- ◆ allow candidates to produce an original piece of work

There are two levels of control.

Under a high degree of supervision and control	Under some supervision and control
<ul style="list-style-type: none"> ◆ the use of resources is tightly prescribed ◆ all candidates are within direct sight of the supervisor throughout the session(s) ◆ display materials which might provide assistance are removed or covered ◆ there is no access to e-mail, the internet or mobile phones ◆ candidates complete their work independently ◆ interaction with other candidates does not occur ◆ no assistance of any description is provided 	<ul style="list-style-type: none"> ◆ candidates do not need to be directly supervised at all times ◆ the use of resources, including the internet, is not tightly prescribed ◆ the work an individual candidate submits for assessment is their own ◆ teachers and/or lecturers can provide reasonable assistance

The assignment has two stages.

Stage	Level of control
◆ research	conducted under some supervision and control
◆ report	conducted under a high degree of supervision and control

Instructions

Teachers and lecturers must exercise their professional responsibility to ensure that the report submitted is the candidate's own work.

It is recommended that no more than 8 hours is spent on the **whole** assignment.

A maximum of 2 hours is allowed for the report stage.

Teachers and/or lecturers must ensure candidates understand the requirements of the task. The instructions for candidates outline the requirements for the assignment and teachers and/or lecturers must give these to candidates at the outset. These must not be altered, or supplemented by centre-devised materials.

It is not permitted **at any stage** to provide candidates with a template or model answers.

Research stage

The research stage is conducted under some supervision and control. See 'Conditions of assessment' section.

Choosing the topic

The teacher and/or lecturer must ensure that a **range** of topics is available for candidates to choose from.

At the start of the research stage, the teacher and/or lecturer must agree the choice of topic with the candidate to ensure that it:

- ◆ is appropriate for Higher Environmental Science
- ◆ has associated experimental/field work that can generate numerical data
- ◆ allows the candidate the opportunity to access all of the available marks

Teachers and/or lecturers must minimise the number of candidates investigating the same topic within a class.

A range of topics chosen for investigation will create the climate in which candidates can produce original work within the conditions of assessment.

Once candidates have agreed the topic with their teacher and/or lecturer, the candidate must formulate an aim.

Formulating the aim

To ensure the candidate's aim is achievable the teacher and/or lecturer must provide advice on its **suitability**, taking into account:

- ◆ health and safety considerations
- ◆ availability of resources

- ◆ availability of internet/literature data/information

Teachers and/or lecturers must not provide candidates with an aim.

After the candidate has formulated an aim, they can progress through the research stage.

The candidate's research consists of gathering data **either** from one experiment/field work investigation and an internet/literature source, **or** from two experiments/field work investigations.

The candidate's research may also involve gathering extracts from internet/literature sources to support their description of the underlying environmental science.

Candidates can carry out their research in any order. They do not have to follow the order outlined below.

Experimental/field work research

Teachers and/or lecturers can supply instructions for the experimental/field work procedure(s). This must **only** be a basic list of instructions. These instructions must not include details of range and interval of measurements, and reference to repeats; candidates must decide on these for themselves. Where there is a safety issue, a maximum value for the range can be provided.

Teachers and/or lecturers are responsible for ensuring that appropriate risk assessment has been carried out and that candidates have guidance on the safe and correct use of equipment.

Teachers and/or lecturers must not provide candidates with experimental/field work data.

Teachers and/or lecturers must not provide candidates with a blank or pre-populated table for experimental/field work results.

Candidates must carry out the experimental/field work either individually or as part of a small group. (A small group is defined as having two, three or four candidates.)

Group work may be an appropriate approach in a number of circumstances, for example:

- ◆ to encourage diversity of research topic
- ◆ where experiments/field work are labour- or time-intensive
- ◆ where resources are limited

Where candidates work in a group, teachers and/or lecturers must ensure every candidate participates in the experimental/field work. Within the small group, it is acceptable for candidates to share experimental/field work data but experimental data must not be shared between groups. Where candidates have the same raw data, any calculations and analysis must be done individually.

Teachers and/or lecturers must not provide feedback to candidates on their data. However, where **candidates** identify a problem with their results and indicate that they wish to repeat the experimental/field work investigation(s), candidates may do so.

Internet/literature research

The internet/literature research must be the work of the individual candidate; candidates cannot work in a group to carry out this research.

Candidates may carry out internet/literature research outwith the direct supervision of teachers and/or lecturers.

