

The logo consists of the letters 'N5' in a large, bold, white font, set against a solid purple square background.

National 5  
Coursework  
Assessment Task



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# National 5 Environmental Science Assignment Assessment task

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# Introduction

This document contains instructions for teachers and lecturers, marking instructions and instructions for candidates for the National 5 Environmental Science assignment. It must be read in conjunction with the course specification.

This assignment is worth 20 marks (scaled to 25). The marks contribute 20% of the overall marks for the course assessment.

This is one of two course assessment components. The other component is a question paper.

# Instructions for teachers and lecturers

## General information

This information applies to the assignment for National 5 Environmental Science.

The purpose of the assignment is to assess 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, designing and safely carrying out experimental/fieldwork investigations to test given hypotheses or to illustrate particular effects
- ◆ selecting information from a variety of sources
- ◆ presenting information appropriately in a variety of forms
- ◆ processing the information (using calculations and units, where appropriate)
- ◆ making predictions and generalisations based on evidence/information
- ◆ drawing valid conclusions and giving explanations supported by evidence/justification
- ◆ suggesting improvements to experimental/fieldwork investigations
- ◆ communicating findings/information

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

- ◆ unfamiliar
- ◆ familiar but investigated in greater depth
- ◆ integrates 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 National 5.

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

The assignment has two stages:

- ◆ research
- ◆ report

The research stage must involve an experiment/fieldwork that allows measurements or counts to be made. Candidates must also gather data/information from the internet, books, journals and/or maps to compare against their experimental/fieldwork results. The candidate's research may also involve gathering extracts from internet/literature sources to support their descriptions and/or explanations of the underlying environmental science.

Candidates must produce a report on their research.

Assessment should take place when candidates are ready to be assessed. It is not advisable to undertake the assignment too early, as it is important that candidates are adequately prepared in the skills needed to undertake all parts of the assignment.

## **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 work/fieldwork at a level appropriate to National 5

#### **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.

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

The assignment has two stages.

Stage	Level of control
<ul style="list-style-type: none"> <li>◆ research</li> </ul>	conducted under some supervision and control
<ul style="list-style-type: none"> <li>◆ report</li> </ul>	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 1 hour and 30 minutes 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 or lecturer must agree the choice of topic with the candidate to ensure that it:

- ◆ is commensurate with National 5 Environmental Science
- ◆ has associated experimental work/fieldwork that can generate numerical data
- ◆ will allow candidates 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 the topic has been agreed, the candidate must formulate an aim.

### Formulating the aim

The teacher or lecturer must provide advice on the suitability of the candidate's aim, taking into account the factors below:

- ◆ health and safety considerations
- ◆ availability of resources
- ◆ availability of literature/internet data/information

Any advice on the suitability of an aim is only to ensure that it is achievable, taking into account the factors identified above.

Teachers and lecturers are **not** permitted to provide an aim.

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

The order in which the research is carried out need not be in the order outlined below.

### **Experimental/fieldwork research**

Teachers and lecturers can supply instructions for the experimental/fieldwork procedure. 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.

It is the responsibility of teachers and lecturers to ensure that appropriate risk assessment has been carried out and to provide guidance on the safe and correct use of chemicals and equipment.

Teachers and lecturers must not provide candidates with a set of experimental/fieldwork data.

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

The experimental work/fieldwork must be carried out 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 experimental work/fieldwork is labour- or time-intensive
- ◆ where resources are limited

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

A teacher or lecturer 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 work/fieldwork, 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 research to find comparative data/information and information on underlying environmental science outwith the direct supervision of teachers or lecturers.

Candidates must undertake research using **only** websites, journals, books and/or maps, to find comparative data/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.

Candidates must find internet/literature data to compare against their experimental/fieldwork data and record the reference to the source.

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/fieldwork data

Where it is not possible to find such data, candidates should aim to find information that may:

- ◆ directly support the experimental/fieldwork data
- ◆ be in contrast to the experimental/fieldwork data

Teachers and lecturers must not provide candidates with a set of experimental/fieldwork data to compare with candidates' own data.

