NAME:

CLASS:

THE GAP STATE SCHOOL

presents

2022 STEM EXPO

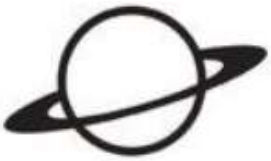
An exhibit of student's science ,technology, engineering and maths displays

16 June 2022

THE GAP STATE SCHOOL
MULTI PURPOSE BUILDING (MPB)

Handbook

Contents



REGISTRATION

31 March – 27 May 2022

Register for STEM Expo 2022 through SOBS. NOTE: If registering as a group or family, only **one registration per group** is required. Please nominate one parent from the group to register on behalf of all of the group members.

Register on SOBS at https://eq.sobs.com.au/ss/student.php?schoolid=70399.

STEM EXPO

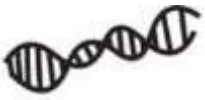
Wednesday 15 June 2022

- **Between 3.00pm and 5.00pm**
  All entries to be brought to the MPB for set up.
  Parents are required to help their child set up their display.

Thursday 16 June 2022

- **9.00am to 11.00am** - Judging of STEM Expo projects.
- **11.30am to 1.50pm** – Viewing of project by students and teachers.
- **4.00pm to 6.00pm** – Viewing of STEM Expo and Activity Displays by families and students.
- **6.00pm – 6.30pm** – Astronomical Society on the oval. Gold coin donation.
- **6.30pm** - All displays must be taken home and not left at school.

Remember to be Scientifically **SMART**:
Specific, **M**easureable, **A**chievable, **R**easonable and **T**imely



Welcome budding young innovators!!

Here is an opportunity for you to create a **wonderful STEM project!**

The following **5 steps in this handbook** will assist you with questions you may have and information you need for completing the project correctly.

Feel free to ask an adult for advice, but **remember**, it is your project so it is much more **rewarding** if you do it by yourself! Are you **ready?** Let's get started……..

☑ Step 1 of 5: Register and choose ONE of the categories below

Category A: COLLECTION *(Prep to Year 2 ONLY)*
Collect and **organise** something of interest, answering questions related to **observations** made while exploring your world. Examples: What kinds of insects can be found in my backyard? What types of tree leaves can be found on my street?

Category B: EXPERIMENT *(Prep to Year 6)*
Conduct an **experiment** to find the **answer** to a question/problem. **The Scientific Method** will take you through the correct process of asking a question, doing some preliminary research, making a **hypothesis** (your best guess at how it will turn out), planning and conducting your **experiment**, and **analysing** your results.

Category C: STEM Design Challenge *(Year 3 to Year 6)*
Everyone is an innovator! Use science, technology, engineering, maths and creativity to dream up and **design** an object or a process to **solve a real-life problem**. The **Design Process** will take you through all the necessary steps: asking a question, brainstorming, planning, creating, testing, and making it even better.

Category D: RESEARCH PROJECT *(Prep to Year 6)*
Collect information about a STEM topic or concept that you are personally interested in, and **present** your **findings**. You will look for existing answers/solutions by **reading** books, **talking** to experts, and **gathering** information from **other sources** such as schools and libraries. Your display board will have drawings, photographs, charts, graphs, dioramas, etc. Examples: How does a solar cell work? How does a light bulb operate? How do clouds form? What research exists on cloud formation?

Category E: Non –judged Entry *(Prep to Year 6)*
This entry can be of any category, this entry will not be "judged" by our community judges. Entrants will not have to converse with our judges, but be able to show/ share a display. All other criteria regarding size of display, category etc. will still apply.

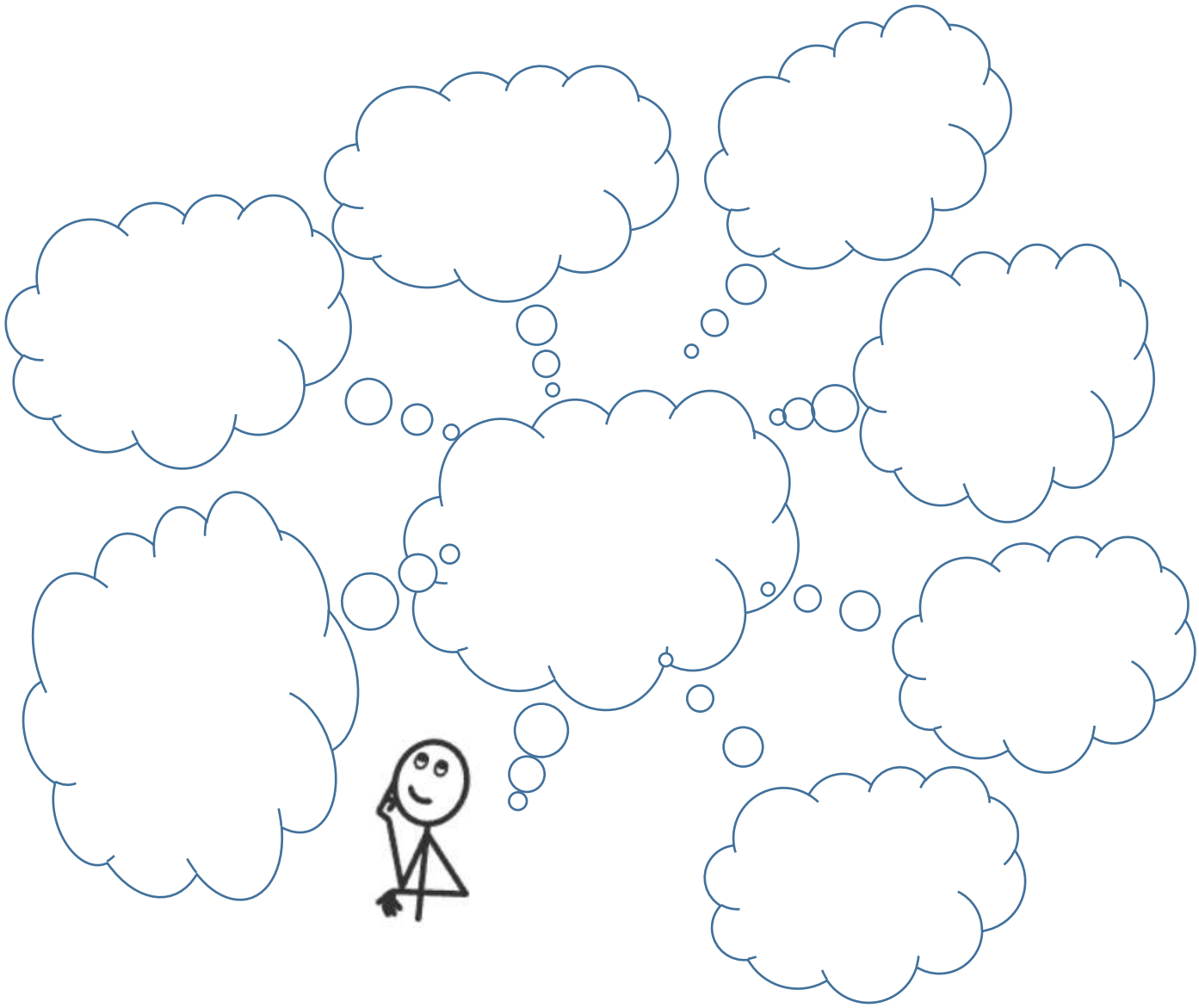
Register through SOBS by 27 May 2022. For any enquiries please email mpete265@eq.edu.au.

