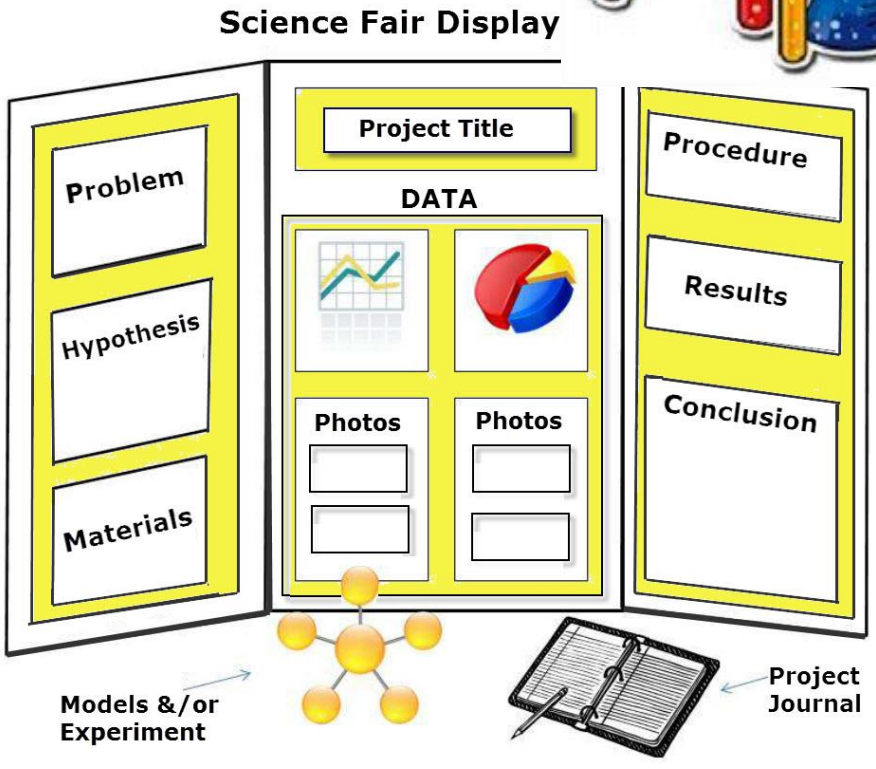
Name: _____

Class: _____

A guide for students and families

2018

2018 Science Fair



Credit to Jodie Lawson-Santos from Garran Primary for compiling the original booklet and sharing it with Fadden.

The SEA*ACT Science & Engineering Fair

Timeline

24-25 August – Science Fair Entries Due – Radford College
26 August – Judging
28 August- Science Fair Project Viewing
22 – 26 October – Science Fair Winning Projects Viewing
26 October – Prize Ceremony

NEW Science investigation booklet (PDF), available on the seaact website (http://seaact.act.edu.au/science-fair/) – Help your students plan and succeed!

Objectives of the Science Fair

- To encourage active involvement and interest by students in science.
- To encourage students to pursue their interests in science beyond the boundaries of the classroom.
- To encourage students to undertake planned and controlled investigations in science and report their results in an appropriate manner.
- To encourage students to apply these processes to scientific enquiry to topics that interest them.
- To encourage students to record and present their work for others and in so doing, develop the various skills used in scientific communication.
- To enable the community, including other students and teachers, to see project work done by students in the ACT colleges, school and preschools.

Prizes

The value of the prizes depends on the total sponsorship and the number of entries received for the Fair.

- For individual and for group entries, prizes will be awarded to First, Second and Highly Commended recipients in each theme for each age group.
- *SEA*ACT School Shields* will be awarded to the school who has the highest number of winning entries in an age group.