Teachers and 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 1 hour and 30 minutes to produce the report.

- ◆ This can be a continuous period of time or split over a number of successive subject lessons.
- ◆ It is the responsibility of the centre to ensure candidates are given no more than the maximum time.
- ◆ If the report is produced over a number of successive lessons, then the teacher or lecturer must retain candidates' work and store it 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.

Reports can be word-processed and graphs may be produced using appropriate software packages, provided that the assessment conditions are met.

The teacher or lecturer must check that the materials (in any format) to be used by each and every candidate in the report stage fit the criteria below.

The only materials that **can** be used in the report stage are:

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

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.

# Marking instructions

In line with SQA's normal practice, the following marking instructions for the National 5 Environmental Science assignment are addressed to the external 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.

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.

Read the whole report before assigning any marks.

Credit should be given for appropriate information wherever it is given in the report.

Section	Max mark	Expected response and marking instructions
1 Aim (1 mark)		
	1	<p><b>An aim that describes clearly the purpose of the investigation.</b></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"> <li>◆ 'to compare differences in biodiversity between two contrasting habitats'</li> <li>◆ 'to compare soil infiltration rates on different ground surfaces'</li> <li>◆ 'to compare the pH of soil samples collected at several sites down a slope'</li> </ul> <p>Note: 'to investigate biodiversity', 'compare soil infiltration rates' or 'measure pH' would <b>not</b> be acceptable.</p>

Section	Max mark	Expected response and marking instructions
<b>2 Underlying environmental science (3 marks)</b>		
	<b>3</b>	<p><b>An account of environmental science relevant to the aim of the investigation.</b></p> <p>This section is marked holistically and is an opportunity to give marks for the ‘quality’ of the underlying environmental science at a depth appropriate to National 5 Environmental Science. Underlying environmental science may be found anywhere in the assignment report but the marks are awarded in this section.</p> <p>Candidates must demonstrate an understanding of relevant environmental science and use their own words wherever possible. It is acceptable, however, to include complex diagrams from a literature/internet source.</p> <ul style="list-style-type: none"> <li>◆ 3 marks should be awarded for demonstrating a good understanding of relevant environmental science. The account does not need to be what might be termed ‘excellent’ or ‘complete’</li> <li>◆ 2 marks should be awarded for demonstrating a reasonable understanding of relevant environmental science</li> <li>◆ 1 mark should be awarded for demonstrating a limited understanding of relevant environmental science</li> <li>◆ 0 marks should be awarded for demonstrating no understanding of relevant environmental science</li> </ul> <p>Credit should only be given for underlying environmental science. Historical or socio-economic information should be credited only where it is appropriate to the topic.</p>

Section	Max mark	Expected response and marking instructions
<b>3 Data collection and handling (6 marks)</b>		
3(a)	1	<p><b>A brief description of the approach used to collect experimental/fieldwork data.</b></p> <p>The description need only include sufficient detail for a marker to be able to visualise the nature of the experiment/fieldwork. Details, such as the concentrations and volumes of solutions, do not need to be included in the description.</p> <p>A diagram on its own is insufficient to gain this mark.</p> <p>Where the candidate has not demonstrated the ability to summarise the method, for example if only a full procedure is provided, the mark should not be awarded.</p> <p>Acceptable descriptions of an experimental/fieldwork approach would include:</p> <ul style="list-style-type: none"> <li>◆ Aquatic invertebrates were sampled above and below an industrial outflow pipe. Species were identified and counted, and compared.</li> <li>◆ Woodlice were placed in a choice chamber to test their preference for damp/dry and dark/light.</li> <li>◆ Daily rainfall was collected and the volume recorded over seven days.</li> </ul>