☑ Step 2 of 5: Brainstorm your ideas

Science, technology, engineering and mathematical concepts are all around you. Think about all those times you wondered about something or asked yourself, "what if _____?" Now is the chance to explore on your own. Instead of reading about composting in a book, you can do experiments comparing store-bought fertilizer to compost that you have made yourself. You may try to figure out how weather patterns form. Or, you can discover what types of plants attract butterflies. Maybe you'll build a machine to test the difference between old hand balls and new hand balls. The fact is that your science project presents your creative solution to a question or problem.
You may wish to start as follows:

- Put your thoughts in clouds. Write down everything that comes to mind!
- Write your topic in the middle. In the clouds surrounding your topic, write down questions that interest you: What do you know? What would you like to know? How will you find out? etc.

Feel free to add more clouds for your thoughts!



☑ Step 3 of 5: Find a Mentor

This can be your parents, uncle, aunt, grandparents or anyone who can guide you along.

IMPORTANT TIPS for Mentors.

- Be **positively encouraging** about your young innovator's work.
- Help choose a project that is of interest to your innovator and appropriate to their age level.
- Help your innovator look around for **ideas**. Investigate libraries, internet, etc.
- If your innovator uses web sites for research, **verify** if the site is "correct" and then let them use the research found there. DOT "org", "gov" or "edu" are generally trustworthy for accuracy of content.
- Help **collect and save** materials. Inexpensive materials found around the home often work the best.
- Help your innovator keep a **daily log** of their research activities. For Prep to Year 1 students, a photographic diary or drawings are ideal ways to show their progress.
- A **Report** is part of the process. It should be written up neatly or typed. However, if you do type the report, type it as your child wrote it or dictated it to you. If the sentence structure is not quite right, ask them if it needs correction. **Guide them to the correction.** Use their words; children say things in unique and fun ways.
- For Prep, Year 1 and Year 2 students, they may wish to show their results in a pictorial flow chart with arrows indicating the steps taken.
- It is best to guide and **answer their questions with questions** e.g. What else could you try to solve this? What is stopping you from going to the next step? You may know the answer, but help them discover it themselves. For example, you may want to show them which paragraph in the book to re-read rather than giving them the answer.
- The project does not have to look 'store-bought'. It needs to be created by them, so that they understand and can be truly proud of their own achievement.
- Encourage your innovator's **artistic** side with the display. Colours and shapes can be used to show the importance of a part of the display.
- Assist as needed, but it is important to let your young innovator do the work. Judges have commented that some students were unable to describe or show understanding of their project as most of the work was done by the adults.

Let this be a fun learning project! Success is when your young innovator asks their own question, completes their project with a smile, and knows more than when they started.

Enjoy this time of discovery with your young innovator!

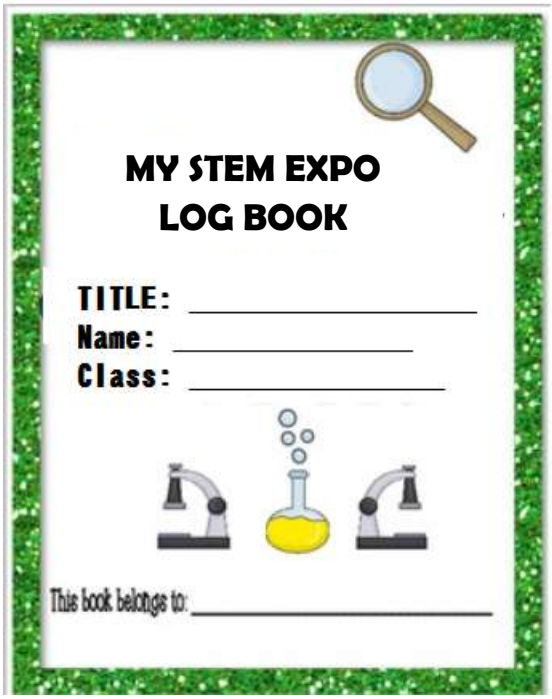
☑ Step 4 of 5: Use a TIMELINE to plan ahead

Start EARLY; don't wait until the last two weeks before it is due. Plan it out.
It will be much easier if you spread the time out over several days per week or several weekends, and you won't have to race to get it done! Here is a suggested timeline to help you along.

Week	Task	Task done	Date achieved
Week 1 18 April	Register through SOBS		
	Topic question/problem to investigate		
Week 2 25 April	Do preliminary research. Collect and read books for your topic. Keep note of references and resources used for your bibliography.		
	Write your introduction: Purpose, Question, Hypothesis (an educated guess about how things work)		
	Have your STEM Log book ready. This is a notebook to record how you did your experiment/research project; it shows what you did and thought every step along the way.		
	Decide on the procedure that you will use to test your hypothesis. Write down the steps you take in your investigation.		
	Draw a sketch of your display and make a list of your materials. Gather your materials.		
	Begin experimentation and organise your data in a table or chart.		
	Drawings, photos of you working on your project and pictures of your collection.		
Weeks 3 2 May	Continue project and collect data, information etc.		
Weeks 4 9 May	Continue project and collect data, information etc.		
Week 5 16 May	Are you able to draw any conclusion based on your results? What did you observe? Don't forget to STATE whether your results matched your hypothesis. If not, why not? Write it down and complete your lab report.		
Week 6 23 May	Write a draft of your STEM Expo written report. This is to be displayed with your project.		
Week 7 30 May	Proofread your draft and have someone else proofread it.		
	Begin working on your display board to present the information you collected.		
Week 8 6 June	Finalise your project. Look at your checklist. Make sure it is neat and organised so the information is easy to read.		
	Keep up to date with your Log book. Write a final copy of your report.		
	Check all the information you need on your display board.		
	Prepare for your STEM Expo interview.		
Week 9 13 June STEM Expo Week	**Wednesday June 15** - Look at your checklist before bringing in your STEM project to school. Setting up of displays begins at 3.00 pm. **Thursday June 16 - Judging day.** Big smiles, ready for your interview and enjoy the day. You did it! Judging of STEM Expo projects from 9.00am to 11.00am. All classes view are invited to view student exhibits from 11.30am to 1.50pm. Families and students are invited to view the displays and participate in STEM activities in the evening from 4.00pm to 6.00pm. STEM projects to be taken home afterwards.		