Candidates must undertake internet/literature research using **only** websites, books, journals, and/or maps.

Candidates whose research includes data from a **single** experiment/field work investigation must find further data relevant to their experiment/field work investigation from the internet, books, journals, and/or maps and must record the source of this data.

This can be data that:

- ◆ matches the sample range used
- ◆ is not an exact match for the sample range used
- ◆ is generic and illustrates a trend or pattern expected in the experimental/field work data

In addition, candidates whose research includes data from a single experiment may also gather extracts from websites, books, journals, and/or maps to support their description of the underlying environmental science.

Candidates whose research includes data from two related experiments/field work investigations must gather extracts from websites, books, journals and/or maps to support their description of the underlying environmental science and must record the source of this information.

Candidates must not have access to lists of potential sources of comparative data or underlying environmental science.

Candidates must not be directed to specific websites, journals, books, or maps. Candidates must not be provided with whole articles or extracts from websites, journals, books, or maps, selected by a third party.

Teachers and/or lecturers must not provide feedback to candidates on their research.

Report stage

The report stage is conducted under a high degree of supervision and control. See 'Conditions of assessment' section.

Candidates must be given a maximum of 2 hours to produce the report.

- ◆ This can be a continuous period of time or split over a number of successive subject lessons.
- ◆ Centres are responsible for ensuring that candidates are given no more than the maximum time.
- ◆ If candidates produce the report over a number of successive lessons, then the teacher and/or lecturer must retain and store candidates' work securely between lessons to ensure that candidates do not add any additional materials to those they had at the start of the report stage. Teachers and lecturers must not provide any additional teaching or coaching in relation to the assignments between reporting sessions.

Candidates may word-process their reports and use appropriate software to produce graphs – providing that the assessment conditions are met.

Teachers and/or lecturers must check that the only materials (in any format) that each and every candidate can use in the report stage are:

- ◆ the instructions for candidates, which must not have been altered
- ◆ the experimental/field work method(s), if appropriate
- ◆ the candidate's raw experimental/field work data, which may be tabulated, but must not have additional blank or pre-populated columns for mean and derived values
- ◆ numerical and/or graphical data from an internet/literature source, which must not include sample calculations
- ◆ extract(s) from internet/literature sources to support the description of the underlying environmental science, which must not include sample calculations
- ◆ a record of the source(s) of data or extracts from the internet/literature

An extract must be:

- ◆ chosen by the candidate – they must select what information to extract
- ◆ verbatim – it must be a direct copy, which can be a printout, photocopy or handwritten (and word for word)
- ◆ from an internet/literature source – not from centre-devised course material or class notes. Candidate notes of any description are not permitted.
- ◆ checked by the teacher or lecturer to ensure that it is an extract (unannotated), and not notes or a draft

There is no size limit on an extract; however, it must be an extract and not the full document.

Candidates must not have access to a previously prepared draft of a report or any part of a report.

In addition, candidates must not have access to the assignment marking instructions during the report stage.

Candidates must not have access to the internet during the report stage.

Teachers and/or lecturers must not provide any form of feedback to candidates on their report.

Following completion of the report stage, candidates must not be given an opportunity to redraft their report.

Teachers and/or lecturers must not read the reports before they are submitted to SQA.

Evidence to be gathered

The following candidate evidence is required for this assessment:

- ◆ a report

The report is submitted to SQA, within a given time frame, for marking.

The same report cannot be submitted for more than one subject.

Volume

There is no word count.

Marking instructions

In line with SQA's normal practice, the following marking instructions for the Higher Environmental Science assignment are addressed to the marker. They will also be helpful for those preparing candidates for course assessment.

Candidates' evidence is submitted to SQA for external marking.

General marking principles

Always apply these general principles. Use them in conjunction with the detailed marking instructions, which identify the key features required in candidates' responses.

- a Always use positive marking. This means candidates accumulate marks for the demonstration of relevant skills, knowledge and understanding; marks are not deducted for errors or omissions.

Detailed marking instructions

Read the whole report before assigning any marks.

