PROJECT TITLE: ... **SUBTITLE** (*if applicable*) ...

First Name(s):

Surname:

Category:

Province and Region:

School:

Grade:

(Cover page: All projects reports must have a cover page with the above details)

ENGINEERING TYPE/COMPUTER SCIENCE PROJECTS

Writing Style/ Format

This is a guide/template on how to write a project report to bring to the Eskom Expo Science Fair. It gives detailed instructions, that you need to read and follow. Ask your teacher if you do not understand any part of this section of the report guide.

Pages should have 2.5-cm margins. It is preferable to use 12-point Sans-serif fonts that are easy on the eyes, i.e. Gill Sans MT, Times New Roman. Use 1.5-line spacing. Include page numbers on the bottom centre or right corner of each page. Spelling, grammar usage and punctuation should conform to the Oxford English Dictionary for UK English (not US English).

Paragraphs are useful tools for separating and organising your ideas. Different ideas should be split into separate paragraphs and common ideas should be grouped in the same paragraph. Your paragraph should have a topic sentence which gives the reader an indication of what to expect in that paragraph. If you present two hypotheses/engineering goals in the Introduction, then you should deal with those hypotheses/goals in the same order in the Methods, Results, and Discussion sections.

Abbreviations

Use abbreviations sparingly and only if they will save substantial redundancy throughout your project report. Adding abbreviations (particularly abbreviations that are common in your choice of category) can make your writing more concise, but overuse simply adds confusion. If you are to use acronyms in your report, you need to tabulate the list of the acronyms along with the full names, at the beginning of the report. Do not begin a sentence with an abbreviation.

Tables and Figures

Tables and figures form part of what you say in the paragraph (s). They are accessories to the text. You cannot just put a table or figure, always refer to them in text e.g. "Viscosity decreases with increasing temperature as shown in Figure 1..." Whenever you refer to tables and figures in the paragraph(s), you need to be clear about what you are determining from them and why. Both should be able to stand alone and make sense to the reader. Do not present your raw data in a table and/or graph. Tables and figures should have an appropriate title/captions and labels with correct units.

Titles and captions

Tables have a title at the top and figures have captions at the bottom which describes the purpose for which it has been presented (e.g. "Table I: Measurements of the width of the cylinder" and "Figure I: The viscosity of oil at different temperatures"). Table and figures are usually referenced by a number and should be numbered in sequence, e.g. Table 1, Table 2... Figure 1, Figure 2, etc.

Labelling of graphs

Label your axes so that the reader knows what scale points are plotted on the graph and specify units for quantities. When referring to graphs, do not use the generic axis (x and y) to refer to the horizontal and vertical axis.

Introduction

In the introduction, just present a brief overview, sufficient to establish the need for your project. It sets the project in its broader context, identifies and explains the need/ motivation for the project. It ranges between two to four pages. Never put your results or conclusion in the Introduction.

Literature Review

Briefly review relevant literature (e.g. journal articles, books, technical reports, etc.) to orientate the reader. You present an overview of what is known about the research project. In doing so, you will read previous and recent research done around your project report and write what is most relevant to it. As you near the end of the literature review (*i.e.*, at the beginning of the last paragraph), identify the important gap that you are trying to fill. You need to build up to why you are doing this research project.

Problem Statement

Based on the gaps/ knowledge you found in the literature review, you lead up to the need. Based on the need you identified, state the problem statement/ phenomena, as clearly as possible.

Aim

Clearly and concisely state your aim.

Engineering goals or Design goals

Clearly state the engineering goal/ design goal. These are linked to solving the problem and filling the knowledge gap identified.

Method

The method section describes what you did, why you did it and how you did it. This section must explicitly explain how you went about testing the engineering/ Design goals, to solve the problem. Describe your methods in enough detail that someone else could replicate your project. In other words, anyone should be able to duplicate your methods to verify or refute what you found. Briefly explain the rationale for the measures you made. This section is written in the past tense.

Materials

List the apparatus that you used for your project.

Procedure

In this section, you orderly describe the series of repeatable steps that you took in creating and testing a functional prototype/process/solution.

