Participate

1. Who is eligible to participate?

The category defined for participation: Class 8 to class 12
Students who have an idea that is original and innovative, are eligible to participate; individually or in a team of two.

Research-based projects or novel engineering design qualify to participate at the IRIS National Fair. Hence, your project must be original in content and should be substantiated with data collected from experimentation, if appropriate. Engineering projects should have novelty improvements over the existing solutions.

2. Choosing a subject for your project:

Select a topic of interest from any of the following subjects for your project. In case you are not sure of this classification the IRIS Scientific Review Committee will evaluate your project and classify it suitably.

You can submit any number of projects in one or multiple subject categories.
Depending on the number of projects received in various categories the Scientific Review Committee may re-categorize projects if necessary.

Subject Categories for Participation at IRIS:

1. Animal Sciences (AS)
2. Behavioral and Social Sciences (BE)
3. Biochemistry (BI)
4. Cellular and Molecular Biology (CB)
5. Chemistry (CH)
6. Computer Science (CS)
7. Earth and Planetary Science (EA)
8. Engineering: Electrical and Mechanical (EE)
9. Engineering: Materials and Bioengineering (EN)
10. Energy and Transportation (ET)
11. Environmental Management (EM)
12. Environmental Sciences (EV)

13. Mathematical Sciences (MA)
14. Medicine and Health Sciences (ME)
15. Microbiology (MI)
16. Physics and Astronomy (PH)
17. Plant Sciences (PS)

3. Project Submission

Please ensure your Participation Form and Project Synopsis reach us online by August 31. Online Submission will enable you to check the status of your synopsis online, and receive an e-notification in the event of your project being shortlisted.

Develop a Project: 12 steps to a prize winning research-based project

1. Select your topic
   The first step, selecting a project idea, is the most important. This is the first question or dilemma a student faces when starting a science project, because it can make the difference between a good and an excellent project.
   Keep two important things in mind while selecting your topic: First, choose a topic that interests you; second, while you are choosing a topic, check all the resources around you. This will help you in doing your project with ease. e.g. - If you are doing a project on Eucalyptus leaves, ensure that you have the Eucalyptus tree in the surrounding region where you live.
2. Source Information on your project
   After selecting your project topic, learn everything about it. You can use the many search engines available to find information or try various science related sites on the internet. In particular, do check the scientific literature by searching databases like www.scholar.google.com, www.scirus.com or www.pubmed.gov to see if related work has been done before.
3. Make a plan
   Make a plan as to how you will conduct your experiment. Your plan should include the following:

- The purpose of your experiment
- The variable or the things that you are going to change during the experiment
- Note the parameters that remain constant during the experiment
- Your hypothesis or what you think the outcome of the project will be
- A detailed procedure outlining how you will conduct the experiment. Include the type of experiment to be conducted
- Make a timetable and allot sufficient time to all stages of your work. Stick to the timetable as far as possible so that you finish your project on time

4. Make a hypothesis

   When you think you know what variables may be involved, think about ways to change one at a time. If you change more than one at a time, you will not know what variable is causing your observation. Sometimes variables are linked and work together to cause something.

   At first, try to choose variables that you think act independent of each other. At this point, you are ready to translate your questions into hypothesis. Hypothesis is a tentative theory that can be proved or disproved through further investigation and analysis. There is usually one hypothesis for each question you have. You must do at least one experiment to test each hypothesis. This is a very important step.

5. Design experiments to test your hypothesis

   Design an experiment to test each hypothesis. Make a step-by-step list of what you will do to answer each question. This list is called an experimental procedure. For an experiment to give answers you can believe, it must have a "control."

   A control is a neutral "reference point" for comparison that allows you to see what changing a variable does by comparing it to not changing anything. It is difficult to develop effective controls. Without a control, you cannot be sure that changing the variable causes your observations. A series of experiments that include a control is called a "controlled experiment".

   Experiments are usually repeated to guarantee that what you observe is reproducible. It is also repeated to obtain an average result. Reproducibility is a crucial requirement. Without it, you cannot trust your results. Think of possible errors and record them, or correct them if you can.