Section	Max mark	Expected response and marking instructions
1	Aim (1 mark)	
	1	<p>An aim that describes clearly the purpose of the investigation.</p> <p>The word 'aim' is not required but the statement of the aim should be separate from the title.</p> <p>Acceptable versions of an aim could be:</p> <ul style="list-style-type: none">◆ 'To investigate if there are differences in soil invertebrates present in fields with differing crop cover.'◆ 'To compare the energy content of selected biofuels.'◆ 'To compare the proportions of soil components in samples from different locations.' <p>Note: 'to compare soil invertebrates' or 'to investigate biofuels' or 'to measure soil' would not be acceptable.</p>

Section	Max mark	Expected response and marking instructions
2 Underlying environmental science (3 marks)		
	3	<p>An account of environmental science relevant to the aim of the investigation.</p> <p>Mark this section holistically. Award marks for the quality of the underlying environmental science at a depth appropriate to at least Higher level.</p> <p>Underlying environmental science may be found anywhere in the assignment report but award the marks in this section.</p> <p>The candidate must demonstrate an understanding of relevant environmental science and use their own words wherever possible. They can however include complex diagrams from an internet/literature source.</p> <ul style="list-style-type: none"> ◆ Award 3 marks for a good understanding of relevant environmental science. The account does not need to be what might be termed excellent or complete. ◆ Award 2 marks for a reasonable understanding of relevant environmental science. ◆ Award 1 mark for a limited understanding of relevant environmental science. ◆ Award 0 marks for demonstrating no understanding of relevant environmental science. <p>Only award mark(s) for underlying environmental science. Only consider historical or socio-economic information where it is appropriate to the topic.</p>

Section	Max mark	Expected response and marking instructions
3 Data collection and handling (5 marks)		
3 a	1	<p>A brief summary of the approach(es) used to collect experimental/field work data.</p> <p>Where the candidate has not demonstrated the ability to summarise the method, do not award the mark. A diagram on its own is insufficient to gain this mark.</p> <p>The summary must contain sufficient detail to be able to visualise the nature of the experiment/field work investigation. The candidate should name any measuring equipment and/or chemical used. They do not need to include details such as exact volumes or concentrations of solutions used. The number of repeats does not need to be included in the summary.</p> <p>Where a candidate has provided summaries for two experiments/field work investigations, only one summary need meet the required standard to gain the mark.</p> <p>Acceptable summaries of experimental/field work could be:</p> <ul style="list-style-type: none"> ◆ ‘The populations of beetles present in deciduous and coniferous woodland were estimated using the capture-mark-recapture method.’ ◆ ‘The concentrations of nitrates and nitrites in samples of drainage ditch water collected from above and below an arable field were assessed using indicator test strips. The colour change was checked against a colour scale to determine ion concentration.’ ◆ ‘The flow rate of shallow sections of a river was measured using a cork and a stopwatch. Kick sampling was then used to identify aquatic invertebrates present in the same stretch of river to see if any species were adapted to the flow rate.’ <p>Note: ‘the populations of beetles found in two different habitats were estimated using the capture-mark-recapture method’ or ‘the concentrations of nitrates and nitrites in samples of drainage ditch water collected from above and below an arable field were assessed’ or ‘the flow rate of a shallow section of a river was measured’ would not be sufficient to gain the mark.</p>

Section	Max mark	Expected response and marking instructions
3 b	1	<p>Sufficient raw data from the candidate’s experiment/field work.</p> <p>Where appropriate, repeated measurements must be included.</p> <p>The number and range of values must be appropriate to the aim. For example, where the candidate’s aim was:</p> <ul style="list-style-type: none"> ◆ ‘To assess the frequency and distribution of seashore organisms’, it would be appropriate for the candidate to assess these at regular intervals along a transect and to repeat the transect at least three times across the seashore using the same intervals. ◆ ‘To determine the effect of slope on soil moisture content’, sampling at more than three locations both down and across the slope would be required. ◆ ‘To compare the salinity of water samples collected from a river, estuary and beach’, it would be appropriate to collect samples from each location along the estuary and then to sub-sample multiple times from each of these. <p>In this section, do not penalise errors in the presentation of the data, such as missing headings or units from tables.</p> <p>Award this mark for raw, unprocessed data and not for mean or derived values calculated from raw data.</p> <p>Where a candidate provides raw data from two experiments/field work investigations, only one need meet the required standard to gain the mark.</p>