Themes and Curriculum Links

Each entry should fall under one of the following themes:

- Earth and Space Science
- Physical Science
- Biological Science
- Chemical Science
- Engineering

Age Groups

- Early Childhood – Preschool to year 2
- Primary Years 3 to 6
- Special Education* All age groups
- Secondary/Post Compulsory Years 7 to 12

Entry Fees

- $6 per individual
- $10 per group (two or more students)

How to enter:

1. Apply on-line at **www.seaact.act.edu.au**
2. Once you register, a label with your details will be generated. Fix this to the front of your project so that it is visible to judges. If your project has several pieces, it is a good idea to print additional labels.
3. Posters are optional and have a maximum **size limit of 500 x 770 mm.**
4. Make sure your entry is durable and can be transported easily.
5. Do **NOT** include any biohazardous material (eg. Mould, plant materials, live specimens, etc.). You should include photos instead.

2018 Science Fair: Student Booklet

Please see your classroom teacher if you are having any problems

What the judges will look for and how to make sure you do really well at the

Science Fair:

Question – You clearly state the question/problem you want to investigate.

Creativity – Your question is unique and/or the question/problem is approached in a unique way.

Scientific Method – You have a clear hypothesis that links to the problem. You show the method you used and have written easy-to-understand results.

Research – You extensively investigate the topic and present information and notes that relate to your question.

Materials - You list and describe materials used.

Procedure –You have a logical, reproducible procedure that lists all the steps you took to conduct the experiment.

Data – You have an organised data table and appropriate, accurate graphs (if applicable) and diagrams.

Conclusion – You include a conclusion that accurately explains and reflects the data you have collected through your experiment and attempts to answer the problem.

Communication – You carefully communicate your ideas and what you have learnt.

Display – Your display effectively communicates the ideas and procedures in the experiment.

Written Presentation and Oral Interview Quality – You clearly and thoroughly communicate science knowledge and understanding of your experiment and conclusions.

Safety, Ethical and Legal issues you need to think about

Some sorts of experiment can get you into difficulties, or maybe even into court! Some experiments seem like a good idea, but you can run into trouble, so it is well to consider the following points:

- Experiments involving animals will not be allowed as part of the Science Fair.
- If other students are to be used as test subjects you need to cover yourself by seeking expert advice. If there is any doubt at all, get signed parent permission slips. Include these in your project.
- Chemistry projects need adult supervision.
- The following items may be used under supervision while working on your experiment, but for safety reasons they are not allowed to be brought to the Science Fair: glass, knives, scissors, liquids, anything flammable, live plants, electrical circuits or expensive items that could be stolen or damaged.
- Electrical experiments which use mains power are NOT a good idea and are not allowed. The use of batteries is fine, but still requires close parental supervision.
- For health reasons, no projects may use consumable alcohol, tobacco or medication. This also includes surveys that focus on the above items.

A step by step guide to doing well at the Science Fair

Register TODAY!

Step 1 – Choose a topic – Think of an idea you want to test and make sure that it interests you. Choose a topic you can learn about and have fun investigating.

Example: I get grass stains on the knees of my pants when I play soccer. Sometimes the stains wash out and sometimes they don't. I wonder if different laundry detergents work better than others on grass stains?

Step 2 – State the Problem – Write down a statement of the problem you plan to investigate in the form of a question.

Example: Which laundry detergent works better on grass stains?

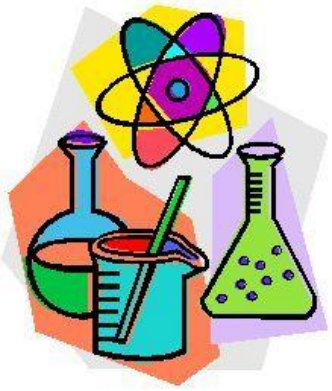
STEP 3 - Research - Read and study as much as you can about your topic. Learn as much as you can from others -parents, teachers, librarians and community people. Make notes and include these notes in your finished project.

Example: If you are going to do an experiment on plants you should learn some basics about how plants grow! You will need to present your research on your display board.

STEP 4 - Form a Hypothesis - Now that you learned about your topic, you can make an intelligent guess about what you think will happen in your experiment.

