



## South West Science and Engineering Challenge

Thursday 2<sup>nd</sup> June 2016

*Presented by*  
The University of Newcastle

*In cooperation with*  
The Rotary Club of Bunbury  
Leschenault

### Check list

- q Carefully read all this Teacher's Guide, including the FAQ below.
- q Obtain approval to attend from your Principal, if you haven't already.
- q Book transport to and from the event.
- q Sort students into groups and submit the 'Participant Registration Form' to Local Organiser.
- q Arrange student excursion permission and check media consent.
- q Distribute the activity notes to students and ensure they bring them on the day.
- q Bring a first aid kit and any changes to the Participant Registration Form with you on the day.
- q Tell your students about lunch, what to wear, to follow instructions of staff, etc.
- q Make sure students are wearing their Challenge wrist bands before they enter the venue.
- q To minimise disruption to the event, please arrive on time and stay until the end.

### Why attend?

The Science and Engineering Challenge encourages year 10 (and year 9) students to consider a career in Science or Engineering, and to study the enabling sciences in senior high school. See [www.newcastle.edu.au/challenge](http://www.newcastle.edu.au/challenge)

### When?

Thursday, 2 June 2016

**Arrive at the venue no later than 9:00 AM to start at 9:30 AM**

**Ensure your school can stay until the end of the presentations at 2:30 PM**

### Who?

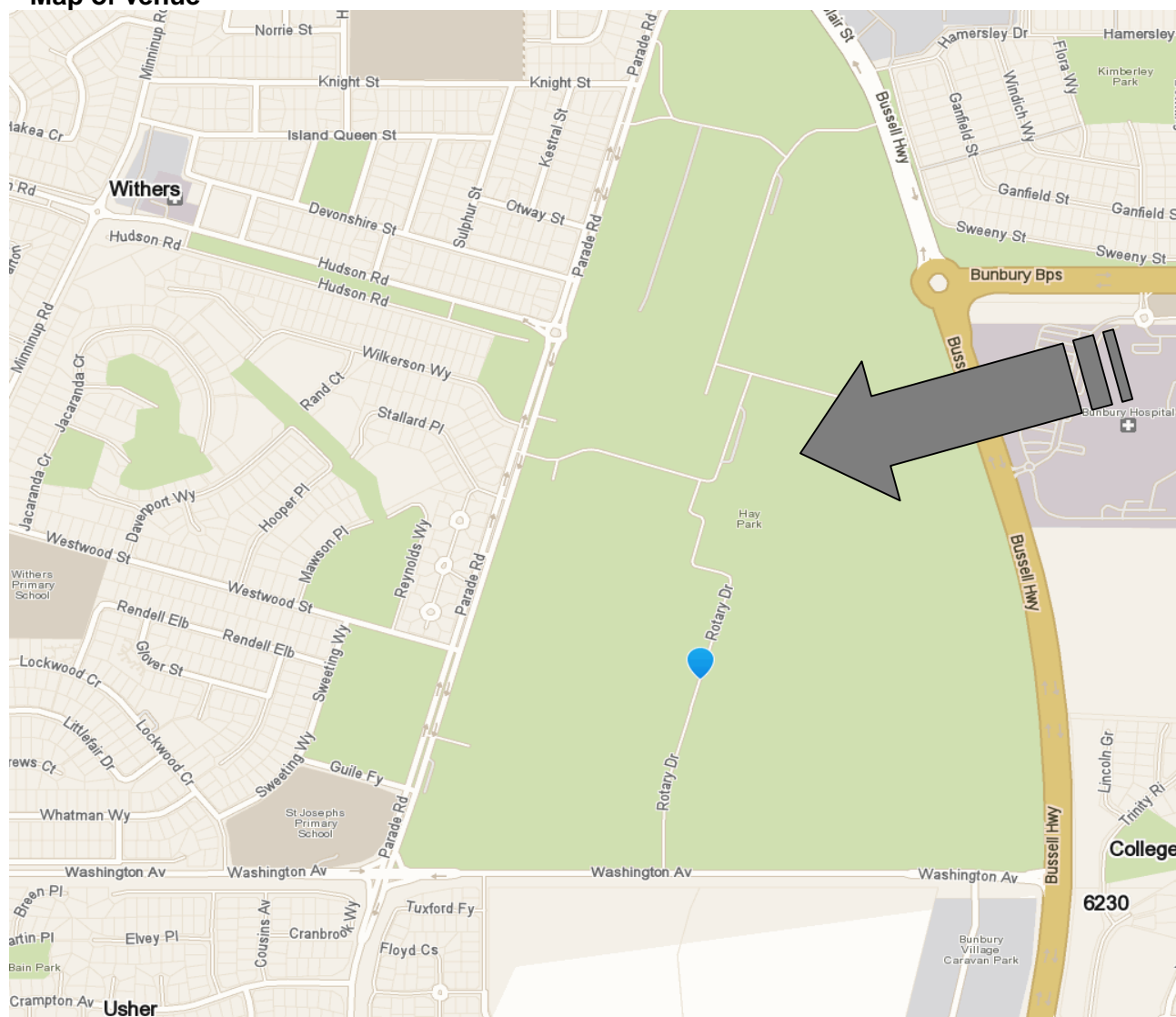
Eight teams (schools) compete against each other on each Challenge day. Each school brings a team of between 16 and 32 year 10 (or year 9) students. Parents and members of the public are also invited to participate and/or watch. The school teams are split into 8 colour-coded groups of 2 to 4 students. Schools need to send a suitable number of teachers to supervise their students. **SCHOOLS CAN ONLY COMPETE IN ONE REGIONAL CHALLENGE PER YEAR.**

