



PRIMARY
MATHEMATICS
ASSOCIATION

Creating Powerful learners of mathematics and numeracy

PMA POWERFUL LEARNERS MATHEMATICS & NUMERACY CHALLENGE

CESA SCHOOL INFORMATION BOOKLET 2020

Know your learners as mathematicians...



KEY STEPS TO GETTING STARTED WITH THE CHALLENGE

Enrol your site using the
registration form (page 15)

Read, share, explore the
information booklet

Start your investigation!

ACCESS ADDITIONAL RESOURCES TO SUPPORT YOUR INVOLVEMENT

- SAMPLE ENTRY DISPLAY
- SAMPLE ENTRY DIGITAL COLLECTION
- CHALLENGE MENTOR (ONLINE/FACE TO FACE)

Email primarymaths@bigpond.com for more info

WHAT'S THE CHALLENGE ABOUT?

This Challenge is offered to you through a partnership between CESA and PMA.

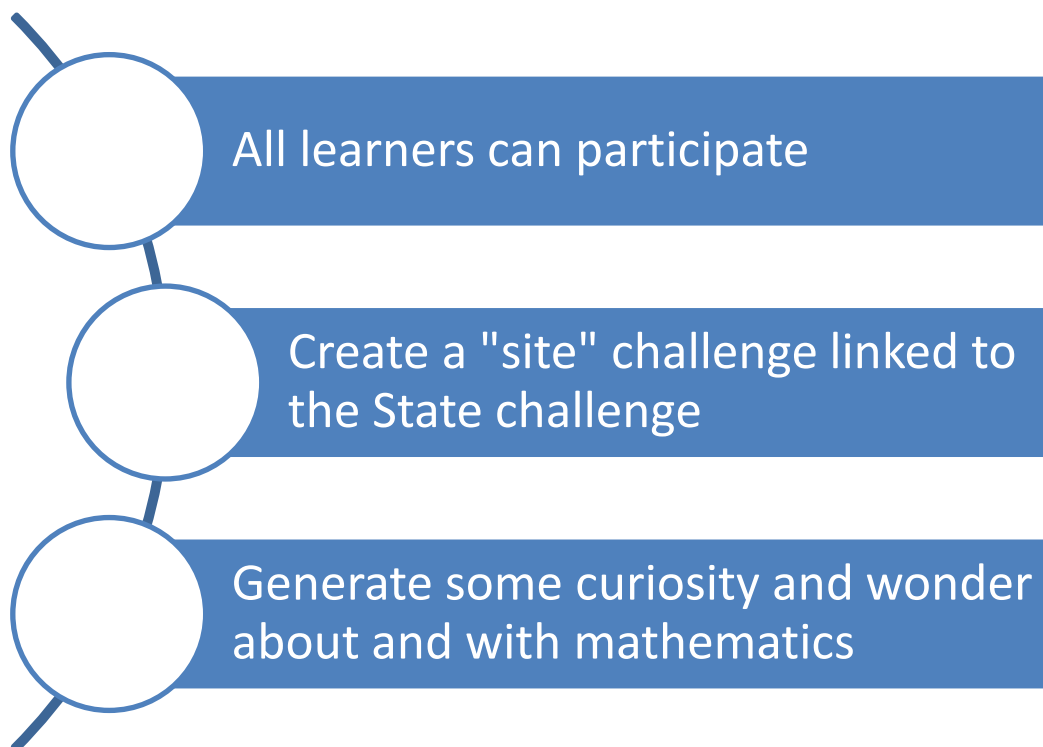
In 2020 CESA and PMA are hoping to celebrate the mathematical achievements of even more catholic learners and this booklet is designed to help you get started in meeting this target!

*The Challenge is now in its **twenty sixth** year and continues to go from strength to strength.*

In 2019, we were very pleased to see so many successful entries and to hear the amazing feedback about the positive impact the Challenge had on the dispositions and learning of the children and educators who became involved.

