Instructions for candidates

These instructions apply to the assignment for National 5 Physics.

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 physics to new situations, interpreting information and solving problems
- planning, designing and safely carrying out experiments/practical 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 based on evidence/information
- drawing valid conclusions and giving explanations supported by evidence/justification
- suggesting improvements to experiments/practical 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 physics by doing research.

Your research involves gathering data from an experiment and comparative data from internet/literature sources. In addition, you may gather extracts about the underlying physics 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 physics 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 **and** find data to compare with your experimental 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 research

- When choosing your experiment, remember it must allow measurements to be taken.
- When carrying out your experiment, 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 over a wide enough range to meet the aim of your investigation.
- You must repeat measurements.
- 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 data during the report stage.

Internet/literature research

You must carry out your own internet/literature research.

- You need to find data from the internet, books and/or journals that you can compare to your experimental data. This could be a table or a graph, or information from diagrams or text. This does not need to exactly match your experimental data, but could illustrate the trend or pattern expected.
- It is important that you record where you get your data from in enough detail that another person could find it. This is known as a reference.
- In your report you need to describe the physics relevant to your aim. You can gather extracts from the internet, books and/or journals to help you write your account of the underlying physics. Extracts must be from an internet/literature source — not from centre-devised 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 physics 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

In the report stage, the only materials you are allowed to have are:	In the report stage, you cannot have
♦ these instructions for candidates ♦ extracts you have gathered from the internet, books and/or journals to help you describe the physics relevant to your aim ♦ the experimental method ♦ your raw experimental data, which may be tabulated your internet or literature data, including the reference to the source of the data	♦ 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 physics

- You must describe the physics relevant to your aim.
- You must use your own words as much as possible.
- You may choose to include:
  - relationships or equations
  - definitions of symbols used
  - explanations or justifications of relationships or equations
  - explanations of physical properties
  - copies of diagrams which you would find difficult to draw
- You can quote from sources as long as you also give a description or explanation showing that you understand the physics.
- Do not include a passage copied directly from your extracts. This would not show that you understand the physics.

Description of experiment

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

Experimental data

- You must include a table showing **all** of the measurements you recorded in your experiment.
- 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 results.
- The graph must:
  - be a scatter graph, line graph or a bar graph, whichever is appropriate for your data
  - be large enough to allow points to be read accurately
  - have suitable scales, labels and units on the axes
- 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 from an internet/literature source

- You must include data obtained from an internet/literature source that you can compare with the data from your experiment.
- You must include a reference to this source of data, 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

Analysis

- You must compare your experimental data with the data from your internet/literature source.

Conclusion

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

Evaluation

- You must identify a factor in your experiment that had a significant effect on the reliability, accuracy or precision of your experiment.
- You must then explain either:
  - 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

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 physics	A description of the physics relevant to your aim, which shows your understanding.	3
Data collection and handling	A brief description of your experimental method.	1
	Sufficient data from your experiment.	1
	Data from your experiment presented in a table with headings and units.	1
	Values correctly calculated from your experimental data.	1
	Comparative data 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 data.	1
	Suitable scales.	1
	Suitable labels and units on axes.	1
	All data plotted accurately, with line or curve of best fit if appropriate.	1
Analysis	Experimental data compared to data from internet/literature source.	1
Conclusion	A conclusion relating to your aim, based on all the data in your report.	1
Evaluation	Identification of a factor affecting the reliability, accuracy or precision of your experiment **and** a related explanation.	2
Structure	A report that can be easily followed.	1
Total		**20**

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