### Where?

South West Sports Centre  
1 Rotary Avenue  
BUNBURY WA 6230

Telephone: 9795 2222

## Map of venue



### IMPORTANT: Please complete the following tasks by the date specified

ASAP

- \* Obtain approval from your Principal, if you haven't already.
- \* Book appropriate transport to the event.
- \* Arrange parental permission for students to attend.
- \* Submit 'Participant Registration Form' to Local Organiser.

20/05/2016

- \* Deadline for submitting the 'Participant Registration Form'.
- \* Pay organisers the Participant registration charge- see below.
- \* Activity notes will be sent to you. Hand them to students.

The week before the event

- \* Ensure that all students have read their activity notes.
- \* Update the 'Participant Registration Form' with any changes.

On the day of the event

- \* **Please arrive at the venue no later than 9:00 AM**
- \* The venue has First Aid provision.
- \* Students should bring pen/pencil and activity notes with them.
- \* When you arrive at the venue - before entering - inform the Event Assistant of any changes. Collect the student wrist bands and plain labels for people without media consent. Bring Participant Registration Forms with you.

## OVERVIEW

The Science and Engineering Challenge is a day-long competition designed to provide year 10 (or year 9) high school students with a positive experience of science and engineering. A maximum of 8 schools per day compete against each other at one central venue.

Each school is divided into 8 groups of 2 to 4 students. Each group works on either 1 full-day activity or 2 half-day activities. (There are 8 activities) Each activity is assigned a colour. Students are given a wrist band to identify which activity(s) they will do. For example, students wearing a silver wrist band do the full-day 'Bridge' activity, but students wearing a purple wrist band do one half-day activity in the morning and a different half-day activity in the afternoon.

Students are awarded points for each activity and the school with the most cumulative points at the end of the day is declared the winner. The highest scoring winning schools from each region/zone will subsequently compete against each other for a place in the state and - perhaps - the national competition.

## FREQUENTLY ASKED QUESTIONS (FAQ)

### How is the day organised?

Schools arrive at the venue 9:00 AM  
Short intro. by Team Leader 9:35 AM , activities commence immediately afterward.