Section	Max mark	Expected response and marking instructions
3 c	1	<p>Data, including any mean and/or derived values, presented in a correctly produced table(s).</p> <p>Experimental/field work data must be tabulated.</p> <p>Every column must have a clear heading.</p> <p>Units must be indicated in column headings or given after every data entry.</p> <p>Where measurements have been repeated, all mean/average values must be calculated correctly and tabulated.</p> <p>Any derived values must be calculated correctly and tabulated.</p> <p>Where a candidate has provided tabulated data for two experiments/field work investigations, only one set of tabulated data need meet the required standard to gain the mark.</p>
3 d	1	<p>Data or information relevant to the experiment/field work investigation obtained from an internet/literature source, or data relevant to the aim from a second experiment/field work investigation.</p> <p>Where a candidate provides data from a second experiment/field work investigation, it must meet the standard described in section 3 b for this mark to be awarded.</p>

Section	Max mark	Expected response and marking instructions										
3 e	1	<p data-bbox="472 296 1570 328">A citation and reference for a source of internet/literature data or information.</p> <p data-bbox="472 371 1899 440">The candidate must cite the internet/literature source within the body of the report and give the reference later in the report.</p> <table border="1" data-bbox="544 480 1756 791"> <thead> <tr> <th data-bbox="544 480 770 520">Source</th> <th data-bbox="770 480 1756 520">Reference</th> </tr> </thead> <tbody> <tr> <td data-bbox="544 520 770 671">Website</td> <td data-bbox="770 520 1756 671">Full URL for the page(s) with date accessed The URL 'www.bbc.co.uk (Feb 2018)' is not acceptable, but https://www.bbc.co.uk/education/guides/z9499j6/revision (Feb 2018) is acceptable.</td> </tr> <tr> <td data-bbox="544 671 770 711">Journal</td> <td data-bbox="770 671 1756 711">Title, author, journal title, volume and page number</td> </tr> <tr> <td data-bbox="544 711 770 751">Book</td> <td data-bbox="770 711 1756 751">Title, author, page number and either edition or ISBN</td> </tr> <tr> <td data-bbox="544 751 770 791">Map</td> <td data-bbox="770 751 1756 791">Title, cartographer/publisher, scale, map number, year</td> </tr> </tbody> </table> <p data-bbox="472 834 1906 903">If the candidate includes data from a single experiment/field work investigation, the reference must be to a source of internet or literature data relevant to the experiment/field work investigation.</p> <p data-bbox="472 946 1877 1015">If the candidate includes data from two experiments/field work investigations, the reference must be to a source of information gathered to assist with the account of the underlying environmental science.</p>	Source	Reference	Website	Full URL for the page(s) with date accessed The URL 'www.bbc.co.uk (Feb 2018)' is not acceptable, but https://www.bbc.co.uk/education/guides/z9499j6/revision (Feb 2018) is acceptable.	Journal	Title, author, journal title, volume and page number	Book	Title, author, page number and either edition or ISBN	Map	Title, cartographer/publisher, scale, map number, year
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Journal	Title, author, journal title, volume and page number											
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Map	Title, cartographer/publisher, scale, map number, year											

Section	Max mark	Expected response and marking instructions
4 Graphical presentation (4 marks)		
		<p>Graphs must be based on the candidate's experimental/field work data.</p> <p>Mark computer-generated graphs in the same way as hand-drawn graphs.</p> <p>Graphs should be of a size that allows the scaling and labelling of the axes, and the accuracy of the plotting of the data points, to be readily checked.</p> <p>It may not be possible to check the accuracy of plotting if data points are excessively large, minor gridlines are omitted or the candidate has not used graph paper.</p> <p>Where a candidate has graphed data from two experiments, both graphs should be marked, and the mark associated with the higher-scoring graph awarded.</p>
4 a	1	<p>An appropriate format from the options of bar graph, line graph, scatter graph, pie chart or other display method appropriate to environmental science.</p> <p>Candidates should choose:</p> <ul style="list-style-type: none"> ◆ a bar graph for a discrete variable ◆ a line graph or scatter graph for a continuous variable(s) ◆ a pie chart for percentage or proportional data

Section	Max mark	Expected response and marking instructions
4 b	1	<p>The axis/axes of the graph has/have suitable scale(s).</p> <p>If the candidate produces a bar graph, then bar labels on one axis are considered here instead of scale; the other axis must include a scale.</p> <p>If the candidate produces a pie chart, each sector must be labelled with the appropriate percentage and these must total 100%.</p>
4 c	1	<p>The axis/axes of the graph has/have suitable labels and units.</p> <p>Do not penalise spelling mistakes or the use of abbreviations if the meaning of an axis label can be clearly understood within the context of the investigation.</p> <p>If a pie chart is produced, each sector must have an appropriate label indicating the number of values per category.</p> <p>Appropriate abbreviations may be used for units.</p>
4 d	1	<p>Accurately plotted data points and a line (line graph) or clear bar tops (bar graph) or angles (pie chart) or a line of best fit (scatter graph).</p> <p>Do not award this mark if it is not possible to check the accuracy of plotting.</p>