Example: In your research, you found out that laundry detergents with more phosphates are supposed to clean better. So, your hypothesis might be: The detergent with the most phosphates will get grass stains out the best.

STEP 5 - Procedure or Method - This is where you record the exact steps you will take to complete your experiment. Write each step, explaining what you did:



For example:

1. Buy a range of different laundry detergents.

2. Choose a sheet that is clean and cut it into patches of the same size.

3. Dirty each patch equally.

4. Wash each patch separately using the test detergents.

5. Dry all patches in the same conditions and compare.

Step 6 - Recording your results and making a conclusion - Record the results of your experiment. What happened? Think about ways of displaying your data so it is easily understood to non-experts. Your data and results can be shown as photos, measurements, charts, and/or graphs. Be careful to choose the <u>right</u> graph or chart to accurately display your results!

For example: After washing all the strips of cloth and comparing them, it is easy to see that one brand of laundry detergent washed the grass stains out much better than the others.
You could choose to show this idea to an audience by showing them strips of cloth and allowing them to see which is best.

Step 7 - Your conclusion - Look at your results and see how it answers your experiment's question. Remember, it's ok if your results and conclusion do not match your original hypothesis! Science is all about learning from mistakes and finding the real reasons why events occur!

Problem: Which laundry detergent works better on grass stains?

Conclusion: My hypothesis was correct. I thought that the McStinky laundry brand would clean the best and it contains 20ml more phosphates than the other brands of laundry detergent. My results suggest it did this because...

Step 8 - Writing an Introduction - Now that you have completed all of the hard work of conducting your experiment it is now time to write a short introduction. This is your way of quickly explaining your work to an audience member in very simple and easy to read language. This section does not need to be long at all—just a short paragraph.

Step 9 – Display your project – Include:

- Title and Introduction (summary)
- Problem or Question
- Hypothesis, Procedures or Methods
- Equipment and Materials Used
- Your Experiment
- Results and Data
- Your Conclusions

Please note – Your science project:

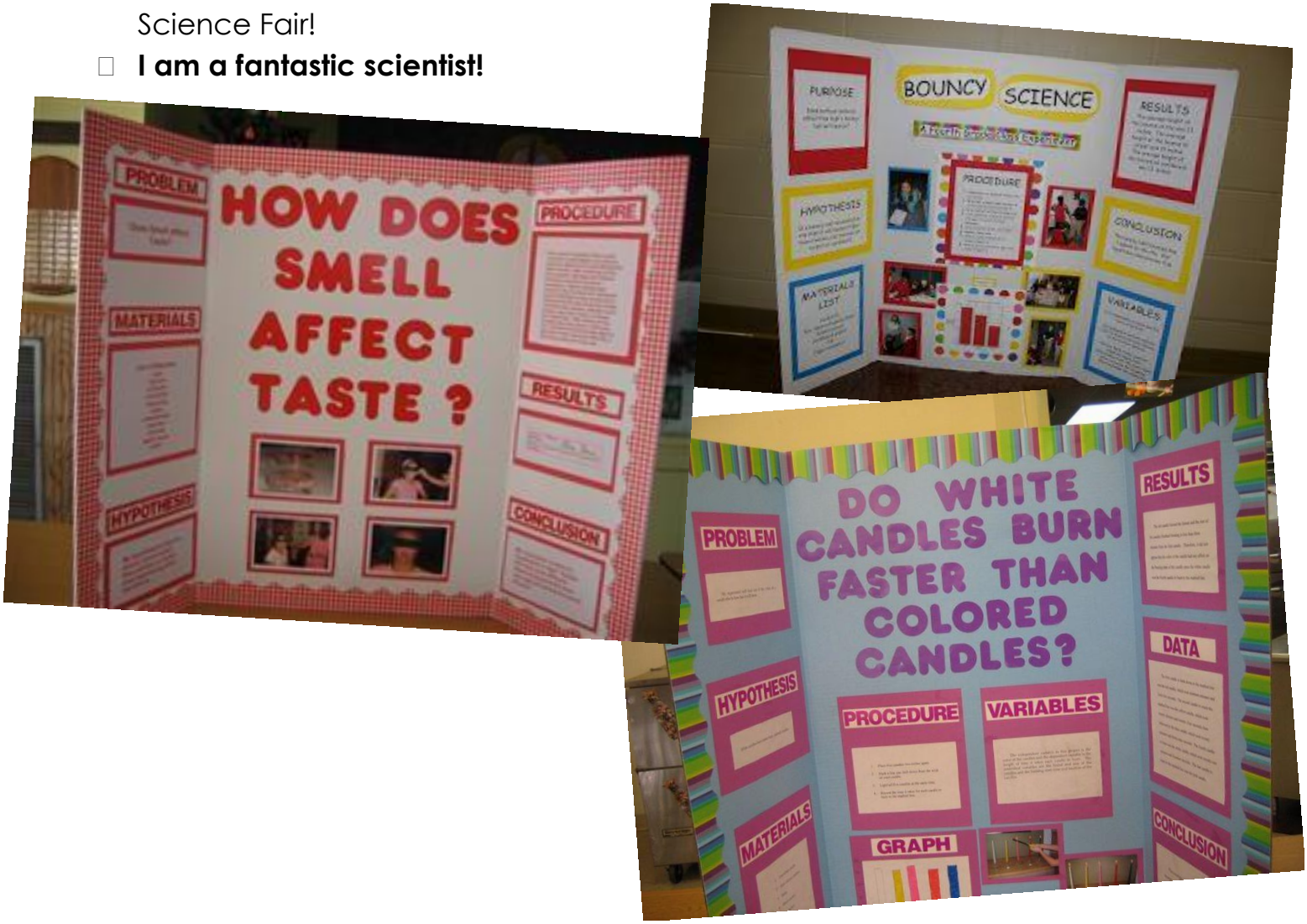
- *should be able to be carried by you and stand on display on its own*
- *should contain the project title with lettering large enough to see from a distance*
- *should include visual materials such as photos, drawings, graphs*
- ***Follow the registration instructions and paste your registration label on the front of your project***

Step 10—Being Assessed! – Judging will take place on 26 August. A copy of the judging rubric can be found in the "2017 Science Fair Manual" on the SEA*ACT website. Take the time to have a look at the expectations of the quality criteria. It should give you a clear idea of what to do if you want to do well.

Progress Checklist

Tick when you have completed each step:

- ☐ I have chosen a topic that interests me
- ☐ I wrote out the research question in the form of a problem.
- ☐ I researched the subject (kept notes and references for my display)
- ☐ I included the hypothesis about what I thought happen based on my research
- ☐ I wrote out the procedure or method that I used in my experiment in the form of steps
- ☐ I have organised everything for my experiment, including gathering the materials I need
- ☐ I have performed my experiment and have tried my best to control all possible variables to **ensure a fair test**
- ☐ I have recorded my observations.
- ☐ Was my original hypothesis correct?
- ☐ What did I learn or find out by doing this experiment?
- ☐ I have begun the construction of my display
- ☐ My project is complete and ready for the Annual Science Fair!
- ☐ **I am a fantastic scientist!**



Ideas for your Science Fair Project

Primary school projects aren't supposed to be rocket science (though of course they could be). Look for a project that you can do over a fairly short time span. Keep in mind, judges will disqualify you if they suspect your parents did the project and not you. Although you may get help from adults, be sure the project is really yours. Resist the temptation to just *present* research. Try to answer a question or solve a problem and communicate this with your scientific knowledge.