Engineering Method

Engineering projects include multiple designs, you build, test, find new problems, make changes and test again (design-test-redesign-retest) before you can settle for a final design. For a clear transition between the designs, you need to mention the earlier designs (minimum two) and evaluations of the prototypes/processes that you did to eventually get to the final one. However, the full details must be in the appendix.

In this section, we are interested in the final design details. The prototype/ process with the most desirable features, fewest negative characteristics and stays within the limitations of the need you are trying to fulfil. *Planning*

The prototype/process design must be appropriately presented in this section. This can be done visually through drawings/ flow diagrams (These can include circuit diagrams, system drawings, technical plans, drawing blueprints, etc.) and must include all the necessary measurement units. Mention the name of the program used for the visual representations.

Creating

A step by step description of how you built your prototype/ developed a process *Testing and Evaluating*

Testing is the way a prototype/process under development is evaluated for correctness and robustness and is proved to meet the stated goals. It is done at each stage of creation and has characteristics unique to the level of the test being performed.

This section includes the quantitative aspects of your project. The prototype/ process components are compared against requirements and specifications through tests. The results from these tests can be represented graphically or in a table. The results are then evaluated to assess the progress of design/ process (performance, supportability, etc.)

If your project involves programming, the code must be in the appendix.

Computer Science Method

When computing data, you need to mention the type of programming language you will be using for the different interfaces and the parameters/fields that will help in fulfilling the need. Flow diagrams are useful for describing computational designs.

Developing

A step by step description of how you are developing a model to meet a certain need. The computational language used must be appropriate for what you want to achieve; taking into consideration the parameters/arguments/features that will determine whether the solution will meet basic requirements. *Testing*

Testing is the way a model/solution under development is evaluated for correctness and robustness and is proved to meet the design goal. It is done at each stage of development and has characteristics unique (parameters/arguments/features) to the level of the test being performed.

The parameters/arguments/features are very important in the testing of your program/ solution. If any modifications are made on the parameters/arguments/features, provide details on how they were changed and how this affected the solution. This can be presented in a table/graph. It is necessary to analyse and choose from two or more alternative approaches to test and evaluate the feasibility of your program/solution.

Results

The overall purpose is to describe patterns, not to explain or interpret them. Think of the Results section as telling a story about what you found when conducting your tests. You need to set the context within which the data was collected. That will help the reader to understand more fully the data and data analyses specific to your engineering/ design goals.

Results should be presented in a way that it aligns with the engineering/design goals. Begin by thinking about what information the reader will need to assess whether you achieved your aim or not. It should be presented in a form that is easy to read, which usually means putting it in a graph or a table. Be sure not to present the same information in both a graph and a table.

Discussion

The discussion interprets patterns you found. Explain why you found what you found, backing it up with relevant literature. This is done by reviewing and comparing literature. Literature used must be cited and referenced. How are they similar or different? Why might there be differences between your project and others?

It explains what the patterns mean (i.e., why you found the results you did). Emphasize the strengths rather than the weaknesses of your prototype/ solution.

Limitations and errors

Briefly discuss all the things that affect your measurement but which you cannot do anything about, given certain constraints. This includes sources of errors in your opinions that bias your results.

Recommendations for Future Research

State how your research can be improved. At the very least, make concrete suggestions about what the next research should do.

Conclusion

Clearly state your conclusions, and briefly summarise your evidence for each conclusion. Most importantly, be sure to address the significance of your work. Write your Discussion to address one all-important question: —So what? What is the overall importance of the results? Why should anyone care?

Acknowledgments

Any person who made a direct contribution to the project should be acknowledged. If applicable, funding sources should be mentioned.

References

Referencing is a way to validate that you have done further reading, learning and comprehension by using relevant sources. Eskom Expo for Young Scientists uses the Harvard format for referencing. Formatting has to be consistent throughout the report.

Appendix

An appendix, placed at the end of your reports, is an item which you refer to in the report, but the full version is either inappropriate or too detailed for the body of the paper. There may be more than one appendix, in which case the series is called the appendices. Examples of material suitable for an appendix are a new computer program specifically designed for the research, an unpublished test and its validation, or a list of stimulus materials