Section	Max mark	Expected response and marking instructions
3(b)	1	<p><b>Sufficient raw data from the candidate's experimental work/fieldwork.</b></p> <p>Where appropriate, repeated measurements must be included.</p> <p>The number and range of values must be appropriate to the aim. While a minimum of three values will be appropriate in some investigations, the number will depend on the aim of the investigation. For example:</p> <ul style="list-style-type: none"> <li>◆ Where the aim is to investigate differences in biodiversity between two contrasting habitats, it would be acceptable for the candidate to assess terrestrial invertebrates in broadleaved woodland versus coniferous woodland, or freshwater and estuary aquatic invertebrates. At least three samples per habitat should be assessed.</li> <li>◆ Where the aim is to assess infiltration rates in relation to land use, at least three sites of differing land use should be sampled.</li> <li>◆ Where the aim is to measure the pH of soil samples collected from sites with differing slope, at least three contrasting sites should be sampled.</li> </ul> <p>Errors in the presentation of the data, such as missing headings or units from tables, are not penalised in this section.</p> <p>This mark is awarded for raw, unprocessed data and not mean or derived values calculated from raw data.</p>

Section	Max mark	Expected response and marking instructions
3(c)	1	<p><b>Data presented in a correctly produced table.</b></p> <p>Experimental/fieldwork data must be tabulated with correct headings and units of measurement.</p> <p>Every column in the table must have a clear heading.</p> <p>Units must be indicated in the heading of the columns or given after every data entry.</p>
3(d)	1	<p><b>Mean and/or derived values calculated correctly.</b></p> <p>Mean and derived values must be based on the candidate's experimental/fieldwork data.</p>
3(e)	1	<p><b>Data/information relevant to the aim from an internet/literature source.</b></p> <p>This could be data that:</p> <ul style="list-style-type: none"> <li>◆ matches the sample range used in the experimental/fieldwork data</li> <li>◆ is not an exact match for the sample range</li> <li>◆ is generic and illustrates a trend or pattern expected in the experimental/fieldwork data</li> </ul> <p>If it is not obvious why the data included is relevant to the aim, supporting information or a statement must be given to indicate the link.</p> <p>Where information is provided rather than data, this could directly support or be in contrast to the experimental/fieldwork data.</p>

Section	Max mark	Expected response and marking instructions										
3(f)	1	<p><b>A reference for the source of the internet/literature data/information.</b></p> <p>A reference to the source of the internet/literature data/information must be given in sufficient detail to allow it to be retrieved by a third party.</p> <p>The reference must appear beside the internet/literature data/information or be cited and referenced later in the report.</p> <table border="1" data-bbox="725 683 1845 991"> <thead> <tr> <th data-bbox="725 683 949 722">Source</th> <th data-bbox="949 683 1845 722">Reference</th> </tr> </thead> <tbody> <tr> <td data-bbox="725 722 949 874">website</td> <td data-bbox="949 722 1845 874">full URL for the page or pages, ie the URL 'www.bbc.co.uk' is not acceptable, but <a href="http://www.bbc.co.uk/education/guides/zq4wjxs/revision">http://www.bbc.co.uk/education/guides/zq4wjxs/revision</a> is an acceptable reference</td> </tr> <tr> <td data-bbox="725 874 949 914">journal</td> <td data-bbox="949 874 1845 914">title, author, journal title, volume and page number</td> </tr> <tr> <td data-bbox="725 914 949 954">book</td> <td data-bbox="949 914 1845 954">title, author, page number and either edition or ISBN</td> </tr> <tr> <td data-bbox="725 954 949 991">map</td> <td data-bbox="949 954 1845 991">title, cartographer/publisher, scale, map number, year</td> </tr> </tbody> </table>	Source	Reference	website	full URL for the page or pages, ie the URL 'www.bbc.co.uk' is not acceptable, but <a href="http://www.bbc.co.uk/education/guides/zq4wjxs/revision">http://www.bbc.co.uk/education/guides/zq4wjxs/revision</a> is an acceptable reference	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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book	title, author, page number and either edition or ISBN											
map	title, cartographer/publisher, scale, map number, year											