The aims of the PMA Powerful Learners Mathematics and Numeracy Challenge are:

- *To promote mathematics in school and preschool communities around South Australia*
- *To further develop students appreciation of the scope of mathematics and their creative and critical thinking skills*
- *To promote the goals and challenges of the State Numeracy initiatives*



2020 STRATEGIC PARTNERSHIPS

In 2020, we are pleased to announce that CESA are again key partners in the Challenge.

They have provided support which allows each site in your system to participate- so all you need is your energy, enthusiasm and commitment!

We are also very pleased to have a range of other Corporate Partners who are providing prizes for Educators and Learners. We thank the following companies for their support and ask you to thank them with your patronage.



ENTRIES CLOSE Week 1, Term 4 -
Thursday 15th October, 4pm

This information booklet is designed to assist children, students and teachers in preparing entries. Permission is granted to copy this document as required.

INFORMATION ABOUT THE CHALLENGE:

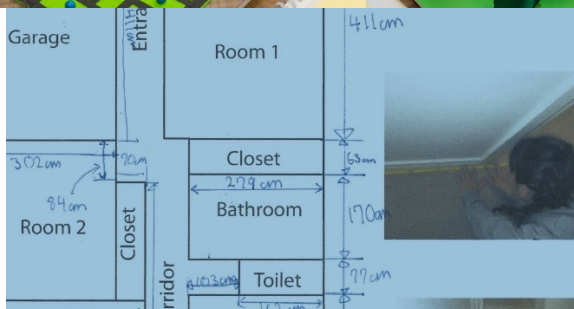
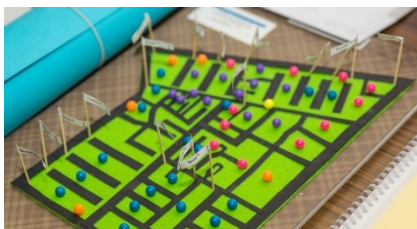
GETTING YOUR LEARNERS INVOLVED!

Choose an
option
1 or 2

Choose a
year level

Choose a
category

Start anytime you like → **ENTRIES DUE**
Week 1, Term 4, Thursday 15th October, 4pm



Our Main Goals

- We wanted to see how maths relates to cricket.
- We were interested in the reflexes of batsmen and wicket keepers.



CHOOSE AN OPTION

Option One

- Exploring your own mathematical investigation

Option Two

- Exploring a "Set" mathematical investigation

CHOOSE A YEAR LEVEL

R,1,2,3,4,5,6,7

Composite groups fit into the group with the higher year level, eg: a group of Year 2/3 students will be entered in the Yr.3 category, (unless there are less than 5 students at the older year level)

**** Preschool and Birth to 3 details are provided in a separate booklet - contact primarymaths@bigpond.com**

CHOOSE A CATEGORY

Individual

Small Groups (up to six learners)

Class Groups

Learners with Special Needs / Disabilities

IELC / EALD Learners

Small group and class group entries need to be collaborative efforts. Rather than a collection of individual pieces of work, individuals or groups may investigate aspects of an issue / topic and bring them together to draw conclusions.

**** Learners with special needs details, refer to page 13**

CELEBRATING YOUR SUCCESS!

Thanks to the generosity of our Challenge Partners, PMA is pleased to be able to provide the following acknowledgements to the participating learners and educators.

All learner and educator participants will be awarded certificates.

➤ **Certificate of Participation** is provided for all learners participating in the Challenge.

An original certificate for all site-based entries will be sent to sites after you have enrolled for the Challenge. Please use this to photocopy one for each site-based participant.

➤ **Certificate of Achievement** to all learners whose work is sent in for State Judging.

➤ **Highly Commended Certificate and Medal** - to learners whose work has been highly commended by judges in each category

➤ **State Winner Certificate and Award** - to learner winners in each category at State level. State winners also receive a small gift and trophy to acknowledge their success.