☑ Step 5 of 5: Keep a STEM Log Book

This is a written record showing the progression of your project from start to finish. The log book contains your notes and does not have to be in report form.



- Use a notebook with lines, or a binder with dividers.
- Use tabs in your log book to indicate the different sections you might include.
- Label the outside of the logbook with your name, class and title of your project.
- Number the pages in your logbook before you begin.
- Use the first couple of pages in the book as a "Table of Contents." By maintaining a table of contents, you will be able to find information in the logbook more easily.
- Date every entry as you would a diary. Entries should be brief and concise.
- Organise your logbook into sections such as: schedule, daily notes and ideas, background research, contacts and references, experimental procedure/method, data collection sheets, observations/results in tables and graphs, conclusions
- Write everything down, even if it seems insignificant at the time; the information may be useful later on.
- Include a reflections section in your logbook. For example, what, if anything would I do differently next time? What part of the experiment could be changed to improve the experimental procedure?
- Include any and all observations made during your experiment. In other words, record ALL data directly in your logbook. If that is not possible, then staple photocopies of data in the logbook.
- Make sure that you describe things in enough detail that you and anyone else reading your logbook in the future will be able to understand your thoughts and repeat the entire experiment exactly like you did it in the first place, just using your logbook.
- You must create your logbook as you go; it is unacceptable to create your logbook on the computer after you have finished your project.

***Note for Prep, Year 1 and 2 students:** You may wish to create a log book in a pictorial flow chart with arrows indicating dates and the steps taken to complete your project.

DETAILED INFORMATION ON THE DIFFERENT STEM CATEGORIES

A: Collection, B: Experiment, C: STEM Design Challenge, D: Research Project

CATEGORY A: COLLECTION (For Prep to Year 2 ONLY)

Put together a collection of items that are organised into groups according to their similarities and differences. Choose items that you already have or can get easily. These items must be similar enough to be called a collection, but different enough to be put into different categories e.g. physical properties, species type, or where it was found.

1) PROBLEM (YOUR QUESTION or PURPOSE)
Choose a topic that you are interested **in learning about**. Ask a sentence question that you will find the answer to by collecting something. "Why does…?", "What happens when..?" Examples:
What kinds of birds live in my suburb? Will building more houses reduce the frogs in my suburb? What different nests are on trees in the park by my house? [Of course, for some natural things you might just collect a PHOTO of each thing, not all the different nests or birds themselves!]

2) HYPOTHESIS (MY PREDICTION)
A hypothesis is what you think will be the answer to your question. I think …….

3) COLLECTION (EXPERIMENT)

- Materials: Think about all the materials you will need to gather and sort your collection.
- Collect and Sort: Time to have fun collecting! Once you have your collection together, sort it in two or more different ways.
- Observe and record data: Take pictures, do drawings, charts and graphs of all the different ways you can sort your collection. See what it looks like.
- Results: Compare and evaluate the different pictures, drawings, charts and graphs you did for your collection. What do they tell you? Evaluate the results.

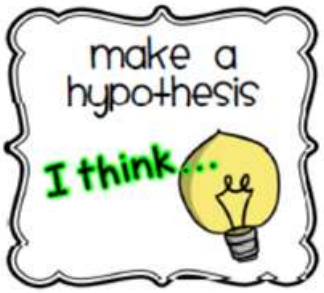
4) MY PLAN (PROCEDURES) Write what you are going to do to find out the answer to your question. How will you find out if your hypothesis is right or not? If you do a few things, list them all. First, I _____ Then, I_____, Next, I_____.
(Explain what you did, e.g. Step 1… Step 2… Step 3. It's easiest to list them in order.)

5) CONCLUSION.
The conclusion answers the hypothesis. Look at the results and figure out if they prove or disprove your hypothesis, and why.

SAMPLE WRITTEN REPORT FOR CATEGORY A: COLLECTION

1) Name:
Class:
TITLE PAGE

2) PURPOSE
What did you collect?
Why did you choose that to collect?
What did you want to find out?
What things will you compare?



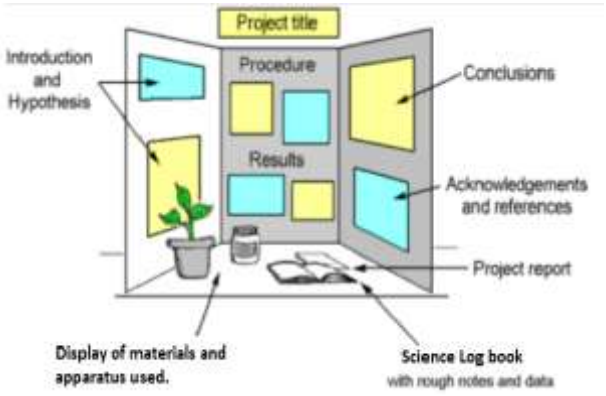
3) **PROBLEM (QUESTION)**
This is your question – this is what you want to find out.
Example: How many kinds *of birds live in my suburb?*

4) HYPOTHESIS (PREDICTION)
A hypothesis is what you think will be the answer to your question. It is your "best guess" before you actually go and collect your evidence. It is written as one sentence.
Example: I think there are 4 different birds in my suburb. I can hear the birds' calls and I found some feathers around.

5) COLLECTION (EXPERIMENT)
This is the collection that answered your question.
A. List all of the materials you used.
B. Sort collection in different ways.
C. Record (draw pictures, photographs, graphs, charts, etc.) all of the ways you sorted.
D. Explain why you sorted them in these ways.

6) CONCLUSION
What was the answer to your problem or question?
I found that there are more than four kinds of birds in my suburb because I found more than
4 different types of feathers and took pictures of more birds flying around and feeding.

7) ACKNOWLEDGEMENTS: This is where you thank those who helped you with your collection.



CATEGORY B: EXPERIMENT (Prep to Year 6)

THE SCIENTIFIC METHOD

Conduct an experiment project using *The Scientific Method*. It includes asking a question, doing some preliminary research, making a hypothesis, planning and conducting your experiment, and analysing your results.