| Morning session        | Lunch*                       | Afternoon session      | Colour group |
|------------------------|------------------------------|------------------------|--------------|
| ElectraCity            | 11:30am-12:00pm for everyone | Grasping at Straws     | Purple       |
| Grasping at Straws     | 11:30am-12:00pm for everyone | ElectraCity            | Blue         |
| Helter Skelter Shelter | 11:30am-12:00pm for everyone | Stringways             | Green        |
| Stringways             | 11:30am-12:00pm for everyone | Helter Skelter Shelter | Yellow       |
| Catapult               | 11:30am-12:00pm for everyone | Catapult               | Orange       |
| Flat-Pack              | 11:30am-12:00pm for everyone | Flat-Pack              | Red          |
| Mission to Mars        | 11:30am-12:00pm for everyone | Mission to Mars        | Pink         |
| Bridge                 | 11:30am-12:00pm for everyone | Bridge                 | Silver       |

Each school tests the bridge they have built in front of everyone at 1:50 PM  
Present school participation certificates and trophy to the winner at 2:25 PM  
Event complete, schools leave at 2:30 PM

### What is the cost?

Schools must arrange and pay for return transport for their students.  
There is a cost of \$440 per school to attend the day  
and ask them for a Fundraising Pack if your school is unable to afford the participant charge.

### **What part do teachers play during the day?**

Teachers should encourage their students and monitor their behaviour.  
Please supervise students during lunch and ensure they are ready to start on time.  
Teachers should not directly assist students with the actual Challenge activities.

### **If students don't like an activity, can they change to another one on the day?**

No, not after the activities have started.  
Usually 4 of the groups will be doing half-day activities and will swap after lunch anyway.

### **How should we select the students who attend?**

You can select students in any way that you wish but please note the following:  
\* We have noticed that the 'top academic students' do no better than other groups.  
\* The ability to work well in a team is the most important ingredient for success.  
\* Low SES/disabled/special needs students are encouraged to be involved.

### **What materials should students bring to the event?**

Students should bring pencil/pen, paper and the activity notes, everything else is provided.  
Students are not allowed to use any other materials that they bring with them.

**What are the arrangements for food?** **Students:** Bring your own lunch  
(limited catering will be available at the venue).(Teachers supervise students during the student lunch time)

**Teachers:** Lunch and morning tea will be provided.

**Why do we need media consent for everyone who attends?**

Quite often radio, TV and/or newspapers cover the event.

We do not need a copy of the actual media consent form, but you must inform us (using the 'Participant Registration Form') of anyone who does not have media consent.

People without media consent will be given a plain white label to wear.

**What happens if there is a medical or behavioural problem with a student?**

Contact the Event Assistant/Team Leader immediately. They will get the supervising teacher.

**What should students wear?**

Please wear school or sports uniform, with enclosed shoes (for safety and comfort).

**Why do we need to know how many Aboriginal or Torres Strait students are coming?**

We need to report how many Aboriginal or Torres Strait students have been involved.

**What happens if our school wins on the day?**

The winning school will receive a trophy and may be invited to the state Super Challenge.

**Who do I contact if I have other questions?**

Most general questions about the event can be directed to the Local Organiser:

Steve Woodhouse

T: (08) 9722 3544 M: 0427 959929 E: [swoodhouse@wml.com.au](mailto:swoodhouse@wml.com.au)

The Team Leader runs the actual day and can answer more specific questions:

Peter Fullagar

T: (02) 4921 6551 M: 0418 407 322 E: [Peter.Fullagar@newcastle.edu.au](mailto:Peter.Fullagar@newcastle.edu.au)

**A BRIEF DESCRIPTION OF CHALLENGE ACTIVITIES**

| Duration & name of activity |                        | Overview  |
|-----------------------------|------------------------|---|
| Half Day                    | ElectraCITY            | Students will be given a large board and different quality cables and are required to make provide power to all the loads on the board.   |
| Half Day                    | Grasping at Straws     | Students are required to design, build and use a 'bionic hand' built from PVC pipe, string, straws, and timber coffee stirrers. Each group will then assess the effectiveness of their construction in several tests.   |
| Half Day                    | Helter Skelter Shelter | Students construct a tall earthquake-proof tower using only basic materials, sound engineering principles, and ingenuity. At the end of the session the towers are put to the test on an earthquake simulator.  |
| Half Day                    | Stringways             | The aim of this half-day activity is to develop rail networks that convey trains in the most efficient way possible. The higher the efficiency of linkage (i.e. minimum travel distance) the more points your team earns.   |
| Full Day                    | Catapult               | This activity involves constructing a catapult from timber dowel, packing tape and rubber bands. Points are awarded for the catapult's ability to propel a tennis ball over distance and hit a target.  |
| Full Day                    | Flat-Pack              | Students need to design and build a model table and chair for a well-known furniture company. They must both be able to support the weight of Ginger and Spot, the family pets. It is important, however, that the furniture is cost effective to generate a profit when it is put into |
| Full Day                    | Mission to Mars        | This activity requires students to construct a vehicle to quickly transverse an undulating surface. Students will use rubber bands for the suspension system.   |
| Full Day                    | Bridge                 | Build a small bridge from balsa, pins, tape, paddle pop sticks etc. Points are awarded for strength and load-carrying capacity (tested with dynamic loads).   |