Highly Commended and State winners will also be invited to attend the formal presentation in early November to accept their awards from the Minister

P.M.A. reserves the right not to award in any category on the advice of the judging panel.



FOR EDUCATORS – GET INVOLVED YOURSELF!

In 2020, there are three sections in the Educator Challenge entry.

You can choose one of two communication mediums. You can produce a short video or write an article (between 1000-1500 words) – whichever format allows you to reflect on your learning and teaching practice most effectively!

You could choose to think and reflect on:

- **how you initiated and then supported your learners' involvement in the Mathematics Challenge.** You may wish to include information about the process you used to design the learning, the provocation you used, your assessment design, the highlights of your intentional actions as an educator, how you used learners as resources for and with each other, how you differentiated the learning, your personal reflections on how you grew as a mathematics educator through this process and future directions for both you and the children

OR

- **how you have been exploring and implementing the Proficiencies aspect of the Australian Curriculum: Mathematics** This could include reflecting on your planning, assessing, recording, reporting or any other comments you have about your efforts to implement this aspect of the Australian Curriculum

OR

- **how you have been using research to inform your practice.** This could include one of the following research areas:
 - o Developing conceptual understanding in Mathematics
 - o Assessment Design in Mathematics
 - o Supporting gifted and talented learners in Mathematics
 - o Putting the M in STEM
 - o Metacognition in Mathematics
 - o The role of mindset in Mathematics
 - o Moderation in Mathematics

We would be looking for you to tell us your story about what research you have considered (remember critical educators always seek out contrasting research to validate and compare views) and how this has informed your actions in the classroom. We would then love to know what has changed for your learners and what your future plans are!

In all three areas, Judges will be looking for evidence of you as a reflective practitioner
Join Belinda and Rachael – two educators recognised for their efforts in recent years!



(please attach an Educator Entry form to your entry, page 16)

WANT TO KNOW MORE?

LEARNERS OPTION ONE: EXPLORING YOUR OWN MATHEMATICAL INVESTIGATION

Topics for Investigation

This section of the Mathematics Challenge is about the everyday learning and teaching children and young people experience in the learning setting. Entries could include ongoing learning conversations / investigations, children / student reports on mathematical learning or a big book of learners demonstrating their mathematical thinking.

Learners may choose any area of interest to investigate as long as the links with the mathematics are obvious.

Investigations could start from a particular context based on a site, learning setting or individual issue or interest. **The key is that mathematics is a central focus in resolving a problem, situation or challenge or developing the interest further.**

For example you could use one of the Australian or global "years/decades" as a foci. The current ones are listed below for your info, and further information can be found by entering these titles into a search engine

- ❖ Chinese Year of the Rat
- ❖ Information about the United Nations Observances listed below can be found at <http://www.un.org/en/sections/observances/united-nations-observances/>
 - International Year of Plant Health
 - International Year of the Nurse and Midwife
 - United Nations Decade for family farming
 - Nelson Mandela Decade of Peace
 - International Decade for Action "Water for Sustainable Development"
 - United Nations Decade of Action on Nutrition
 - United Nations Decade of Sustainable Energy for all
 - United Nations Decade on Biodiversity
 - International Decade for People of African Descent
 - Decade of Action for Road Safety
 - United Nations Decade for Deserts and the Fight against desertification

They also have a list of international days and weeks which might provide some connections points for your exploration

<https://www.un.org/en/sections/observances/international-days/>

<https://www.un.org/en/sections/observances/international-weeks/index.html>

Each term also has a range of activities/foci weeks which might be able to be used. Check out the details at <http://www.australia.gov.au/about-australia/special-dates-and-events>