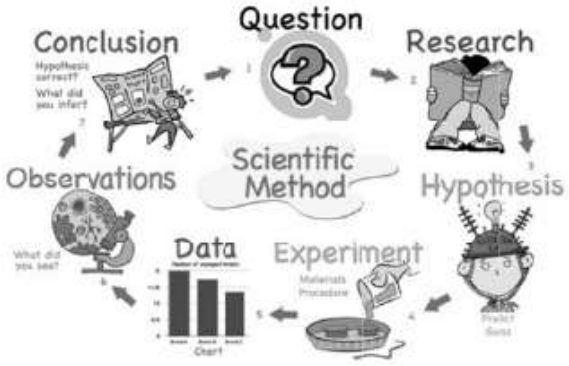
1) PURPOSE/PROBLEM

The Purpose Statement should explain what it is you are trying to discover or prove. The Purpose should be written in a form of a statement. Try to make your statement original and creative.

2) PRELIMINARY RESEARCH

Research, read, watch science videos, and contact resource people who may help. Include prior knowledge.

3) HYPOTHESIS: Form a hypothesis as a one-sentence statement.



Now it's time to PREDICT what you think will happen if you TEST your problem. This type of "SMART GUESS" or PREDICTION is what scientists call a HYPOTHESIS.

The hypothesis is based upon your research. A formalised hypothesis contains the three variables. One is the **"independent"** variable, which is what you, the scientist, are going to change and work with to see what will happen. The second is the **"dependent"** variable, which is the type of results you are going to observe and/or measure when you make your changes. The third is the ***'Constant'*** variable – which is something that is kept the same throughout your experiment. The formalised hypothesis is written in the IF and THEN format.

Suppose your PROBLEM STATEMENT was:

How does the colour of crayons affect how fast they melt in the sun?

This is how you write the formalised hypothesis:

Hypothesis: IF black and white crayons are placed in the sun, THEN the black crayons will melt faster than the white ones as dark colours absorb more heat than light colours do.

4) EXPERIMENT

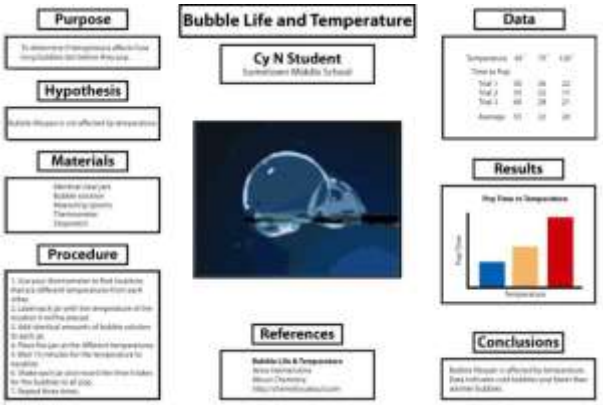
- Materials: Plan and collect the materials you will need for your experiment.
- It is best to make, or use inexpensive materials.
- Procedure: Plan the steps of your experiment carefully. Conduct your experiment.
- Observe and record data: Plan how you will record your data. Record what happens during your experiment.
- Results: Summarize findings in the form of data tables, graphs, and drawings. Write an explanation of your findings.

5) CONCLUSION

The conclusion answers the hypothesis. What did you learn from your experiment? Was your hypothesis proven? Why or why not?

SAMPLE WRITTEN REPORT for CATEGORY B: EXPERIMENT

Name: **Class:** **TITLE PAGE**	**PROCEDURE** List the steps of your experiment. Diagrams are helpful in this section.
PURPOSE In three sentences or less, explain why you did your STEM project on the topic you chose.	**DATA** Show what you observed during the experiment. Include measurements you made. You may also use drawings to help show what you observed.
PROBLEM State the problem in the form of a question. The problem is one sentence long and specific.	**RESULTS** The results section of your report is organised into graphs and charts. This is where you record what you have observed and the data that you have collected. Remember, even if your data shows that your hypothesis was incorrect, your project is still good.
PRELIMINARY RESEARCH This part of your report has information that was found by other scientists and relates to your topic.	**CONCLUSION** Look over your report, graphs, charts and tables. Use two or three sentences to tell what you learned from your experiment. Was your hypothesis valid? Why or why not?
HYPOTHESIS/PREDICTION State your best guess for answering the question before you have performed an experiment. The hypothesis can be one sentence long.	**APPLICATION** Now that you have finished your project, use this section to share with others your thoughts about this experience. Did you have any problems? What would you do differently next time? Explain how your project applies to the real world.
EXPERIMENT The experiment is used to test your hypothesis. State everything you can to describe your experiment, surveys, or research.	**REFERENCES/SOURCES / BIBLIOGRAPHY** List all books, articles, pamphlets and other communications or sources that you used to research your topic and writing your report. You must have at least two sources, and only one may be an encyclopaedia. Interviews with experts in your field of study are encouraged.
MATERIALS List the materials you used and how you used them.	**ACKNOWLEDGEMENTS** In one or more sentences, say "Thank You" to those who have helped you with your project. You should include those who gave you guidance, materials and the use of facilities or equipment.



CATEGORY C: STEM Design Challenge (Year 3 to Year 6)

Nearly everything we use, work with, or wear is engineered. Someone had to think of how to **design** that object to solve a particular problem. Anyone can be an innovator by using science, technology, engineering, maths and their own creativity to design objects or processes to solve a problem.

PROBLEM/QUESTION
Ask a question about an everyday problem you would like to solve. Examples include pencils, cups, cell phones, processes to clean water or move heavy objects, etc. Check out this site: http://www.inventions-handbook.com/science-fair-inventions.html

HYPOTHESIS/PREDICTION
A hypothesis is an educated guess on the outcome of your design, based on knowledge that you have and research you have conducted.

RESEARCH
Research products/processes already available to meet a need or serve a similar function. To do your research, look online, visit stores, and interview experts as well as potential design users.

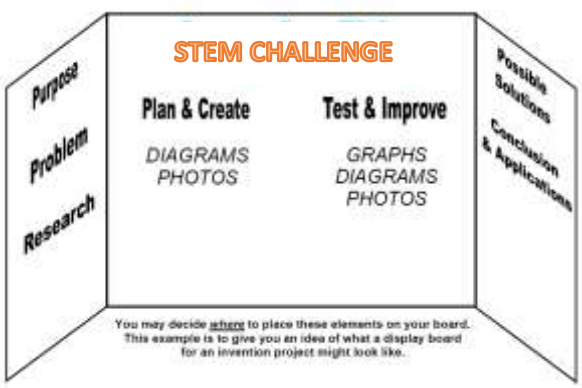
POSSIBLE SOLUTIONS
Brainstorm possible solutions. Imagine a few different set-ups or designs. Compare and talk about the positive and negative points of each idea. Do not just try your first idea, but choose the best one.