Section	Max mark	Expected response and marking instructions
5 Analysis (2 marks)		
5 a	1	<p>Analysis of experimental/field work data.</p> <p>The candidate must include a discussion of their experimental/field work data.</p> <p>Where a candidate has carried out a single experiment/field work investigation, this must be a comparison of the experimental/field work data with data from an internet/literature source.</p> <p>Where a candidate has analysed data from two experiments/field work investigations, mark both analyses and award the mark for the better single analysis.</p>
5 b	1	<p>A correctly completed extended or statistical calculation based on the experimental/field work data.</p> <p>Calculations should be appropriate to the investigation and could include:</p> <ul style="list-style-type: none"> ◆ a measure of distribution, for example density, relative abundance, percentage cover or frequency ◆ a diversity or biotic index ◆ a measure of spread, such as standard deviation or interquartile range ◆ percentage change ◆ other relevant calculation <p>Do not award this mark for the calculation of an average/mean or percentage on its own.</p>

Section	Max mark	Expected response and marking instructions
6 Conclusion (1 mark)		
	1	<p>A valid conclusion that relates to the aim and is supported by all the data in the report.</p> <p>Where no aim has been stated, do not award this mark.</p>
7 Evaluation (3 marks)		
	3	<p>Evaluation of the investigation.</p> <p>Award 1 mark for each valid evaluative statement supported by appropriate justification, to a maximum of 3 marks.</p> <p>The evaluative statements could relate to experimental/field work methods, results or data from internet/literature sources.</p> <p>A maximum of 1 of these marks is available for an evaluation of data from an internet/literature source.</p>
8 Structure (1 mark)		
	1	<p>A clear and concise report with an informative title.</p> <p>The structure of the report does not need to follow the structure suggested in the marking instructions or instructions for candidates, but should flow in a logical manner.</p> <p>Note: 'Higher Environmental Science assignment' alone is not acceptable.</p>
Total	20	

Instructions for candidates

This assessment applies to the assignment for Higher Environmental Science.

This assignment is worth 20 marks. This contributes 20% to the overall marks for the course assessment.

It assesses the following skills, knowledge and understanding:

- ◆ applying knowledge of environmental science to new situations, interpreting information and solving problems
- ◆ planning or designing and carrying out experimental/field work investigations to test given hypotheses or to illustrate particular effects
- ◆ recording detailed observations and collecting data from experiments/field work investigations
- ◆ selecting information from a variety of sources
- ◆ presenting information appropriately in a variety of forms
- ◆ processing information (using calculations and units, where appropriate)
- ◆ making predictions or generalisations from evidence/information
- ◆ drawing valid conclusions and giving explanations supported by evidence/justification
- ◆ evaluating experimental/field work investigations and suggesting improvements
- ◆ communicating findings/information effectively

Your assignment has two stages:

- ◆ research
- ◆ report

Your teacher or lecturer will let you know if there are any specific conditions for doing this assessment, and how the assignment will be carried out.

In this assignment you have to investigate a topic in environmental science by doing research.

Your research involves:

- ◆ gathering data from an experiment/field work investigation and from internet/literature sources

or

- ◆ gathering data from two experiments/field work investigations

In addition, you may gather extracts about the underlying environmental science from internet/literature sources.

You then produce a report on your investigation.

Your teacher or lecturer will not mark your report at any point. It is sent to SQA for marking.

Research stage

Choosing your topic

- ◆ You need to choose a relevant topic in environmental science to investigate.
- ◆ You must agree your topic with your teacher or lecturer.

Deciding your aim

- ◆ Once you have chosen your topic, you need to decide what the aim of your investigation is.
- ◆ Remember that:
 - You need to carry out and collect data from a single experiment/field work investigation **and** find data from an internet/literature source to compare with your experimental/field work results.
 - or**
 - You need to carry out and collect data from two experiments/field work investigations related to your aim.
- ◆ Your teacher or lecturer will provide advice on the suitability of your aim, in terms of safety and availability of resources. They will not assess your aim.