- Calendar of Cultural and Religious Dates
<https://www.dss.gov.au/our-responsibilities/settlement-and-multicultural-affairs/programs-policy/a-multicultural-australia/government-building-social-cohesion/calendar-of-cultural-and-religious-dates>
- Calendar of Environmental Events 2019
<http://www.environment.gov.au/about-us/media-centre/events>
- Health Awareness Weeks
<http://www.health.gov.au/internet/main/publishing.nsf/Content/health-pubs-calendar-index.htm>

There are also specific events related to Mathematics:

- Check out the National STEM agenda and resources at <http://innovation.gov.au/>

- National Mathematics Day <http://www.aamt.edu.au/Student-activities/National-Maths-Day>
- National Numeracy and Literacy Week <https://www.literacyandnumeracy.gov.au/>
- National Science Week <http://www.scienceweek.net.au/>
- World Maths Day, 4th March

There are also a couple of "anniversaries" this year

- 75th anniversary of the end of World War 2
- 10th anniversary of the release of the Ipad

There may also be state and local issues you wish to focus on, for example:

- Environmental issues e.g climate change, water salinity, greenhouse gases, global warming, river murray, pollution, management of electricity, extinction of animals
- Building of significant infrastructures such as the new road systems, rejuvenation of the old hospital site
- Transition issues - how is Year 8 same/different (incorporating surveys etc), how is reception same/different, what do the current year 6/7's think about Year 7 moving into high school
- Designing your classroom learning environment
- Planning a holiday - how you do save and budget for a holiday, how much do you need to earn to be able to go on different kinds of holidays
- Managing the school canteen
- Class budgets
- Energy alternatives
- Keeping a class pet
- Setting up the classroom environment
- Redesigning an area of your school
- Play areas
- Fitness circuits
- Healthy Food
- Travelling to other countries
- Class/School Newspaper
- Gardening
- Planning lunchtime activities
- Planning, organising a fundraiser

Alternatively investigations could begin from a mathematical idea or from a particular aspect of the Australian Curriculum eg:

- Patterns
- Fermi problems
- Probability -trailing & predicting a chance event
- Tessellations
- Polyominoes, pentominoes
- Design & construct a measuring device
- Exploring the data collection and use process
- Networks
- Location

Two other resources that could help:

- Collation of Set Investigations from 2010-2019. This is a collection of all the Set Investigations that have been used as Challenges in the past and these provide a great starting point for helping you think about what you and your learners could investigate.
- List of Investigation Topics from previous entries. This is a list of all the different "questions" that children have used as the entry point for their investigation

Both these resources are accessible from the PMA office at primarymaths@bigpond.com

How will technology enhance your learner's mathematical investigations? School Educators are encouraged to reflect on the ICT Capability Learning Continuum Description for this General Capability in the Australian Curriculum as a way of developing the investigations and providing learning opportunities. Or you could check out the Digital Technologies curriculum to see what might be relevant at your year level. Lots of the "coding" activities provide a fantastic context for investigating mathematics concepts in a challenging way. (check out more information at the Digital Technologies support website at: <https://www.digitaltechnologieshub.edu.au/>)

Learners are able to work on their investigation anytime between now and the end of Week1 Term 4, Thursday 15th October, 4pm Alternatively, they may like to write up and present an investigation they have completed anytime since the beginning of this year.

LEARNERS OPTION TWO: EXPLORING A SET MATHEMATICAL INVESTIGATION

In this section of the Challenge, the topic for the investigation is provided **FOR you**. Participants in this section of the Challenge will be sent this year's investigations **on request after your site registration form has been submitted** (form on page 15), and will then have until the Challenge closing date to complete the investigation, present their findings and submit their entries.

In 2020, a variety of Set Mathematical Investigations over the year. Our release schedule is below:

Term One - Set Investigations Booklet February

Term Two - Set Investigations Booklets May

July Holidays - Set Investigations Booklet July

Week Three, Term Three - "Last chance" Set Investigations

Alternatively in 2020 you also have the option of choosing one of our previous Set Investigations and entering it in the "Retro Set Investigation" section

PRESENTING YOUR INVESTIGATIONS IN OPTION ONE OR TWO

In both options of the Challenge, the **learners should make the decision** on how their investigation is presented.