PLAN & CREATE

- Draft Plan: Make a plan and explain it. Draw a diagram and label the parts of your diagram. Use symbols to label the parts.
- Materials: Make a list of the materials you would like to use for your design and the amounts you will need. Collect the materials you will need for your design. It is best to make, or use inexpensive materials.
- Build: Build your design according to your plan.
- Obstacles: Keep a log of difficulties you run into and how you address them.

TEST & IMPROVE

- Test: See if it works! Keep a data log of when and how you tested your product. Evaluate the results.
- Improve: Gather information from the "test" of your first design to help find problems that need improvement. Improve your first design to make it better! Re-Test: See if it works better! Add the new data to your data log to show the change.



CONCLUSION & APPLICATIONS
Review how well your design worked and how it might be useful to others.

SAMPLE REPORT for CATEGORY C: STEM Design Challenge

Name: **Class:** **TITLE PAGE**

PURPOSE
In three sentences or less, explain why you did your science project on the topic you chose.

PROBLEM/QUESTION
State the problem in one sentence and be specific.

HYPOTHESIS/PREDICTION
This would be a statement concerning the predicted results of your design.

RESEARCH
This is where you summarise information that was found by other engineers, designers, and potential users of your innovation.

POSSIBLE SOLUTIONS
Describe and draw diagrams to show possible solutions that you have considered. Include a table that shows positive and negative points (strengths and weaknesses) for each. Identify the solution you chose to try, explaining why you chose it.

PLAN & CREATE

- DRAFT PLAN
  Describe and explain the details of how your design will work. Show your diagram (drawing) with the parts labelled, using symbols.
- MATERIALS
  List and describe the materials you used and briefly tell how and where you obtained them
- BUILD
  Explain how you put your design together according to your plan.
- OBSTACLES
  Make a log of the troubles you run into with materials or the building process. Discuss how you make changes or discover ways to make it work.

TEST & IMPROVE

- TEST
  Use your data log, diagram with labels, and any charts you created to explain the ways you tested your design. Use two or three sentences to evaluate how well your design worked.
- IMPROVE
  Based on your data, describe changes you made to your design so that it would work even better.
- RE-TEST
  Tell about the results of your improved design. Did the redesign help or not?

CONCLUSION & APPLICATIONS
Now that you have finished your project, use this section to share with others your thoughts about this experience. What would you do differently next time? What went well? Explain how what you learned applies to the real world.

SOURCES / BIBLIOGRAPHY
List all books, articles, pamphlets and other communications or sources that you used for researching your topic and writing your paper. You must have at least two sources, and only one may be an encyclopaedia. Interviews with experts in your field of study are encouraged.

ACKNOWLEDGEMENTS
In one or more sentences, say "Thank You" to those who have helped you with your project. You should include those who gave you guidance, materials, and the use of facilities or equipment

CATEGORY D: RESEARCH PROJECT (Prep to Year 6)

Collect information about a STEM topic or concept that you are personally interested in, and **present** your findings. You will look for existing answers/solutions by reading books, talking to experts, and gathering information from other sources such as schools and public libraries. Your display board will have drawings, photographs, charts, graphs, dioramas, etc.

PURPOSE/BACKGROUND

Choose a topic that you are interested in learning more about. State the purpose as a one-sentence question. Be specific. How does a solar cell work? How does a light bulb operate? How do clouds form? What research exists on cloud formation?

HYPOTHESIS/PREDICTION

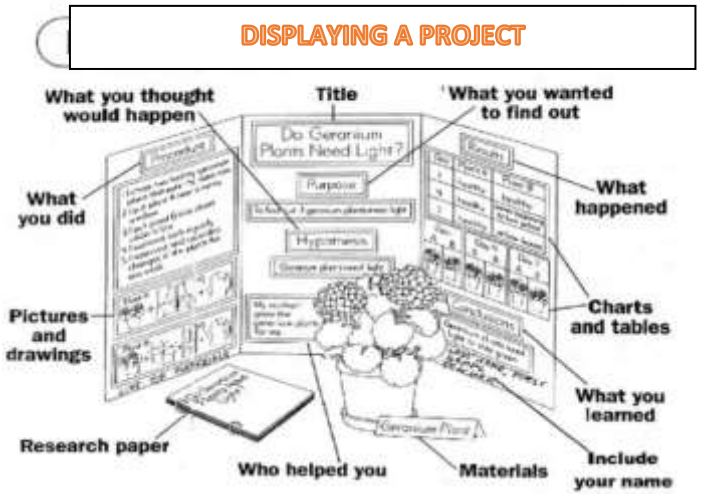
A hypothesis is what you think will be the answer to your question. It is your "best guess" before you actually DO the research. It is written as one sentence. Examples: You are taller in the morning than at night, or, A Granny Smith apple has more seeds than any other apple.

RESEARCH

Use a minimum of two sources. Use different types of sources. While conducting your research, think about how it connects to your question and your hypothesis. Take good notes that you can organise later as part of your display.

CONCLUSION

Look over your research. Analyse the information and see what it tells you about your topic. The conclusion answers the hypothesis. Does your research prove or disprove your hypothesis?



SAMPLE WRITTEN REPORT for CATEGORY D: RESEARCH

<table>
<tr><td>Name: Class: TITLE PAGE</td><td>CONCLUSION
Look over your research and then write what the information shows or indicates. The conclusion is one or two sentences long and should either confirm or reject your hypothesis</td></tr>
<tr><td>PURPOSE
In three sentences or less, explain why you did your science project on the topic you chose.</td><td>APPLICATION
Now that you have finished your project, use this section to share with others your thoughts about this experience. Did you have any problems?
What would you do differently next time?
Explain how what you learned from your project applies to the real world.</td></tr>
<tr><td>PROBLEM
State the problem in the form of a question. The problem is one sentence long and specific.</td><td>SOURCES / BIBLIOGRAPHY
List all books, articles, pamphlets and other communications or sources that you used for researching your topic and writing your paper. Only one may be an encyclopaedia.
Interviews with experts in your field of study are encouraged.</td></tr>
<tr><td>HYPOTHESIS/PREDICTION
The hypothesis is an educated guess which answers the question.</td><td rowspan="2">ACKNOWLEDGEMENTS
In one or more sentences, say “Thank You” to those who have helped you with your project. You should include those who gave you guidance, materials and the use of facilities or equipment</td></tr>
<tr><td>RESEARCH
It is now time to use information from books, magazines, interviews, etc. This section of your paper is your report on the work and research conducted by others that relates to your topic.</td></tr>
</table>

HANDY TIPS FOR YOUR DISPLAY

DISPLAY BOARD MATERIALS

The display must be sturdy and stand by itself on a table. Foam core-board, Corflute (corrugated plastic sheet available at Bunnings) and thick cardboard are the best materials. If you need to cut through the sides of your display board to make "wings", make sure do not cut all the way through.
You could also use cardboard boxes to display your project.