Your results should be predictable, i.e. the same results should be obtained when the experiment is repeated. It is useful to choose a statistical test that will validate your results. This will also ensure that your results are not due to mere chance but are scientific in nature.

6. Do the experiments and record the data:
   During each experimental 'run', you measure how much the variable affects the system under study. Each change of variable produces a different response in the system. You measure this response or record data in a table for this purpose. These are considered "raw data", since they have not been processed or interpreted yet. When raw data are processed mathematically, for example, they become results.
7. Record your observations:
   Observations can be written descriptions of what you noticed during an experiment or problems encountered. Keep careful notes of everything you do and everything that happens. Observations are valuable when drawing conclusions and useful for locating experimental errors.
   However, maintain a record of experimental details and data-log book. Do not rely on your memory. Alternately, one can take photographs or video record a process of an experimental procedure performed. This will be an added proof for any experiment performed.
8. Consult your guide
   Discussion with your guide should be an ongoing activity. Your guide is very important in guiding you through your project until the end. He/ she will be able to give you all the required inputs to develop a research-based project. The guidance will ensure that you are working in the right direction and the methodology being used by you is correct.
9. Do your calculations
   Use your raw data to calculate and arrive at conclusions. For example, you weighed a container. This weight is recorded in your raw data table as "wt. of container". Then you added some soil to the container and weighed it again. This would be entered as "wt. of container + soil".
   In the calculation section, do the calculations to find out how much soil was used in this experimental run: (wt. of container + soil) - (wt. of container) = wt. of soil used. Each calculated answer is entered into a table in a "Results" section, using proper units.

10. Summarize results

    Summarize what happened. This can be in the form of a table of processed numerical data or graphs. It could also be a written statement of what occurred during experiments on studying tables and graphs, you can see trends that tell us how different variables cause our observations. Based on these trends, you can draw conclusions about the system under study.

    These conclusions help you to confirm or deny our original hypothesis. Often, mathematical equations can be made from graphs. These equations allow you to predict how a change will affect the system without the need to do additional experiments. Apply appropriate statistics to analyze your data so that valid conclusions can be drawn.

11. Make your conclusions

    Using the trends in your experimental data and your experimental observations, try to answer your original questions. Is your hypothesis correct? Now is the time to put together what happened and assess the experiments you did.

    It is possible that your observations lead you to conclude something different from your starting hypothesis? Do not alter results to fit a theory. If your results do not support your hypothesis, it does not matter. You still have done successful scientific research. The spirit of scientific inquiry requires an open mind.

12. Cost feasibility

    If your project involves making a 'device', then put down the estimated cost of all the components required for that device. You must do a cost comparison with the existing products, if applicable. You should also state the source from which these components can be obtained.

Tips

1. Tips on writing a project synopsis

A synopsis gives the essence of the project in brief. Ideally, a synopsis should not exceed 250 words. Scientific Review Committee and other readers should have a fairly accurate idea of the project from reading the synopsis. The synopsis must focus on the current year's research and give only minimal reference to previous work as applicable. Details, discussions and acknowledgement should not be included in the synopsis, but may be put in the longer research paper or given on the project exhibit board.

A synopsis does not give details about the materials used unless they greatly influenced the procedure or had to be developed to conduct the investigation. A synopsis should only include procedures done by the student. Work done by a mentor (such as surgical procedures) or work done prior to student involvement must not be included.

The following should be the elements in your synopsis:

- Purpose of the experiment
- An introductory statement of the reason for investigating the topic of the project. A statement of the problem and/or the hypothesis being studied
- Procedures used in the experiment
- A summary of the key points and an overview of how the investigation was conducted
- Data - This section should provide key results that lead directly to the conclusions you have drawn. It should not give too many details about the results nor include tables or graphs
- Conclusion - Conclusions from the investigation should be described briefly. The summary paragraph should reflect on the process and possibly state some applications and extensions of the investigation.