Experimental/field work research

- ◆ When choosing your experiment(s)/field work investigation(s), remember that it/they must allow measurements to be taken or counts to be made.
- ◆ When carrying out your experiment(s)/field work investigation(s), you must work either on your own or as part of a small group. If you are working as part of a small group, you must take an active part.
- ◆ Make sure you take a sufficient number of values over a wide enough range to meet the aim of your investigation.
- ◆ You must have repeat measurements/counts.
- ◆ Your raw experimental data may be tabulated. However, tables must not have additional blank or pre-populated columns for mean and derived values.
- ◆ You will use your raw experimental/field work data during the report stage.

Internet/literature research

- ◆ You must carry out your own internet/literature research.
- ◆ If you have gathered experimental/field work data from a **single** experiment/investigation, you need to find data from the internet, books, journals and/or maps that you can compare to your experimental/field work data. This could be a table or a graph, or data from diagrams or text. This data does not need to exactly match your experiment/field work but could illustrate a trend or pattern expected in your experimental/field work data.

- ◆ In your report, you will need to describe the environmental science relevant to your aim. You can gather extracts only from websites, books, journals and/or maps to help you write your description of the underlying environmental science. Extracts must be from an internet/literature source – not from centre devised course material or class notes. An extract must be a direct copy, which can be a printout, photocopy or handwritten (word for word) and must not be annotated. There is no size limit on an extract, but it must be an extract and not the full document.
- ◆ Your extracts can include any formulae or relationships you may need but must not include sample calculations
- ◆ During the report stage, you will need to show your understanding by writing your description of the environmental science relevant to your aim using your own words.
- ◆ It is important that you record where you get your data or extracts from in enough detail that another person could find it. This is known as a reference.

Report stage

Producing the report

- ◆ The report must be all your own work.
- ◆ When producing your report, you will be supervised at all times.
- ◆ You have 2 hours to complete your report.

Resources

During the report stage you are only allowed to have certain materials.

You can have:	You cannot have:
<ul style="list-style-type: none"> ◆ these instructions for candidates ◆ extracts you have gathered from the internet, books, journals and/or maps to help you describe the environmental science relevant to your aim ◆ the experimental/field work method(s) ◆ your raw experimental/field work data, which may be tabulated ◆ data from the internet, books, journals and/or maps that is relevant to your experimental/field work data, if you have data from a single experiment/field work investigation ◆ the references to the sources of data or extracts 	<ul style="list-style-type: none"> ◆ a draft of your report ◆ a draft of any part of your report ◆ sample calculations from any source ◆ a previously prepared table containing additional blank or pre-populated columns for mean and derived values

Your teacher or lecturer cannot provide you with feedback or tell you how to improve your report.

Guidance on producing your report

Your report must be easy to follow.

You may find that using headings will help to make your report clear.

Title

- ◆ Your title must tell the reader what your report is about.

Aim

- ◆ Your aim must describe clearly the purpose of your investigation.

Underlying environmental science

- ◆ You must describe the environmental science relevant to your aim.
- ◆ You must use your own words as much as possible.
- ◆ You may choose to include:
 - formulae or balanced equations
 - an explanation of physical properties
 - an explanation of relationships or trends
 - copies of diagrams which you would find difficult to draw
- ◆ You can quote from extracts as long as you give a description or explanation, in your own words, showing that you understand the environmental science.
- ◆ Other than quoting from your extracts, you must not copy directly from them. Copying directly from your extracts would not show that you understand the environmental science.

Description of experiment(s)/field work

- ◆ You must give only a **brief** description of the experiment/field work investigation you carried out.
- ◆ If you carried out two experiments/field work investigations, you should give a brief description of both. You will be awarded the mark if one of the two descriptions is acceptable.
- ◆ You must show that you can summarise your experimental/field work method(s) and must not give a full description.
- ◆ You must include the names of any measuring equipment and/or chemicals you used, although you don't need to give details of volumes or concentrations, or the range of measurements or the number of repeats.

Experimental/field work data

- ◆ You must include a table showing **all** of the measurements or counts you recorded in your experiment/field work.

- ◆ If you carried out a second experiment/field work investigation, you should include a table of measurements or counts from each experiment/field work investigation. You will be awarded the mark if one of the two tables is acceptable.
- ◆ Make sure you include column headings. You must also include units, where appropriate.
- ◆ You must calculate mean/average values for your repeated measurements or counts and these must be included in your table.
- ◆ Any derived values needed for graphing must be included in your table.