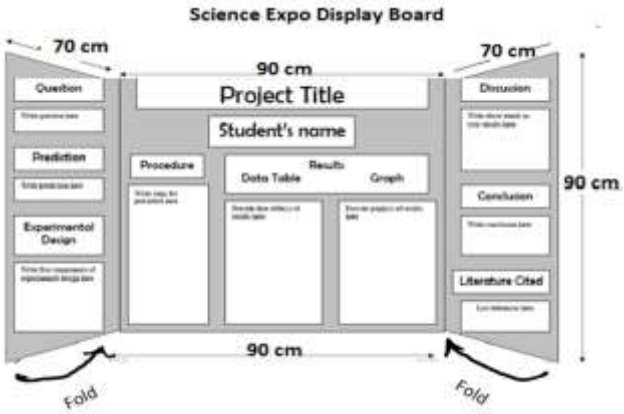
DISPLAY DIMENSIONS

Maximum Size of Project

1. Width of back panel: 90 cm
2. Depth (front to back): 70 cm, side panels (wings)
3. Height should be no more than 90 cm.

When backboard (display portion) is **flat**, it should be no more than 230 cm wide; 70cm + 90 cm + 70 cm
(side + back + side)

It is important that when the two 'wings' are folded toward the front, the display would be ***no wider*** *than 90 cm wide when standing on the table*



COLOURS

If you need to paint your backboard, water-based acrylic works best. Coloured cardboard is also great! Use a minimum of three contrasting colours on your board

LETTERING

Your TITLE and SUBTITLES may be computer-generated, cut out from construction paper, or hand written. The title letters should be about 7 cm high. The subtitle letters should be about 5 cm high. The subtitles, which are mandatory on the display board, are: **Problem, Hypothesis, Collection (Experiment), and Conclusion**.

NAME, CLASS, CATEGORY

Make up a card displaying your NAME, CLASS and chosen CATEGORY.

DRAWINGS, PHOTOS AND GRAPHS

Drawings and photos are most useful on the display. Drawings should be drawn in pencil first and then retraced. They can then be coloured in outlined in thin black felt tip pen. It would be a good idea to photograph your collection in progress. All photos should be dated and titled. https://nces.ed.gov/nceskids/createagraph/

Written Report – To be written neatly or typed and displayed on the table. Prep and Year 1 students may display their report in pictures with minimum writing.

LOG BOOK -To be displayed on the table.

RESOURCES and BIBLIOGRAPHY

This is a list of all text and source material used and should be presented alphabetically. Referencing is important as you need to acknowledge where you obtained your information. There are certain conventions for referencing, some of which are shown below.

Books: Example: Lundeen, R.L. and Wood, D.L. 1977, Structure and Function of the Human Body (2nd Ed). J.B. Lippincott Company, Philadelphia.

Encyclopaedias: Example: Encyclopaedia Felicia, vol. 1, 1993 Unwin Publishing, Sydney.

Newspapers: Example: Scaly, D. 1987. Diamond Pythons love cats for breakfast. Weekend Australian Magazine, 7-8 Feb, 22.

Journals, Periodicals, Magazines: Example: Fang, D. 1993, Experts advise pythons to combine fruit with cats for a balanced diet. Australian Slitherer 4: 26-32

Internet: Address of the site, date of access, page number if applicable.
Example: www.schools.ash.org.au/schools/rochedale/banjo.htm, 07/02/14, 3-6.

Interview - Smith, John, Telephone Conversation, Mar. 5, 2016.

STEM EXPO 2022

Student/s name and class:		
Type:	**Category:**	
Project Title		**Project No**
Judge's Name:		

	Developing	Sound	High	Very High
1) Question and Hypothesis	Question/Problem is **not present** Hypothesis/Prediction is not present or doesn't address the SAMPLE question at all.	Question/Problem is **fairly clear** Hypothesis/Prediction somewhat addresses the question.	Question/Problem is **clear** Hypothesis/Prediction addresses the question **adequately**.	Question/Problem is specific and **very clear** and can be answered by doing an experiment/making observations. Hypothesis/Prediction addresses the question **very clearly**.
2) Collected data and Experimental Procedure	Very little data was collected. Materials list is **not detailed**, is incomplete and unclear. Experimental procedure is **not clear.**	Some data was collected. Materials list is **fairly detailed,** complete and clear. Experimental procedure is **clear.** **No evidence of variables conducted.**	Some data was collected. Materials list is **detailed,** complete and clear Experimental procedure is **clear and detailed. Variables are evident.**	Data collection is thorough and detailed. Materials list is **very detailed** and clear. Experimental procedure is **very clear and detailed.** **Variables are clearly defined;** controls have been made and results have been double-checked.
3) Data Presentation **and Log Book**	Data is **not clear**. **Poor** or **little use** of photos/charts/graphs to display data. No log book provided	Data is **clear. Some use** of photos/charts/graphs to display data. Log Book provided with some details of the process used for the project.	Data is **clear and thorough. Good use** of photos/charts/graphs to display data. Log Book provided with detailed account of process used for the project.	Data is **very clear. Excellent use** of photos/charts/graphs to display data. **Logbook is detailed, thoughtful, and an interesting account of everything done for the project**
4) Conclusions	Conclusions are **not supported** by the data and experimental results.	Conclusions are **not adequately supported** by the data and experimental results.	Conclusions are **adequately supported** by the data and experimental results.	Conclusions are **clearly supported** by the data and experimental results
5) Display	Display is **neither** clear **nor** well-organised. **No** attention to detail.	Display is legible and fairly well-organized. **Some** attention to detail.	Display is **clear** and well-organised. **Good** attention to detail noted	Display is **very** clear and well-organised. **Excellent** attention to detail.
6) Creativity and Originality	Project shows a **low** amount of creativity.	Project shows some creativity.	Project shows a **good level** of creativity.	Project shows a **high level** of creativity.
7) Student Interview	Demonstrated **little** knowledge and understanding of project.	Demonstrated **some** knowledge and understanding of the project.	Demonstrated **good** knowledge and understanding of the project. Well spoken.	Showed **extensive** knowledge and understanding of project. Confident and articulate in the presentation.
Overall Standard	Participation	Bronze	Silver	Gold

QUESTIONS TO ASSIST IN JUDGING
(A guide for judges only)

1) PURPOSE/QUESTION/HYPOTHESIS

- *What is your project about?*
- *What is your hypothesis? A hypothesis is an educated guess about how things work: You must state your hypothesis in a way that you can easily measure, and of course, your hypothesis should be constructed in a way to help you answer your original question.*
- *What is the aim of your project?*
- *Why did you decide to solve this problem?*
- *What were you trying to prove or disprove?*
- *What questions did you set out to answer?*