2. Tips on writing Screening Report

The Screening Report should present an accurate idea of your project to the Scientific Review Committee during the screening stage. It is a very important document and you need to fill it in completely, to indicate the what, why and how of the project.

It would include the following details:

- Origin of the idea
- Objectives
- Place of research and time frame followed
- Type of work done
- Present status of the project leading to future research plans
- Focus on the research methodology followed and the various resources utilized
- Important experimental results as quantitative values with proper units
- Key diagrams and graphs to support your research
- Financial aspects of the project including comparative costs with similar, available

products and technology would help gauge the feasibility of the idea

The Scientific Review Committee would also like to know your creative contribution and the unique aspects of the project. Carefully read the sample synopsis, screening report and award winning projects at IRIS. This will give you an idea on the content as well as the expected standard of quality at IRIS.

3. Tips for parents

Encourage, support, and guide your child. Make sure your child feels it is his/her project. Make sure the work is primarily the work of the child. Realize the main goal of a Science Fair project is to help your child use and strengthen the skills he/she has learned and develop higher-level skills.

The main goal should not be the ribbon or prize. Provide transportation to libraries, nature centers, or universities that can help your child find project information. Locate Internet access, either at home or at a school or library. Help your child design a project that is safe and properly supervised.

Help your child plan a mutually agreed upon timeline to prevent a last minute project. It is suggested you allow at least 12 weeks conducting an experiment and preparing the presentation. Do not worry or get upset if your child does not win a prize at the Science Fair. The skills the child has gained are worth all the effort.

Project essentials

1. What is NOT ACCEPTED as an IRIS Project?

Of the thousands of entries that we receive every year, many do not make it beyond the screening stage because they do not follow the scientific method, are not research projects or innovative ideas.

Typical examples of projects that are not selected are:

- Merely repeating an experiment in your science textbook, e.g. generating oxygen from hydrogen peroxide solution, germination of seeds etc.
- Writing an essay on a science topic, e.g. uses of nuclear energy, or a survey based report
- Making a wild hypothesis without personally doing any experiment or showing proof to

support the concept, e.g. generating electricity from speed breakers

- Making unsubstantiated claims that violate known laws and principles of science, e.g. perpetual motion machines, generating energy out of nothing etc.
- Toxicity studies and experiments that lead to the death of vertebrate animals (even mice)
- Simple posters, thermocol or wood models explaining science/technology principles, e.g. model of a hydroelectric power station, models illustrating pollution control etc.

2. What should be the essential elements of your project?

Ideally, your project should have the following elements:

Project data book - The project data book should have accurate and detailed notes of your research.

Synopsis - This is a summary of your idea and should include the purpose of the experiment, procedure used, data, and conclusion.

Research paper - A research paper should be prepared and must be available along with the project data book with relevant written material. A research paper helps organize data as well as thoughts.

A good paper includes the following sections:

a. Title page:

Centre the project title, and put your name, address, school, and grade at the bottom right

b. Table of Contents:

Include a page number for the beginning of each section

c. Introduction:

The introduction sets the stage for your report. The introduction includes your hypothesis, an explanation of what prompted your research and what you hoped to achieve

d. Method:

This section describes how you did the study. Describe in detail the methodology used to collect your data or make your observations. Your report should be detailed enough for someone to be able to repeat the experiment from the information in your paper.

Include photographs or drawings of self-designed equipment. Also specify the material used in the study. The research work conducted by you may have taken more than a year. In such case, include this year's work only.

e. Discussion:

This is the essence of your paper. The results and conclusions should flow smoothly and logically from your data. Be thorough. Allow your readers to see your train of thought, letting them know exactly what you did. Compare your results with theoretical values, published data and expected results.

Include a discussion of possible errors. How did the data vary between repeated observations of a similar event? How were your results affected by uncontrolled events? What would you do differently if you were to repeat this project? What other experiments should be conducted?

f. Conclusion:

This section describes the findings and conclusion of the project. Briefly summarize your results. Be specific, do not generalize. Never introduce anything in the conclusion that has not been discussed.

g. Acknowledgement:

You should always credit those who assisted you, including individuals, business and educational or research institutions. Identify any financial support or material donations received, but do not put it on the display board.

h. Reference list:

Your reference list should include any documentation that is not your own (i.e. books, journal articles, include specific internet urls).

