

Steps to a good scientific project

STEP 1: Choosing a topic

The topic for your project should be something that you are interested in and that you want to learn more about. You may think of a good topic straight away just by looking at the list of Expo categories on Page 7, or you may need to look for ideas for your topic. You can get ideas for projects from:

- Newspaper and magazine articles
- The internet
- Television programmes
- Practical problems from your community
- The Expo website

Your idea for a project should be an original one. This means that it should be your own idea and not somebody else's. Do not repeat an experiment from the school syllabus or choose a problem to which people already know the answer. For example "Determining the specific heat capacity on iron" is not an original topic for your Expo project. The method to follow is well known from school textbooks and you can easily look up the answer.

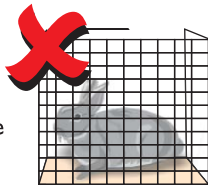
The best Expo projects are not always complicated, but they are imaginative and well carried out.

A good project is often:

- a clever solution to a problem; or
- a new idea for a piece of apparatus; or
- a study or survey that no-one has done before.

Be original, but **DO NOT** choose a project that:

- could be dangerous to yourself or others;
- needs any experiments on insects, live animals or humans; or
- involves collecting plants or animals that are protected by Nature Conservation laws.



Ask your teacher for advice if you are not sure whether your topic will make a suitable scientific Expo project.

STEP 2: Project description

- State your topic as a question or aim and then formulate your hypothesis (what you think the answer is going to be).

STEP 3: Gather background information

- Use books and internet sites for your research. A summary of your research must be included in your introduction. Remember to record your references/bibliography.

STEP 4: Collect data

- Do experiments to test your hypothesis.
- Interview people interested in your topic.
- Do surveys or send out questionnaires - a minimum of 100 people. If applicable, make a working model to illustrate the solving of your problem. Use what is at hand, an e.g. use material from home.
- Keep handwritten notes in a project data book (e.g. file, diary or scrap book). A project data book is your most important piece of work. Accurate and detailed notes make a logical and winning project. Good notes show consistency and thoroughness to the judges. Record data in the data book and then transfer to tables when writing your report. Make sure you date every entry.

STEP 5: Record your results in tables

- Generate graphs from your tables.
- Add photos.
- File a blank copy of your questionnaire/survey in your data book.

STEP 6: Discuss results

- Interpret the data or make comparison.
- Look at trends and patterns.
- Note limitation and errors in your discussion.

STEP 7 : Conclusion

- Your conclusion must be based on your findings and must be linked to your hypothesis/aim.

FOR NATIONAL FINALS: Challenge and test your hypothesis again and make sure that you collect more data between regional and the national finals to support your hypothesis.

STEP 8: Evaluate the whole project

- Review
- Revise
- Redo

STEP 9: Write a report using the following headings

- Choosing a title for the project: Title simple and must be descriptive.
- State problem/aim and hypothesis
- Introduction, including information collected and description of project
- Method (numbered, logical, concise, third person includes variables)
- Results (record of data in tables and graphs)
- Analysis/discussion and interpretation of results (including errors and modifications)
- Conclusion/s
- Bibliography/References (with a list of books, magazine articles or internet sites where you acquired important information)
- Acknowledgements (this is a list of the people who helped you and the help each one gave. For example, someone might have lent you a piece of equipment, taken photographs for your poster or given you some important advice)
- Abstract - compulsory for Regional Expo and National Finals (maximum of 250 words on one page)
- Plagiarism form

STEP 10: Showing your work

- Your presentation must include the following:
Poster
Project data book
Report
Display
Working model on table (if applicable)
Your presentation must be presented logically and eye-catching.
- Check with your Regional Coordinator if display boards are provided and what is the size and dimensions. Each exhibit at National Finals is given a space of maximum 1.5m table length and a display. It is compulsory to use the display boards provided at National Finals - size and dimensions of the display board - height 1m; left side 50cm; middle 1.5m and right side 50cm. Look at the drawing on page 14 to see how to make the most of the space you are given.



Ethic Statement

Scientific fraud and misconduct are not condoned at any level of research or competition. Such practices include plagiarism, forgery, use of presentation of other researcher's work as one's own and fabrication of data. Fraudulent projects will fail to qualify for competition in Regional Expos or the Eskom Expo National Finals.

I. Plagiarism

What is plagiarism?

It can be defined as follows:

To use another person's words or ideas and to pretend that they are your own. The following are considered as plagiarism:

- To steal or borrow another person's work.
- To pay another person to write your assignment.
- To copy directly from a source without referencing the original source.
- To use another person's ideas and build on them without giving credit to the original ideas.
- To paraphrase another person's work word-for-word.
- To present false data (fabricated, altered or borrowed without permission).

The worst form of plagiarism is to do it intentionally:

- to pretend that another person's work is your own;
- to buy a piece of written work from somebody (e.g. from the internet); or
- to pay somebody to write your assignment for you; or
- to write something word-for-word from a source without acknowledging that source (or to "cut and paste" from the Internet).

Plagiarism can also occur unintentionally: when you rewrite another person's ideas or words in your own words, or use small sections of another person's writings without acknowledging it as a source. Fraudulent projects will be disqualified at a Regional Expo and National Finals. **It is compulsory that every participant has a signed copy of the plagiarism form in their file.**

2. Ethics

Ethics is concerned with what is right or wrong, good or bad, fair or unfair, responsible or irresponsible. Information about research on human or animal subjects including surveys. All of these need a form signed by a supervising scientist or teacher giving approval for the project to be done. Any surveys (questionnaires) need another form giving consent or permission by parents or schools. Both forms need to be filled in the project file in the appendix

Make sure your project is safe and ethical

Before you start a project, it's important to know the rules - especially if you're thinking of using animals, human subjects, hazardous equipment or materials, recombinant DNA or other biotechnological materials. (By the way, "animals" include pets and livestock and humans include family members and students in your class or school.) It's heartbreaking to have your project disqualified at the Regional or National Finals because you broke the rules - or maybe even the law! Any research or experiment on potentially hazardous biological agents, animal or human subjects must be done under the supervision of a qualified scientist/laboratory. A signed letter from the qualified scientist or/and laboratory will be required before participating at Regional Expos or National Finals.

REGIONAL EXPOS AND NATIONAL FINALS ETHICS INFRINGEMENTS

Students are encouraged to check their ethical infringements before exhibiting their projects at any Eskom Expo. Please note that the following are not allowed on any Eskom Expo project:

- Living organisms including animals, fish, insects and plants
- Agar plates and other growth mediums for microbiology studies
- Human or animal parts including tissues and body fluids (for example blood, urine, hooves, skins etc)
- Dangerous chemicals: Poisons, drugs, medications, controlled substances, hazardous substances and devices (for example firearms, weapons, ammunition, reloading devices, knives and any other sharp instruments)
- Flammable substances
- Photographs or other visual presentation depicting humans or vertebrate animals in surgical techniques, dissections, necropsies or other lab procedures or who belittle people in any way or show animals being harmed in any way
- Brand names or any other branded products
- Food substances that are not in completely sealed containers (plastic wrap is not acceptable as it can easily be removed)
- Water except if in sealed apparatus
- Any apparatus deemed unsafe by the Eskom Expo organisers.

NB: Photographs will be sufficient for judging