2) COLLECTED DATA, EXPERIMENTAL PROCEDURE (WHERE APPLICABLE), DESIGN (WHERE APPLICABLE), DEPTH OF RESEARCH

- *Where did you conduct most of your research?*
- *What methods of data collection did you use?*
- *If someone else uses the same method as you, do you think they will get the same results?*
- *How did you think it would turn out?*
- *How much time (many days) did it take to run the experiments (grow the plants) (collect each data point)?*
- *How did you make sure that your tests can be compared to others?*
- *What did you learn from your background search?*
- *Did you have any experimental errors in your project? If so, how did you correct for them?*
- *Tell me about your variables –*
    - *What was the independent variable? (thing being changed)*
    - *What were your controlled variables? (things kept the same)*
- *How did you build the apparatus?*
- *What do you mean by (terminology or jargon used by the student)?*
- *How does your apparatus (equipment) (instrument) work?*
- *Who or what did you test your experiment on?*

3) DATA PRESENTATION

- *How did you come up with the idea to record your process and results like this?*
- *Can you explain what you have recorded in your log book/journal to me?*
- *Did you take all data (run the experiment) under the same conditions, e.g., at the same temperature (time of day) (lighting conditions)?*
- *What do your results mean?*
- *What variables did you control?*
- *What problems did you find?*
- *How did you measure and analyse your data?*
- *Did you conduct many trials?*
- *Why did you choose to present your data like this?*

4) CONCLUSIONS

- *How does your conclusion answer your problem?*
- *Do you feel your results answered your questions that you set out to answer?*
- *What changes would you make if you continued this project?*
- *What other things might have affected your results?*
- *How will your design make a difference……..?*

5) DISPLAYS

- *What gave you the idea to present your project this way?*
- *What other things did you base the design of your display around?*
- *What part of your display will attract interest in your project? Why?*
- *Did you have any help setting up your project?*

6) CREATIVITY and ORIGINALITY

- *Tell us about how you became interested in your topic, where did you get this idea?*
- *How did you prepare the materials for your investigation?*
- *Did you go about solving the problem in an original way?*
- *Where did you find the materials for your project?*
- *What was the easiest and most challenging part of this project?*
- *How much time did you spend on this project?*
- *What help did you receive from others (Mum, Dad, brothers and sisters etc.)?*

7) STUDENT INTERVIEW

- *What inspired you to choose this topic for your project?*
- *How did you decide what to investigate?*
- *Explain the procedure from your project and your results.*
- *What would you do differently next time?*
- *Did you find this project challenging, exciting or interesting?*
- *Explain the processes that you used to answer your problem.*
- *If you had to do this experiment again, what would you change, add or improve?*
- *How are the results of your project useful to others?*
- *What is the most important thing you found out by doing this project?*
- *What practical applications does your work have in the real world?*
- *Is your project useful in real life?*
- *What new skills, if any, did you learn by doing this STEM Expo?*
- *What sources of information did you use in conducting research before you started?*
- *What resources did you use?*
- *The great thing about working together is the ideas that each of you can bring. What would you say was the most important skill or idea each of you had during the course of this STEM project?*

Year Achievement Standards. Australian Curriculum

Foundation (QLD – Prep) Year Achievement Standards. Australian Curriculum.

Achievement Standard

By the end of the Foundation year, students describe the properties and behaviour of familiar objects. They suggest how the environment affects them and other living things.

Students share and reflect on observations, and ask and respond to questions about familiar objects and events.

Year 1 Achievement Standards. Australian Curriculum.

Achievement Standard

By the end of Year 1, students describe objects and events that they encounter in their everyday lives, and the effects of interacting with materials and objects. They describe changes in their local environment and how different places meet the needs of living things.

Students respond to questions, make predictions, and participate in guided investigations of everyday phenomena. They follow instructions to record and sort their observations and share them with others.

Year 2 Achievement Standards. Australian Curriculum.

Achievement Standard

By the end of Year 2, students describe changes to objects, materials and living things. They identify that certain materials and resources have different uses and describe examples of where science is used in people's daily lives.

Students pose and respond to questions about their experiences and predict outcomes of investigations. They use informal measurements to make and compare observations. They record and represent observations and communicate ideas in a variety of ways

Year 3 Achievement Standards. Australian Curriculum.

Achievement Standard

By the end of Year 3, students use their understanding of the movement of Earth, materials and the behaviour of heat to suggest explanations for everyday observations. They group living things based on observable features and distinguish them from non-living things. They describe how they can use science investigations to respond to questions.

Students use their experiences to identify questions and make predictions about scientific investigations. They follow procedures to collect and record observations and suggest possible reasons for their findings, based on patterns in their data. They describe how safety and fairness were considered and they use diagrams and other representations to communicate their ideas.

Year 4 Achievement Standards. Australian Curriculum.

Achievement Standard

By the end of Year 4, students apply the observable properties of materials to explain how objects and materials can be used. They describe how contact and non-contact forces affect interactions between objects. They discuss how natural processes and human activity cause changes to Earth's surface. They describe relationships that assist the survival of living things and sequence key stages in the life cycle of a plant or animal. They identify when science is used to understand the effect of their actions. Students follow instructions to identify investigable questions about familiar contexts and make predictions based on prior knowledge. They describe ways to conduct investigations and safely use equipment to make and record observations with accuracy. They use provided tables and column graphs to organise data and identify patterns. Students suggest explanations for observations and compare their findings with their predictions. They suggest reasons why a test was fair or not. They use formal and informal ways to communicate their observations and findings.

Year 5 Achievement Standards. Australian Curriculum.

Achievement Standard

By the end of Year 5, students classify substances according to their observable properties and behaviours. They explain everyday phenomena associated with the transfer of light. They describe the key features of our solar system. They analyse how the form of living things enables them to function in their environments. Students discuss how scientific developments have affected people's lives, help us solve problems and how science knowledge develops from many people's contributions.
Students follow instructions to pose questions for investigation and predict the effect of changing variables when planning an investigation. They use equipment in ways that are safe and improve the accuracy of their observations. Students construct tables and graphs to organise data and identify patterns in the data. They compare patterns in their data with predictions when suggesting explanations. They describe ways to improve the fairness of their investigations, and communicate their ideas and findings using multimodal texts.

Year 6 Achievement Standards. Australian Curriculum.