3. Choosing a Guide

You can take guidance from your teachers, research scientists or any qualified person who is capable of guiding your research project. Different projects can have different guides, however, only 1 guide should be assigned per project. The guide will have to certify that the work has been done under his/her supervision and that necessary care has been taken while carrying out research on living organisms, human subjects, recombinant DNA, controlled substances, nonhuman vertebrate animals, human and animal tissues, pathogenic agents, etc.

4. **Conducting research for the project**

   Students are allowed to conduct experiments at home, in school or in laboratories of research institutions, universities, and colleges or at other recognized research facilities. The data reflected in the report must not be more than 12 months old. However, the project could be an extension of earlier work done by the student.

Display Guidelines

1. **Project Setup and Display**

   If your project is shortlisted to be displayed at IRIS National Fair, then you may follow certain Display Guidelines to set up your project stall at the Fair.

   Since you want to attract and inform interested spectators and Scientific Review Committee, make it easy for them to access your project and the results you have obtained.

   a. Display –

   Make the most of your space using clear and concise displays. The display is what shows the Scientific Review Committee and public what you did. It should look organized, neat and attractive. While color is nice, do not distract from your results with a lot of decoration or distracting features.

   The focus is the work; the board is just to display the work. The same guidelines apply for this as do the paper: watch your grammar, spelling and wording. Again, all sections should be TYPED and computer generated. Please refer to the diagram below. Make sure the display reflects the current year's work only.

   b. A good title –

   Your title should be simple and must accurately represent your research.

   c. Take photographs/ videos –

   Many projects involve elements that may not be safely exhibited at the fair, but are an important part of the project. You might want to take photographs/videos of important parts/ phases of your experiment to use in your display.

   d. Models –

Prepare a miniature of your project in case your prototype is too large to be transported or carried along.

e. Be organized –

Make sure your display is logically presented and easy to read. A glance should enable anyone (particularly the Scientific Review Committee) to locate the title, experiments, results, and conclusions quickly. When you arrange your display, imagine that you are seeing it for the first time.

f. Eye-catching display –

Make sure your display stands out. Use neat, colorful headings, charts, and graphs to present your project. Pay special attention to the labelling of charts, diagrams, graphs, and tables. Each item must have a descriptive title.

g. Correctly presented and well-constructed –

Be sure to adhere to the size limitations and safety rules when preparing your display. All forms required for the project should be displayed. Make sure your display is sturdy, as it will need to remain intact for quite a while.

Maximum project sizes include all project materials, supports, and demonstrations for public and Scientific Review Committee. If a table is used, it becomes part of the project and must not itself exceed the allowed dimensions nor may the table plus any part of the project exceed the allowed dimensions.

Demonstrations:

Any project with a component that will be demonstrated by the Finalist must be demonstrated only within the confines of the Finalist’s booth. When not being demonstrated, the component plus the project must not exceed allowed dimensions. Table or freestanding display must be parallel to, and positioned at the back curtain of the booth.

2. Allowed for display

a. Dried plant materials if permanently sealed in acrylic or other similar material

b. Soil or liquid samples if permanently sealed in acrylic or other similar material

c. Empty tanks that previously contained combustible liquids or gases

d. Personal photographs, accomplishments, acknowledgements, addresses other than the finalist's address, telephone, fax numbers, e-mail and web addresses are allowed only on the inside of research papers or data books
e. Any apparatus with unshielded belts, pulleys, chains, or moving parts with tension or pinch points may not be operated
f. Class II lasers:
   a) May be operated only by the finalist
   b) Posted sign must read "Laser Radiation: Do not stare into beam"
   c) Must have protective housing that prevents access to beam (Class III and IV lasers may not be operated)
g. Large vacuum tubes or dangerous ray generating devices must be properly shielded
h. Pressurized tanks that contain non-combustible material may be allowed if properly secured
i. Any apparatus producing temperatures that will cause physical burns must be adequately insulated