Section	Max mark	Expected response and marking instructions
<b>4 Graphical presentation (4 marks)</b>		
		<p>The candidate's graph must be based on their own experimental/fieldwork data.</p> <p>Computer-generated graphs are marked 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 graph paper has not been used.</p>
4(a)	1	<p><b>An appropriate format from the options of bar graph, line graph, pie chart or other display method appropriate to environmental science.</b></p> <p>A bar graph should be selected for a discrete variable. A line graph should be selected for a continuous variable. Nominal or ordinal data could be displayed in either a bar graph or pie chart.</p>
4(b)	1	<p><b>The axes of the graph have suitable scales.</b></p> <p>If a bar graph is produced, then bar labels are considered here instead of scale.</p> <p>If a pie chart is produced, each sector must be labelled with the appropriate percentage and these must total 100%.</p>

Section	Max mark	Expected response and marking instructions
4(c)	1	<p><b>The axes of the graph have suitable labels and units.</b></p> <p>Spelling mistakes or the use of abbreviations must not be penalised 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 a suitable label, including the number of values per category.</p>
4(d)	1	<p><b>Accurately plotted data points and a line (line graph), clear bar tops (bar graph) or angles (pie chart). Where appropriate, a line of best fit.</b></p> <p>If it is not possible to check the accuracy of plotting, this mark must not be awarded.</p>
<b>5 Analysis (1 mark)</b>		
	1	<p><b>A valid comparison of the experimental/fieldwork data with data/information from the internet/literature source.</b></p> <p>If no comparison can be made then a statement must be given to that effect and the reason for this given.</p>

Section	Max mark	Expected response and marking instructions
<b>6 Conclusion (1 mark)</b>		
	<b>1</b>	<p><b>A valid conclusion that relates to the aim and is supported by all the data/information in the report.</b></p> <p>If the candidate has stated multiple aims then the conclusion must relate to all of the aims.</p> <p>Where no aim has been stated, this mark cannot be awarded.</p>
<b>7 Evaluation (2 marks)</b>		
	<b>2</b>	<p><b>An evaluation of the experimental/fieldwork procedure.</b></p> <p>1 mark should be awarded for identifying a factor that can be expected to have a <b>significant</b> effect on the reliability, accuracy or precision of the experimental work/fieldwork.</p> <p>1 mark should be awarded for an explanation of:</p> <ul style="list-style-type: none"> <li>◆ what could have been done to minimise the effect of the identified factor</li> <li>or</li> <li>◆ what was done to minimise the effect of the identified factor</li> <li>or</li> <li>◆ the evidence supporting the identification of the factor</li> </ul>

Section	Max mark	Expected response and marking instructions
<b>8 Structure (2 marks)</b>		
<b>8(a)</b>	<b>1</b>	<b>An informative title.</b>
<b>8(b)</b>	<b>1</b>	<b>A clear and concise report.</b>  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.
<b>Total</b>	<b>20</b>	

# Instructions for candidates

These instructions apply to the assignment for National 5 Environmental Science.

This assignment is worth 20 marks. The marks contribute 20% of 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, designing and safely carrying out experimental/fieldwork investigations to test given hypotheses or to illustrate particular effects
- ◆ selecting information from a variety of sources
- ◆ presenting information appropriately in a variety of forms
- ◆ processing the information (using calculations and units, where appropriate)
- ◆ making predictions and generalisations based on evidence/information
- ◆ drawing valid conclusions and giving explanations supported by evidence/justification
- ◆ suggesting improvements to experimental/fieldwork investigations
- ◆ communicating findings/information

Your teacher or lecturer will tell you how the assignment will be carried out and any required conditions for doing it.

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

Your research involves gathering data/information from an experiment/fieldwork and comparative data from internet/literature sources. In addition, you may gather extracts about the underlying environmental science from internet/literature sources.

You then produce a report on your investigation.

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

Your assignment has two stages:

- ◆ research
- ◆ report

## Research stage

### Choosing your topic

- ◆ You need to choose a relevant topic in environmental science to investigate.
- ◆ Your topic must be agreed 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 do an experiment/fieldwork **and** find data/information to compare with your experimental/fieldwork results.
- ◆ 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/fieldwork research

- ◆ When choosing your experiment/fieldwork, remember it must allow measurements to be taken or counts to be made.
- ◆ When carrying out your experiment/fieldwork, you must either work 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 measurements or counts 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/fieldwork data during the report stage.

### Internet/literature research

You must carry out your own internet/literature research.