Achievement Standard

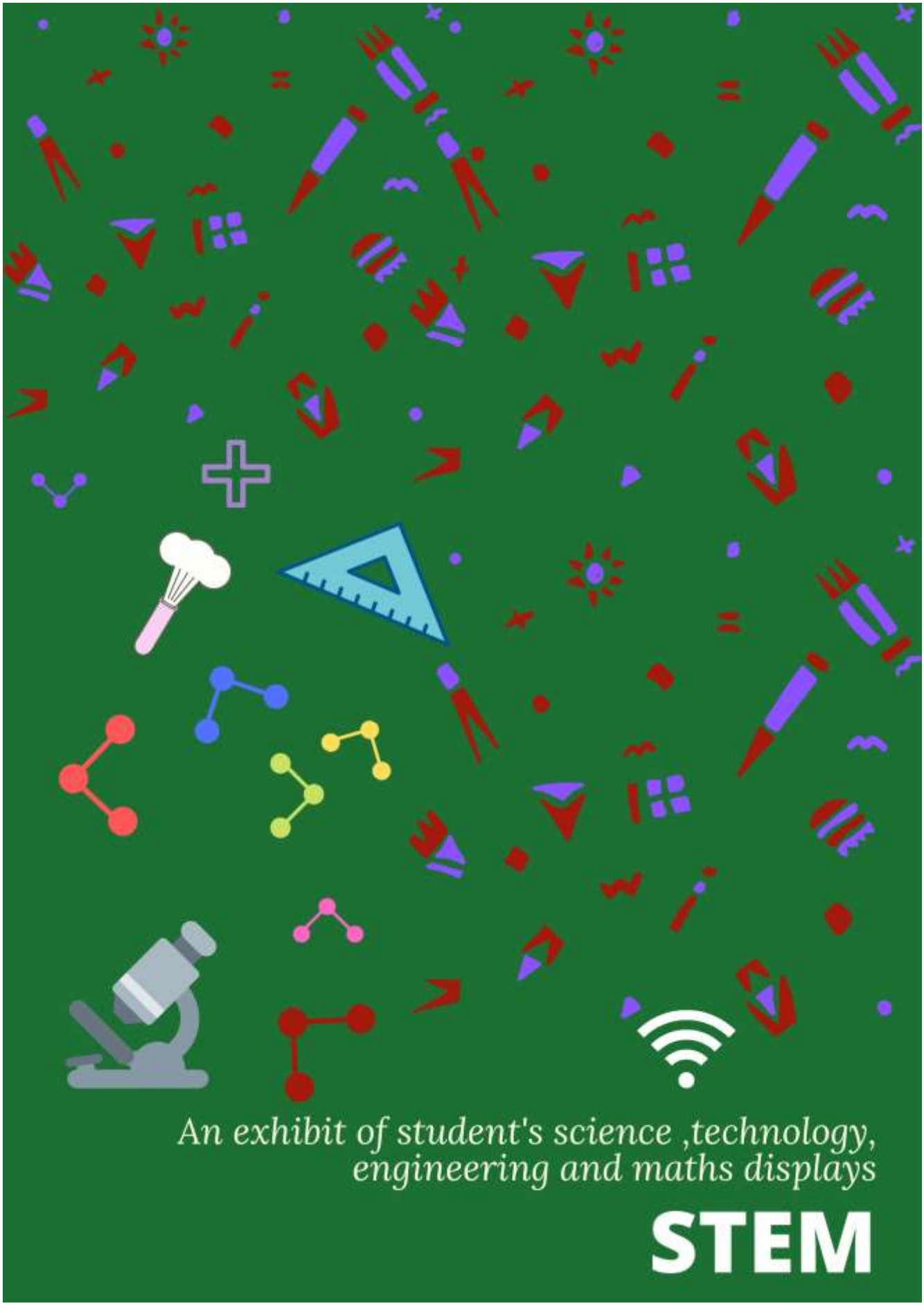
By the end of Year 6, students compare and classify different types of observable changes to materials. They analyse requirements for the transfer of electricity and describe how energy can be transformed from one form to another when generating electricity. They explain how natural events cause rapid change to Earth's surface. They describe and predict the effect of environmental changes on individual living things. Students explain how scientific knowledge helps us to solve problems and inform decisions and identify historical and cultural contributions. Students follow procedures to develop investigable questions and design investigations into simple cause-and-effect relationships. They identify variables to be changed and measured and describe potential safety risks when planning methods. They collect, organise and interpret their data, identifying where improvements to their methods or research could improve the data. They describe and analyse relationships in data using appropriate representations and construct multimodal texts to communicate ideas, methods and findings.

Examples of previous judges' feedback:

- Your display was very good and you must have learnt a great deal collecting and looking for insects.
- Extremely well thought out and designed experiment where all the variables were controlled and measured taken in a consistent manner.
- It is important that the student understands his project. Student should not have props or information in the display which he can't read or explain.
- Great display. Some extra thought regarding variables and how these could be measured would help bring this project to the next level e.g. changing the volume of vinegar, length of time or using multiple eggs.
- It would be more beneficial for the student to choose a project of her choice so she could explain what the project is about and what she has learnt from doing the project.
- Your display was very eye-catching. We liked the overall visuals. You spoke confidently to us – you showed a thorough understanding of your project. You should be proud of your work.
- We enjoyed your display of what you found in your suburb. What a surprising number of birds that lived in The Gap! We loved how you displayed the pictures of different birds in your graph.
- Well done. Your hypothesis was clear and your results and conclusions proved with a fun experiment. Your display was a great way to create excitement and interest in your project.
- Project was well organised and presented. Next time, develop your hypothesis so your experiment proves/disproves what you are trying to show. Great effort.
- The display of your project was good. Project could be improved with more information on your charts to support your experiment. Good effort.
- Your oral presentation was very informative and you clearly understood your conclusions. You may wish to develop your hypothesis so that your experiment can prove/disprove what you are trying to show.
- Well done, you explained your research very well. You demonstrated involvement at all stages and showed a keen interest in the subject matter. Fantastic work!
- We really enjoyed talking to you. You showed a thorough understanding of your project and have obviously learnt a lot and enjoyed the experiment. Well done!
- A brilliant presentation. Excellent use of graphs for results. Presentation was very clear and easy to follow with great use of images. The project was eye catching! You presented with great confidence. Congratulations.

Awesome STEM Projects sites

http://www.sciencebuddies.org/
Great start to help selection of Science project ideas.
www.all-science-fair-projects.com/
This site has over 1000 examples of science fair projects as well as step by step instructions.
www.sciencemadesimple.com/
This site promotes itself as having fun, simple home and school project ideas.
http://www.kidsciencechallenge.com/year-four/create.php
More ideas and examples on how to do a Science Fair project
http://www.sciencebob.com/experiments/.
Cool experiments and resources
https://babbledabbledo.com/20-science-projects-for-preschoolers/
Wonderful start for the Prep students


An exhibit of student's science ,technology,
engineering and maths displays
STEM