Here are some examples of previous questions posed and researched by students:

- What type of plastic wrap best prevents evaporation?
- What plastic wrap best prevents oxidation?
- Are night insects attracted to lamps because of heat or light?
- Do white candles burn at a different rate than colour candles?
- Does the presence of detergent in water affect plant growth?
- Does magnetism affect the growth of plants?
- Does the shape of an ice cube affect how quickly it melts?
- Do different brands of popcorn leave different amounts of un-popped kernels?
- How accurately do egg producers measure eggs?
- How do differences in surfaces affect the adhesion of sticky tape?
- If you shake up different kinds or brands of soft drinks (e.g., carbonated), will they all spew the same amount?
- Are all potato chips equally greasy (you can crush them to get uniform samples and look at the diameter of a grease spot on brown paper)?
- Is greasiness different if different oils are used (e.g., peanut versus soybean)?
- Do the same types of mould grow on all types of bread?
- Does light affect the rate at which foods spoil?
- Can you use a household water filter to remove flavour or colour from other liquids?
- Does the power of a microwave affect how well it makes popcorn?
- Can you tell/taste the difference between ground beef, chuck, and round steak after they have been cooked?
- Do all brands of diapers absorb the same amount of liquid?
- Does it matter what the liquid is (water as opposed to juice - keep it hygienic please!)?
- Do different brands of batteries (same size, new) last equally long? If a brand lasts longer than others, does this change if you change the product (e.g., running a light as opposed to running a digital camera)?
- Do all brands of bubble gum make the same size bubble? Why or Why not?
- Do all dishwashing detergents produce the same amount of bubbles? Clean the same number of dishes?
- Is the nutritional content of different brands of a vegetable (e.g., canned peas) the same?
- How much of the weight in the can is water?
- Is laundry detergent as effective if you use less than the recommended amount? More?
- Do all hairsprays hold equally well? Equally long? Does type of hair affect the results?
- How do different factors affect seed germination? Factors that you could test include the intensity, duration, or type of light, the temperature, the amount of water, the presence/absence of certain chemicals, or the presence/absence of soil. You can look at the percentage of seeds that germinate or the rate at which seeds germinate.
- How does cold storage affect the germination of seeds? Factors you can control include the type of seeds, length of storage, temperature of storage, and other variables, such as light and humidity.
- What conditions affect the ripening of fruit? Look at ethylene and enclosing a fruit in a sealed bag, temperature, light, or nearness to other pieces or fruit.
- Does fast food spoil like normal homemade food?

- How are different soils affected by erosion? You can make your own wind or water and evaluate the effects on soil. If you have access to a very cold freezer, you can look at the effects of freeze and thaw cycles.
- What percentage of different fruits (like an orange or apple) is water?
- Does the temperature of soft drink affect how much it sprays when a can is shaken up?
- Do all brands of soft drink spray the same when shook up?
- Does it matter whether they are full sugar or diet brands?
- Do all brands of paper towels pick up the same amount of liquid? Compare single sheets from different brands. What type of paper decomposes the fastest?
- Can body language help you determine whether someone is lying?
- Does age make a difference in lung capacity?
- Which uses more water-a bath or a shower?
- Is the sense of smell or taste more successful in identifying carrots, beans, potatoes or cabbage?
- How do aerodynamic wings effect a soft drink bottle rocket?
- How does temperature effect the size of balloons when refrigerated? What is really going on?
- What methods can we use to demonstrate gravity apart from dropping things?
- Is it possible to simulate an eclipse?
- Why do the length of shadows change?
- Is it possible to trace and follow the movement of stars?
- How does a spectroscope show us the different forms of light?
- Is it possible to inflate a balloon using yeast?
- What is the diversity of plants in your backyard?
- Can plants grow without fresh air?
- Can plants grow without soil?
- Do plants need water to survive?
- What is the effect of salt in the soil when growing plants?
- What are the factors required to build the best bird feeder?
- How are birds able to use their beaks to feed?
- Do bird callers work to attract birds to your garden?
- Is it possible to identify animals by examining their tracks?
- How does evaporation help when creating sugar crystals?
- How do materials change when they are heated?
- Do eggs float in all liquids? Is it possible to stop a cut apple from turning brown?
- How does vinegar compare as a household cleaner?
- How fast does a gas pass through the air?
- How fast does evaporation occur in different size containers?
- Is it possible to make stone? Try limestone, sandstone or conglomerate rock! What's in dirt?
- Is it possible to identify and classify different types of rocks?
- How are stalagmites and stalactites formed?
- What influence do plants and water have on erosion?
- Can earth breathe? How could we find out if there is air in soil?
- Is it possible to make a seismograph that can measure small tremors?
- How strong is an eggshell?
- How effective are levers?
- How do siphons demonstrate water pressure?
- Is it possible to make a battery using lemons?
- Is it possible to create a homemade thermometer?
- Which wall design is best for windy location?
- Which bridge design holds the most weight? Suspension or arch?
- What parachute design and size best effects the parachutes flight
- What shape parachute (circle, square, rectangle, triangle or ellipse) will slow your fall down the best?
- What is the effect of tyre pressure on petrol consumption—ask your parents very nicely if they will help with this one!
- What is the effect of weight placement on a car racing down a slope?