3. Prohibited for display

a. Living organisms
b. Taxidermy specimens or parts
c. Preserved vertebrate or invertebrate animals
d. Human/animal parts or body fluids (e.g., blood, urine). (Exceptions: teeth, hair, nails, dried animal bones, histological dry mount sections and completely sealed wet mount tissue slides)
e. Human/animal food
f. Laboratory/household chemicals. (Exceptions: water integral to an enclosed apparatus or water supplied by the Display and Safety Committee)
g. Poisons, drugs, controlled substances, hazardous substances, or devices (e.g., firearms, weapons, ammunition, reloading devices)
h. Dry ice or other sublimating solids
i. Sharp items (for example syringes, saw blades, needles, pipettes, knives etc.)
j. Flames or highly flammable display materials

k. Batteries with open top cells
l. Awards, medals, business cards, flags
m. Photographs or other visual presentations depicting vertebrate animals in surgical techniques, dissection, necropsies, other lab techniques, improper handling methods, improper housing conditions, etc.
n. Identity of the student on the posters in any form

4. Electrical power

a. 220 Volt 50Hz single-phase AC power supply will be available for usage at the National Fair. Maximum circuit amperage/ wattage available will be determined by the electrical circuit capacities of the exhibition hall and may be adjusted on site by the Display and Safety Committee

b. Heavy electrical machinery such as large compressors, electric hot plates etc. may not be used

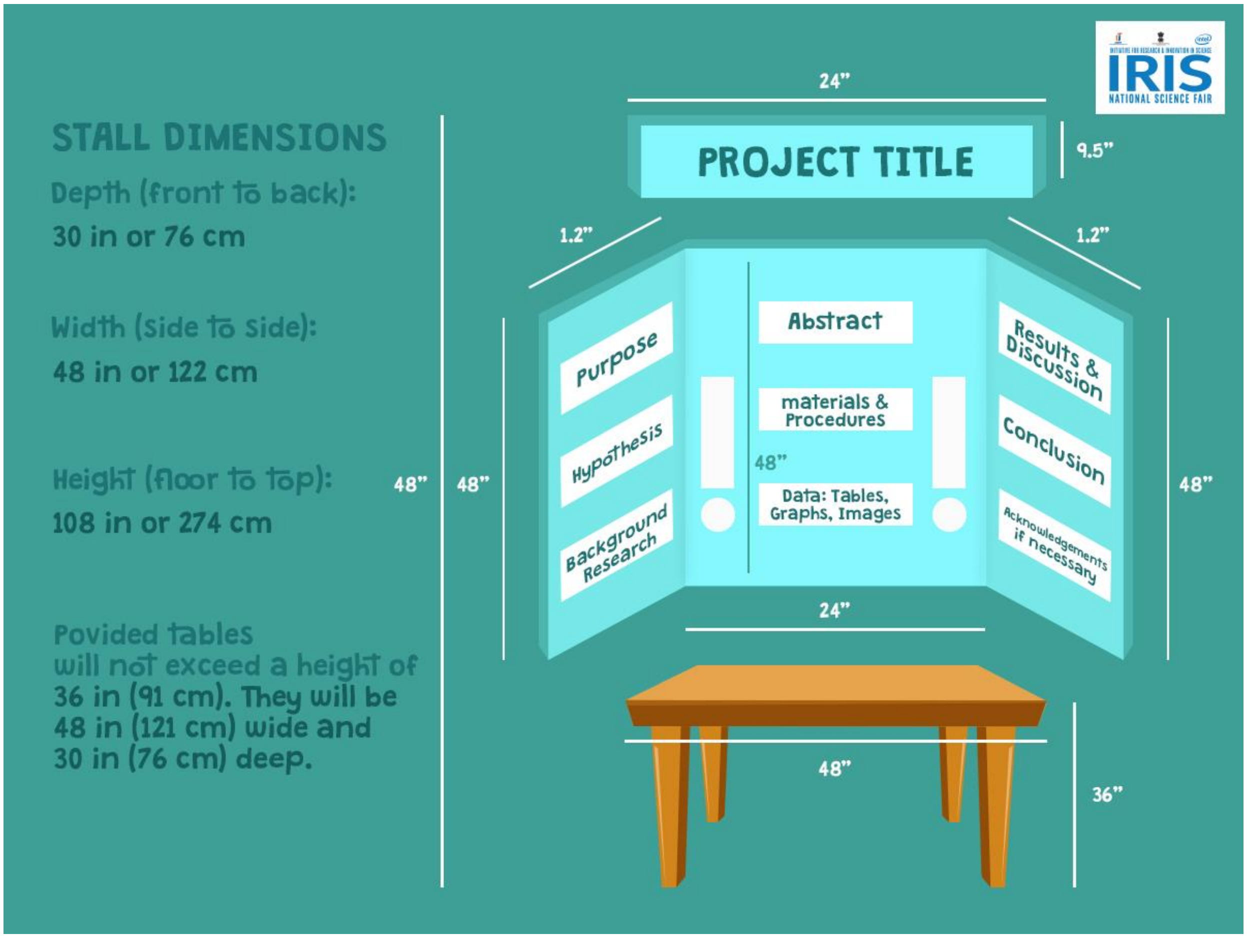
c. All open ends of electrical wires, sharp objects, edges to be properly insulated/ sealed