- ◆ You need to find data/information from the internet, books, journals and/or maps that you can compare to your experimental/fieldwork data. This could be a table or a graph, or information such as a diagram or text which is relevant to your aim. This does not need to exactly match your experimental/fieldwork data, but could illustrate the trend or pattern expected.
- ◆ It is important that you record where you get your data/information from in enough detail that another person could find it. This is known as a reference.
- ◆ 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.

# Report stage

## Producing the report

- ◆ The report must be all your own work.
- ◆ When producing your report, you are supervised by your teacher or lecturer at all times.
- ◆ You have 1 hour and 30 minutes to complete your report.

## Resources

<b>In the report stage, the only materials you are allowed to have are:</b>	<b>In the report stage, you cannot have:</b>
<ul style="list-style-type: none"><li>◆ these instructions for candidates</li><li>◆ extracts you have gathered from the internet, journals, books and/or maps to help you describe the environmental science relevant to your aim</li><li>◆ the experimental/fieldwork method</li><li>◆ your raw experimental/fieldwork data, which may be tabulated</li><li>◆ your internet or literature data/information, including the reference to the source of the data/information</li></ul>	<ul style="list-style-type: none"><li>◆ a draft of your report</li><li>◆ a draft of any part of your report</li><li>◆ sample calculations from any source</li><li>◆ a previously prepared table containing additional blank or pre-populated columns for mean and derived values</li></ul>

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 can quote from extracts as long as you also 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.
- ◆ If relevant to your aim, you may include formulae or balanced equations, an explanation on properties, explanations of relationships or trends, and/or copies of diagrams that you would find difficult to draw.

## Description of experiment/fieldwork

- ◆ You must give only a **brief** description of the experiment/fieldwork you carried out.
- ◆ You must show that you can summarise your experimental/fieldwork method and must not give a full description.

## Experimental/fieldwork data

- ◆ You must include a table showing **all** of the measurements/counts you recorded in your experiment/fieldwork.
- ◆ Make sure you include column headings. You must also include units, where appropriate.
- ◆ You must use the data from your table to carry out calculations.
- ◆ If you have repeated measurements, you should calculate average values. These can be included in your table of results.
- ◆ If you've used the results from your experiment to determine further values, you should show at least one sample calculation.

## Graphical presentation

- ◆ You must produce a graph of your experimental/fieldwork results.
- ◆ The graph must:
  - be a line graph, bar 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 that are joined with a line (line graph), clear bar tops (bar graph) or correct angles (pie chart)
- ◆ You must use graph paper or a computer graphing package.
- ◆ If you are using a computer graphing package, you must include both major and minor gridlines, and use plotting symbols that are clear but not too large.
- ◆ If you are plotting a scatter graph, a line or curve of best fit should usually be drawn. However, if there is no obvious pattern to your plotted data points you should not draw a line or curve of best fit.

## Data/information from an internet/literature source

- ◆ You must include data/information obtained from an internet/literature source that you can compare with the data from your experiment/fieldwork.
- ◆ You must include a reference to this source of data/information, which would allow another person to find it. For example:

Source	Reference
website	full URL for the page or pages
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

## Analysis

- ◆ You must compare your experimental/fieldwork data with the data/information from your internet/literature source.
- ◆ If they cannot be compared you must state this and explain the reason why.

## Conclusion

- ◆ You must state a conclusion that relates to your aim. The conclusion must be based on **all** the data/information in your report.

## Evaluation

- ◆ You must identify a factor in your experiment/fieldwork that had a significant effect on the reliability, accuracy or precision of your experiment/fieldwork.
- ◆ You must then explain:
  - what you did to minimise the effect of this factor
  - or
  - what you could have done to minimise the effect of this factor
  - or

— how you know this factor had a significant effect

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 sections in your report.

