**Assignment**

**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. That is the difference between a pass (50% and an A grade 70%!)

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/information from an experiment and 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** try to find data/information to compare with your experimental results.
* Your teacher or lecturer will provide advice on the suitability of 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 measurements over a wide enough range to meet the aim of your investigation.
* You should repeat measurements, if possible.
* You will use your raw experimental data during the report stage.

**Internet/literature research**

* You need to find data/information 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.
* 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 need to explain, in your own words, the physics relevant to your aim. You can gather information using the internet, books and/or journals.

**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.

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| **Resources** |  |
| **In the report stage, the only materials you are allowed to have are:** | **In the report stage, you cannot have a previously prepared:** |
| * these instructions for candidates * information you have gathered from the internet, books and/or journals to help you explain the physics relevant to your aim * the experimental method * your raw experimental data * your internet or literature data/information, including the reference to the source of the data/information | * draft of your report * draft of your explanation of physics relevant to your aim * specimen calculation or set of calculations for mean or derived values * graph * comparison of data * conclusion * evaluation of your experimental procedure |

**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 explain 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 give a description or explanation showing that you understand the physics.
* Do not include a passage copied directly from a source. 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 and units.
* 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 (usually a line graph!)

— 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, include **both major and minor gridlines, and use plotting symbols which 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 try to 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.
* You must include a reference to this source of data/information, which would allow another person to find it. For example:



**Analysis**

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

**Conclusion**

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

**Evaluation**

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

— what you did or could have done to minimise the effect of this factor

or

— how you know this factor had a significant effect.

**Summary**

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| **Heading** | **Information** | **Marks** |
| **Title** | An informative heading. | *1* |
| **Aim** | A description of the purpose of the investigation. | *1* |
| **Underlying Physics** | A description of the physics relevant to the aim which shows understanding. | *3* |
| **Experimental Data** | A brief description of an experiment. | *1* |
| Raw data from the experiment. | *1* |
| Raw data presented in a table with headings and units. | *1* |
| Values correctly calculated from raw data. | *1* |
| **Internet / Literature Data** | Data from an internet / literature source. | *1* |
| A reference for the internet / literature source | *1* |
| **Graph** | The correct type of graph used to present the experimental data. | *1* |
| Suitable scales. | *1* |
| Suitable labels and units on axes. | *1* |
| All points plotted accurately, with line of best fit if appropriate. | *1* |
| **Analysis** | Experimental data compared to data from internet / literature source. | *1* |
| **Conclusion** | A conclusion related to the aim that is supported by data in the report. | *1* |
| **Evaluation** | A discussion of a factor affecting the reliability, accuracy or precision of the results. | *2* |
| **Structure** | A report that can be easily followed. | *1* |
|  | **Total Marks** | ***20*** |