- Does a swim cap reduce drag and help a swimmer swim faster through the water?
- Does the presence or absence of the basketball net affect free throw accuracy?
- Are all rain drops the same size and shape?
- Is the pyramid the strongest 3D geometric structure?
- What is the effect of a building's height on its stability?
- Why igloos are dome shaped and not square?
- What are the effects of types of music on driving ability? Does loud music make a difference?
- How do teaching styles and colour affect learning?
- Do hand motions affect your memory?
- Auditory and visual memories of males and females - Is there a difference?
- Which colour Glad Wrap allows plants to grow the tallest?
- Do fruit and vegetable juices contain the same amount of vitamin C?
- How does the type of water you feed a plant affect its growth?
- Do hydrating shampoos really strengthen hair more than regular shampoos?
- How does vitamin C content of packaged orange juice compare to freshly squeezed?
- What are the effects of temperature on enzyme activity?
- Which brand vegetable soup has the most potatoes?
- Are the content percentages on tinned fruit and vegetables accurate?
- Are you juicy? Do naval and Valencia oranges of the same weight give the same amount of juice?
- Does temperature affect bacterial growth?
- Does chewed chewing gum lose or gain mass?
- The effects of varying amounts of water on seed germination?
- A comparison of two hydroponic techniques Evaluation of fertilizer types: which works best on flowers?
- How does temperature affect viscosity?
- Which bandage stays on best when placed in water?
- Does spending more money for your sunscreen give more protection from the sun?
- Does fabric softener affect drying time?
- A comparison of computer-based pseudo random number generators. Utilizing a genetic algorithm to stimulate lunar landing.
- How does computer-enhanced learning compare to conventional learning?
- Whose website predicts high and low temperatures with the best accuracy?
- What is the best insulation to use on a house?
- How could we test the load bearing capacity of I-beams? Which materials are best suited to soundproofing a small room?
- Which insulating clothing materials work best to protect you from cold?
- What is the effect of soccer ball temperature in kicking distance?
- Will temperature affect the way a paper plane flies through the air?
- How fast do yard waste materials decompose?
- Should you believe your local weather forecaster?
- Music does it have an effect on blood pressure?
- Does your hearing level change after exposure to amplified rock music?
- Do taller people have a greater lung capacity than shorter people?
- Does viewing television affect pulse rate?
- Generating electricity through water wave movement.
- Are advertisements on TV louder than regular broadcasts?

Remember – The aim is for your project to be solving a problem that is ***important to you***! Creating a volcano is a pretty display, but it is not a Science Fair project unless you are using your volcano to ***test*** an idea or ***solve*** a ***problem***.

Be very careful your project is <u>not</u> just a display.

It would be a very big shame to waste all of your energy on a project that cannot **demonstrate your science knowledge and understanding**!