Graphical presentation

- ◆ You must produce a graph of your experimental/field work data.
- ◆ If you carried out two experiments/field work investigations, you should include a graph of your data for both investigations. In this case, both graphs will be marked, and you will be awarded the mark for the better of your graphs.
- ◆ You must use graph paper or graphing software. If you are using graphing software, you must include both major and minor gridlines, and use plotting symbols that are clear but not too large.
- ◆ The graph must:
 - be a line graph, bar graph, scatter graph, pie chart or other type of graph appropriate for your data
 - be large enough to allow points to be read accurately
 - have suitable scales, labels and units on the axes (if you are constructing a pie chart, each sector should have a label, value and percentage)
 - have points which are joined with a line (line graph), clear bar tops (bar graph), correct angles (pie chart), or a line of best fit (scatter graph) if there is an obvious pattern to your plotted data points

Data from an internet/literature source or second experiment/field work investigation

- ◆ If you carried out a single experiment/field work investigation, you must include data from an internet/literature source that you can compare with the data from your experiment/field work.
- ◆ If you carried out two experiments/field work investigations, you must include the data from your second experiment/field work investigation. In this case, you must not include data from an internet/literature source.

Citation and reference for a source of data/information from the internet/literature

- ◆ You must include a reference to a source of data/information.
- ◆ If you carried out a single experiment/field work investigation, your reference must be to the source of data obtained from the internet/literature, which is comparable to your experimental/field work data.

- ◆ If you carried out two experiments/field work investigations, your reference must be to a source of information gathered to support your description of the underlying environmental science.
- ◆ You must cite the internet/literature source within the body of the report, near to the relevant data/information.
 - If you carried out a single experiment/field work investigation and have included data from an internet/literature source in your report, you must cite this source next to the data.
 - If you carried out two experiments/field work investigations, you must cite your source(s) of the information that supports your description of the underlying environmental science. This must be cited next to the information.
 - You can cite a source in many ways. One way is to put a number, for example (1), next to the data/information and the same number beside the reference included later in the report. A URL cannot be a citation.
- ◆ You must include a reference at, or near, the end of the report
- ◆ You must include the following information in the reference:

Source	Reference
website	full URL for the page or pages, with date accessed
journal	title, author, journal title, volume and page number
book	title, author, page number and either edition or ISBN
map	title, maker/publisher, scale, map number, year

Analysis

- ◆ You must include a discussion of your results. If you carried out a single experiment/field work investigation, you must compare your experimental/field work data with the data from your internet/literature source. If you carried out two experiments/field work investigations, you should include an analysis of results from both experiments/field work investigations. Both will be marked, and you will be awarded the mark for the better analysis.
- ◆ You must do an extended or statistical calculation. This must be based on your experimental/field work data and be appropriate to the aim of your investigation. You must show at least one worked example.

Conclusion

You must state a conclusion that relates to your aim **and** is supported by **all** the data included in your report; this includes the outcome of the extended/statistical calculation.

Evaluation

You must make three statements, supported by justification, which evaluate the data/information you have included.

The statements can relate to:

- ◆ your experimental/field work method(s)
- ◆ your results

- ◆ data from your internet/literature source(s)

Two or three of the statements can evaluate your experimental/field work method(s). No more than one of your statements can evaluate **data** from your internet/literature sources. You could make your evaluative statements include, as appropriate, comments on:

- ◆ the accuracy and precision of your experimental measurements
- ◆ the adequacy of your repeated readings
- ◆ the adequacy of the range over which you altered variables
- ◆ the adequacy of how you controlled variables
- ◆ any limitations of the equipment you used
- ◆ the reliability of your methods

You do not need to use the words reliability, accuracy or precision in your explanation, but if you do use them, they must be used correctly.

Summary

You can use this table to check you have covered all the sections in your report.