Section	Description	Marks
Title	The report has an informative title.	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 your experimental/fieldwork method.	1
	Sufficient data from your experiment/fieldwork.	1
	Data from your experiment/fieldwork presented in a table with headings and units.	1
	Values correctly calculated from your experimental/fieldwork data.	1
	Comparative data/information from an internet/literature source.	1
	A reference for the internet/literature source.	1
Graphical presentation	Appropriate type of graph used to present your experimental/fieldwork data.	1
	Suitable scales.	1
	Suitable labels and units on axes.	1
	All data plotted accurately.	1
Analysis	Experimental/fieldwork data compared to data/information from internet/literature source.	1
Conclusion	A conclusion relating to your aim, based on all data/information in your report.	1
Evaluation	Identification of a factor affecting the reliability, accuracy or precision of your experiment/fieldwork and a related explanation.	2
Structure	A report that can be easily followed.	1
<b>Total</b>		<b>20</b>

Once complete, your report should be given to your teacher or lecturer for submission to SQA.

# Administrative information

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Published: June 2020 (version 4.0)

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## History of changes

Version	Description of change	Date
2.0	<p>'Instructions for teachers and lecturers' and 'Instructions for candidates' sections: minor amendments throughout to clarify the research and report stages.</p> <p>'Marking instructions' section: minor clarifications throughout based on 2017-18 exam diet.</p>	October 2018
3.0	<p>'Instructions for teachers and lecturers' section updated as follows:</p> <ul style="list-style-type: none"><li>◆ 'General information' 'sub-section:<ul style="list-style-type: none"><li>— topic must be chosen with guidance' rather than 'should'</li></ul></li><li>◆ 'Instructions' sub-section:<ul style="list-style-type: none"><li>— clarification that instructions for candidates must not be altered or supplemented by centre-devised materials</li></ul></li><li>◆ 'Choosing the topic' sub-section:<ul style="list-style-type: none"><li>— 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</li></ul></li><li>◆ 'Experimental research/fieldwork' sub-section:<ul style="list-style-type: none"><li>— candidates can be given only a basic list of instructions for the experimental/fieldwork procedure and must decide on range, interval and number of repeats for themselves</li><li>— reference to sharing data between groups has been removed</li><li>— information amended from 'A teacher or lecturer must not provide feedback to candidates on their results' to 'A teacher or lecturer must not provide feedback to candidates on their data.'</li></ul></li></ul>	September 2019

	<ul style="list-style-type: none"> <li>◆ 'Internet/literature research' sub-section: <ul style="list-style-type: none"> <li>— this must be the work of the individual candidate</li> <li>— provision of a wide list of URLs or a wide list of journals and/or books should be the exception</li> <li>— provision of the full content of a wide list of sources should be the exception</li> </ul> </li> <li>◆ 'Report stage' sub-section: <ul style="list-style-type: none"> <li>— teachers/lecturers must check the materials of each and every candidate</li> <li>— information added to the bullet points about raw experimental data, internet/literature data and extracts</li> <li>— information added on extracts</li> <li>— list of items that candidates cannot have access to in the report stage replaced with 'Candidates <b>must not</b> have access to a previously prepared draft of a report or any part of a report.'</li> </ul> </li> </ul> <p>'Instructions for candidates' section updated as follows:</p> <ul style="list-style-type: none"> <li>◆ amended throughout to reflect the changes in the course specification and the 'Instructions for teachers and lecturers'</li> <li>◆ candidates must repeat measurements</li> <li>◆ when using graphing software, candidates must include both major and minor gridlines</li> </ul>	
4.0	<p>'Instructions for teachers and lecturers' section updated as follows:</p> <ul style="list-style-type: none"> <li>◆ 'Internet/literature research' sub-section: <ul style="list-style-type: none"> <li>— 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.</li> </ul> </li> <li>◆ 'Report stage' sub-section: <ul style="list-style-type: none"> <li>— 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.</li> </ul> </li> </ul> <p>'Instructions for candidates' section updated as follows:</p>	June 2020

	<ul style="list-style-type: none"> <li>◆ ‘Underlying environmental science’ sub-section: <ul style="list-style-type: none"> <li>— clarification added about quoting and copying from sources</li> </ul> </li>   <li>◆ ‘Evaluation’ sub-section: <ul style="list-style-type: none"> <li>— advice added about using the words reliability, accuracy, and precision</li> </ul> </li> </ul>	
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