Suggested Presentation Formats

Investigations may be presented in any of the following ways or as a combination of ways.

- Written
eg: Essays, scripts, stories, diaries, booklets (text with illustrations or newspaper format), big book, collection of poems/ letters.
- Posters
- Videos
- Models - May accompany written reports. Models must be sturdy!
- Computer/Web Based - Most software can be accepted, but if you are concerned that the software your learner may be choosing is not a common one, please check with our office. The entry needs to be able to be run on standard equipment eg:

standard Mac or PC without specialist software. Note: Please test your CD/website before forwarding it/details to the State Challenge

*All entries submitted to the Challenge **MUST** be accompanied by a completed Learner Entry Form (page 19/20 in this booklet)*

All entries may be kept (or copied) by PMA for promotional purposes and then returned to sites at a negotiated time.

"JUDGING" YOUR INVESTIGATIONS

"Judging"

"Judging" will occur at the end of week one in term four and the statewide judging panel will be comprised of representatives from sectors and educational roles. The focus is to celebrate the mathematical thinking of learners and to provide acknowledgement of their efforts.

"Judging" Criteria (example judging sheet on page 17/18 for your info ONLY)

(1) Mathematical Content and Processes - 50%

- The judges are looking for evidence of clear understanding of mathematical concepts along with mathematical thinking skills (proficiency strands) including: thinking, estimating, justifying, generalising, comparing, proving, concluding...
- it is also important that the mathematics presented in the investigation is **congruent with the mathematics expected at that year level within the Australian Curriculum/EYLF**. For example - ACM states that graphs presented using technology are expected from early years upwards. It is also important to consider what types of graphs are expected at each year level - eg: bar and column are beginning graphs and may not be the appropriate choice (depending on the type of data) for learners in the later years

KEY REFLECTION POINT: Can the judges clearly see which mathematics (Content and Proficiencies) you were investigating and learning more about?

(2) Report -50%

The key aspect of the report is that it should be **constructed by the children**. Even in a class entry, it is important that the judges can clearly see that the learners have constructed the entry, **NOT the educator**.

Where it is clearly evident that the educator has taken the children's work and compiled it as a class entry, the entry will be moved into the Educator section.

The Report is the key way in which children can share their learning journey with the judges. It should clearly describe the mathematics they have learnt and explored, and most importantly the “so what”. Why did they choose this investigation Why does it matter to them? Now they have completed it, what different will it make to their learning lives or their personal lives?

The report section of the learner entry should include information constructed by the children related to:

- DESCRIPTION
 - How they chose the topic/investigation
 - How long the project took
 - What they did, how they went about investigating the topic and making their conclusions (work samples could be included here to demonstrate your working, thinking and strategies)
- MATHEMATICAL REFLECTIONS
 - What mathematics did you need to use that you already knew about or how to do?
 - What mathematics did you learn by undertaking this investigation?
 - Why did mathematics matter in your investigation? What did it help you do?
 - What questions about mathematics do you have now? What mathematical questions do you have now?
 - How have you changed/developed as a mathematician by undertaking this investigation?
- LEARNING REFLECTIONS
 - Things that worked well and difficulties encountered
 - For group and class entries they could describe how they worked together
 - What they would do differently next time
 - So what? Why did this question / investigation matter to you, to others or to the community?
- CONCLUSION
 - What they found out
 - Generalisations
 - Further directions
- ACKNOWLEDGMENTS
 - Acknowledge help given by other adults and/or students
 - References used

The use of headings may assist in the writing of the report. The report could be written as a separate item or the key headings could be addressed throughout the children's learning evidence. Where necessary, educators may annotate learner's written reports so that the judging panel can interpret them.