Section	Description	Marks
Title and structure	An informative title and a structure that can easily be followed.	1
Aim	A description of the purpose of your investigation.	1
Underlying environmental science	A description of the environmental science relevant to your aim, which shows your understanding.	3
Data collection and handling	A brief description of an approach used to collect experimental/field work data.	1
	Sufficient raw data from your experiment/field work investigation.	1
	Data from your experiment/field work, including any mean and/or other derived values, presented in a table with headings and units.	1
	Numerical or graphical data comparable to your experiment/field work data obtained from an internet/literature source, or raw data relevant to your aim obtained from your second experiment/field work investigation.	1
	A citation for an internet/literature source and the reference listed later in the report.	1
Graphical presentation	Appropriate type of graph used to present your experimental/field work data.	1
	Suitable scales.	1
	Suitable labels and units.	1
	All data plotted accurately and, where appropriate, a line of best fit drawn.	1
Analysis	Discussion of your results. This should be a comparison of your experimental/field work data with data from an internet/literature source, or analysis of both sets of results.	1
	A correctly completed extended or statistical calculation using your experimental/field work data.	1
Conclusion	A conclusion relating to your aim based on all the data in your report.	1
Evaluation	Three evaluative statements supported by justifications.	3
Total		20

Once complete, give your report to your teacher or lecturer to submit to SQA.

Administrative information

Published: June 2020 (version 3.0)

History of changes

Version	Description of change	Date
2.0	<p>'Instructions for teachers and lecturers' section updated as follows:</p> <ul style="list-style-type: none">◆ 'Instructions' sub-section:<ul style="list-style-type: none">— clarification that instructions for candidates must not be altered or supplemented by centre-devised materials◆ 'Choosing the topic' sub-section:<ul style="list-style-type: none">— information added that there must be a range of topics available for candidates to choose from and that teachers/lecturers must minimise the numbers investigating the same topic within a class◆ 'Experimental/field work research' sub-section:<ul style="list-style-type: none">— candidates can be given only a basic list of instructions for the experimental/field work procedure(s) and must decide on range, interval and number of repeats for themselves— facility for data to be shared between groups removed◆ 'Internet/literature research' sub-section:<ul style="list-style-type: none">— this must be the work of the individual candidate— candidates must undertake research using only websites, journals, books and maps— provision of a wide list of URLs or a wide list of journals, books and/or maps should be the exception— provision of the full content of a wide list of sources should be the exception◆ 'Report stage' sub-section:<ul style="list-style-type: none">— teachers/lecturers must check the materials of each and every candidate— information added to the bullet points about raw experimental data, internet/literature data and extracts— information added on extracts	September 2019

	<ul style="list-style-type: none"> — list of items that candidates cannot have access to in the report stage replaced with ‘Candidates must not have access to a previously prepared draft of a report or any part of a report.’ <p>‘Instructions for candidates’ section updated as follows:</p> <ul style="list-style-type: none"> ◆ amended throughout to reflect the changes in the course specification and the ‘Instructions for teachers and lecturers’ ◆ when using graphing software, candidates must include both major and minor gridlines ◆ ‘Citation and reference’ sub-section: <ul style="list-style-type: none"> — information reordered — URLs can’t be used as the citation — the reference needs to be listed at or near the end of the report ◆ ‘Analysis’ and ‘Evaluation’ sub-sections: <ul style="list-style-type: none"> — additional advice added 	
3.0	<p>‘Instructions for teachers and lecturers’ section updated as follows:</p> <ul style="list-style-type: none"> ◆ ‘Instructions’ sub-section: <ul style="list-style-type: none"> — clarification that it is not permitted at any stage to provide candidates with a template or model answers ◆ ‘Research’ sub-section: <ul style="list-style-type: none"> — clarification that ‘they’ means it is the candidate who formulates the aim ◆ ‘Internet/literature research’ sub-section: <ul style="list-style-type: none"> — teachers and lecturers are no longer permitted to provide a list of potential sources, direct candidates to particular sources, or provide candidates with articles or extracts from sources. — clarification about candidates whose research includes data from a single experiment, and from two related experiments/field work investigations ◆ ‘Report stage’ sub-section: <ul style="list-style-type: none"> — clarification added that where reports are being produced over successive lessons, candidates must not add additional materials between reporting sessions. Teachers and lecturers must not provide additional teaching or coaching in relation to assignments between sessions. 	June 2020

	<p>‘Instructions for candidates’ section updated as follows:</p> <ul style="list-style-type: none"> ◆ ‘Underlying environmental science’ sub-section: <ul style="list-style-type: none"> — clarification added about quoting and copying from sources ◆ ‘Conclusion’ sub-section: <ul style="list-style-type: none"> — advice added about that the conclusion should also be based on the extended/statistical calculation ◆ ‘Evaluation’ sub-section: <ul style="list-style-type: none"> — advice added about using the words reliability, accuracy, and precision 	
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Note: you are advised to check SQA’s website to ensure you are using the most up-to-date version of this document.

Security and confidentiality

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