d. Wire connectivity without proper plug at power source not permitted

5. Computer facilities

If required, for your project display at the National Fair, you will need to bring your own laptop, internet access, should you need it.

6. Stall dimensions:



Restrictions

1. **Human subjects**
    a. Research must be reviewed and approved by organizers before experimentation begins
    b. Both the student and the organizers must carefully evaluate psychological and physical risks
    c. Informed consent is strongly recommended for all the projects using human subjects and is required for all subjects when the risk is determined as more than minimal by the organizers

2. **Recombinant DNA**
    a. Non-exempt DNA studies must be conducted in a registered research institution under the direct supervision of a qualified scientist
    b. Non-federally registered laboratory (including school laboratory) under direct supervision of a trained teacher or qualified scientist

3. **Controlled substances**
    a. Students must adhere to all federal and state regulations governing controlled substances
    b. Students under the age of 21 years may not purchase and/or handle smokeless powder for science projects

4. **Non-human vertebrate**

    Research must be reviewed and approved by the SRC before experimentation. Projects involving animal subjects or animal data are limited to the following:

    a. Use of data from pre-existing, publicly available resources
    b. Use of data from observational or behavioral projects that involve animals in their natural environment.

    Alternatives to the use of vertebrate and invertebrate animals for research must be used whenever possible, in accordance with the "Prevention of Cruelty to Animals Act, 1960".

5. **Human and animal tissue**

   Research must be reviewed and approved by organizers before experimentation begins. Both the student and the organizers must carefully evaluate psychological and physical risks. Informed consent is strongly recommended for all the projects using human subjects and is required for all subjects when the risk is determined as more than minimal by the organizers.

6. **Pathogenic agents**
   a. Micro-organisms collected, isolated, and /or cultured from any environment should be considered potentially pathogenic
   b. If your project is related to any of the above topics, and has been shortlisted for participation at the National Fair, you would be required to submit relevant forms

7. **Pathogenic agents**
   a. Human blood (and products) must be documented free of HIV and hepatitis viruses and/or must be handled under supervision of expert/guide, by acceptable containment procedures applicable to blood borne pathogens
   b. Students using their own blood do not need HIV or hepatitis certificates
   c. For the purpose of student research, all body fluids, including saliva and urine (but excluding hair), are not to be considered tissues

Patent and Copyright

If you consider that your project is worth patenting, it can be done so by registering it with the Patent Office in your state. But IRIS does not own the responsibility to help the participant to patent his or her idea. We suggest that you can contact either the patent office in your state, or contact:

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Tel: +91 (11) 26567373/26962819.