## RISK ASSESSMENT

|                   | Hazard  | Consequence                          | Risk Reduction  | Likelihood                                   | Risk                           |
|-------------------|---|--------------------------------------|---|--|--------------------------------|
| ElectraCITY       | ElectraCity board falling<br>Battery falling<br>Spike injury from cable                             | Medium<br>Medium<br>Medium           | Boards are supported to prevent tipping. Students are not allowed to walk between table.<br>Batteries to be placed towards the centre of the table.<br>Coordinators only to move.<br>Students told not to remove plug ends. Point penalty applies.  | Unlikely<br>Unlikely<br>Unlikely             | Low<br>Low<br>Low              |
| Grasping at Stra  | Cutting with scissors   | Medium                               | Students advised on the correct use of scissors.  | Unlikely                                     | Medium                         |
| Helter Skelter Sh | Weights falling on toes and fingers   | Medium                               | Enclosed shoes required, long lead to operate equipment, instruction to coordinators to keep students at a 2m distance.   | Unlikely                                     | Low                            |
| Stringways        | String used as choking hazard.<br>Tripping hazard   | Major<br>Medium                      | Students are supervised and awarded a points penalty for dangerous behaviour.<br>Students are required to wind up string after each scenario.   | Unlikely<br>Possible                         | Medium<br>Medium               |
| Catapult          | Cutting with scissors<br>Hit with tennis ball<br>Moving parts<br>Hammering fingers                  | Medium<br>Medium<br>Medium<br>Medium | Students advised on correct use of scissors<br>Students not to fire while people are on the firing range, penalties apply. May only fire when supervised.<br>Must wear safety glasses, students warned of hazard and to keep away from moving parts.<br>Coordinators only to use hammers to put in pegs for target. | Unlikely<br>Possible<br>Possible<br>Unlikely | Low<br>Medium<br>Medium<br>Low |
| Flat-Pack         | Inappropriate use of equipment e.g. scissors, pins, hacksaw.<br>Test weight falling during testing. | Medium<br>Medium                     | Students advised on the correct use of equipment.<br>Sharp objects only provided when needed.<br>All personnel to stand back when testing   | Unlikely<br>Possible                         | Low<br>Medium                  |
| Mission to Mars   | Collapse of trestle<br>Catch on screw   | Medium<br>Medium                     | Trestles checked before each challenge day.<br>Ensure screws are attached with wing nut inside surface so there are no protrusions.   | Possible<br>Possible                         | Medium<br>Medium               |
| Bridge            | Inappropriate use of equipment e.g. scissors, pins, hacksaw.<br>Test weight falling during testing. | Medium<br>Medium                     | Students advised on the correct use of equipment.<br>Sharp objects only provided when needed.<br>All personnel to stand back from the rig when not required. Only one student to release trolley. Raised section on test rig which keeps trolley on course.   | Unlikely<br>Possible                         | Low<br>Medium                  |
| CONSEQUENCE       | Calculation of Risk   |                                      | LIKELIHOOD  |  |                                |
|                   | Action required for risk not in green area  |                                      | Unlikely  | Possibly                                     | Likely                         |
|                   | Catastrophic - serious or death   |                                      | MEDIUM  | HIGH   | EXTRM                          |
|                   | Major - medical treatment   |                                      | MED   | MEDIUM                                       | EXTRM                          |
|                   | Medium - first aid  |                                      | LOW   | MEDIUM                                       | HIGH                           |
|                   | Minor - no treatment  |                                      | LOW   | LOW  | MEDIUM                         |



## MEDIA CONSENT FORM



I (parent/caregiver) hereby consent to the University of Newcastle and its Partners to take or have taken by others, photographs, digital images and/or audio and/or video footage (the images) of the student named below, and to store the images, make copies of the images and publish the images in any form, in whole or in part, and distribute them in any medium including, but not limited to, print media, the Internet, CD-ROM, other multi-media uses or graphic representation, cinematography or video.

I consent to the images being used by the University or provided to others for the following purposes only:

- General news or promotion of the event on TV, Radio or in Newspapers, in trade and other journals and on websites and the internet.
- The production of resources/programs that will assist The Science and Engineering Challenge or the University of Newcastle in their educational mission,
- Promoting and advertising the resulting educational products/resources,

The University of Newcastle and its Partners undertake not to use any images in a way that would cause embarrassment or misrepresent the intent of the student's participation.

I understand that neither I nor the student will be paid for giving this permission and I hereby waive any claim that I or we may have or may have had for remuneration, residuals, royalties or any other payment in respect of use of the images.

I agree that The University of Newcastle and its Partners shall not be bound to make any use of the images.

Student name (please print): \_\_\_\_\_

Student signature: \_\_\_\_\_ Date \_\_\_\_\_

Parent / Caregiver name (please print): \_\_\_\_\_

Parent / Caregiver signature: \_\_\_\_\_ Date \_\_\_\_\_

School name: \_\_\_\_\_

School address: \_\_\_\_\_





## **CODE OF CONDUCT**

### **Science & Engineering Challenge**

#### **A code of conduct...**

- Is a set of consistent guidelines for an acceptable standard of conduct.
- Addresses in a concise manner the broader issues of ethical responsibility, and encourages greater transparency and accountability.
- Provides reasonable expectations for participation in a Science & Engineering Challenge.

#### **School students**

- Come prepared, follow directions, and play by the rules.
- Never argue with event staff. If you disagree, ask your teacher to talk with the Challenge staff.
- Verbal abuse, taunting or intimidating event staff or other teams is not acceptable.
- Contribute to your team. Your team's performance will benefit; so will you.
- Be a good sport. Applaud all good results whether they are from your team or another.
- Treat everyone as you like to be treated. Do not bully or take unfair advantage of others.
- Cooperate with your teacher, team-mates and other teams.
- Respect the rights, dignity and worth of all participants regardless of their gender, ability, cultural background or religion.

#### **Event staff**

- Prepare fully, set a good example, follow the rules, and assist all competitors equally.
- Always act with honesty, fairness, transparency and integrity.
- Compliment and encourage all participants to achieve their personal/team best.
- Be consistent, objective, professional and courteous when making decisions.
- Condemn unsporting behaviour and promote respect.
- Do not be alone with, or inappropriately touch a student.
- Place the safety and welfare of the participants above all else.
- Give all students a 'fair go' regardless of their gender, ability, cultural background or religion.

#### **Parents and members of the public**

- Focus on students' creativity and commitment, rather than winning or losing.
- Encourage students to always work according to the rules and to settle disagreements without resorting to hostility or violence.
- Never ridicule or yell at anyone for making a mistake or performing below your expectations.
- Respect the decisions of Event Staff and teach students to do likewise.
- Show appreciation for volunteers, Event Staff, parents, teachers and administrators.
- Respect the rights, dignity and worth of all participants regardless of their gender, ability, cultural background or religion.

#### **Teachers**

- Give all students an equal opportunity to participate in the event.
- Respect the other schools by arriving on time and staying until the end of the day.
- Make students aware of the positive benefits of participating in the event.
- Do not help your students too much. Let them learn from experience, and don't expose yourself to criticism by giving your team an unfair advantage.
- Work with your students to ensure that they behave appropriately throughout the day.
- Respect the rights, dignity and worth of all participants regardless of their gender, ability cultural background or religion.

*The Science and Engineering Challenge is a high-quality, safe, ethical, smoke and drug-free event.*