KEY REFLECTION POINT: Can the judges clearly see you using your mathematical thinking to explain what you have been learning and investigating in your entry?

The judges are always looking for evidence of children thinking critically and creatively as they explore and think mathematically!

Educator Statement as part of the Learner Entry

Educators are encouraged to complete a brief statement (on the back of the Learner Entry Form) describing the context of the learner(s) and how the mathematics was investigated as this will assist the judges in making a fair analysis of your children's entry/entries.

Packaging

So that we can ensure that the judges can see ALL aspects of your investigation please include details of the number of separate components that make up your entry (as requested on the bottom of the Learner Entry form) and we ask that each component must be clearly labelled.

Site Judging

As you will have read you can have as many learners as you wish participate at the site level. It is then up to you to organise a "site judging" session.

We suggest that your site organises a group of judges to select site winners in each category i.e.: An Individual, Small Group and Class entry for each year level in both Option ONE and Option TWO (you can have one entry in each Set Investigation topic) if appropriate.

Site judges could include site-based staff; Governing Council or School Council members and community representatives.

Only one site winner from each Option/Year Level/Category can be entered into the State Challenge. Eg: only one Yr 3 Individual Own Investigation, or only one Reception Small Group Set Investigation 3

These entries are then to be forwarded to PMA for State Judging by Week 1, Term 4, Thursday 15th October, 4pm

If two entries are sent in for the same category neither can be considered for State Judging.

A copy of the judging sheet used by P.M.A. is attached at page 17/18 of this booklet and may be helpful when judging in your site.

Special Needs/Disabilities Category EALD / IELC Category

SPECIAL NEEDS / DISABILITIES

In 2020, we are again inviting entries from learners with Special Needs/Disabilities. This includes children from Special Classes or children identified in your school with an identified learning disability or a special learning need.

To assist judges, we ask their educator to provide information regarding the nature of the disability/learning need

EALD / IELC

In 2020 we are pleased to again provide a category for IELC / EALD learners. This will allow learners and educators to share the amazing ways that they are learning mathematics and also learning English at the same time.

Important Dates

COLLECTION POINTS

Term 4, Week 1 - Thursday 15th October, 4pm

1. c/- Principal, Greg Parker, St Pius X Catholic School, Windsor Grove
2. c/- Principal, Thomas Harvey at Riverdale PS
- 3.c/- Assistant Principal, Tara Augustin at Flagstaff Hill R-7 School
4. c/- Deputy Principal, Deb Postema, Cowandilla PS
5. c/- PMA Office at PO Box 635, Salisbury, 5108

17th October State Judging

19th October Notification by email to Award recipients

Early November, 6pm Friday evening: Presentation of State Awards by the Minister

Further Information

More information on the PMA Mathematics Challenge is available by contacting:

PMA's Clerical Officer - Deb Prout

Phone: (08) 8182 3288

Fax: (08) 8182 3299

Email: primarymaths@bigpond.com

Website : <https://www.primarymathematicssa.com/>

Looking for a great way to involve and engage the learners in your environment in some targeted and personalised learning investigations? Looking to have your children's learning recognised on the State stage? Then this Challenge is for you!

ENTRIES ARE DUE IN ON THURSDAY 15th October, 4pm, Week 1, Term 4

[illegible]

We think we will be lodging entries in

- Learners – “Exploring YOUR OWN mathematics investigation”
- Learners – “Exploring a SET mathematics investigation”
- Educator entry

At this stage we think we will be participating as:

- ☐ Whole site
- ☐ Some learning spaces (please list approx.. number) How many? _____

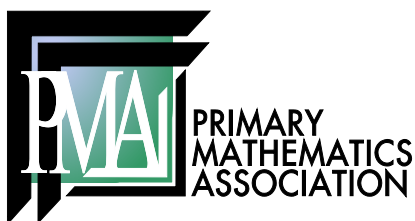
Site: _____

Email Address:

Contact Person:_____ Mobile No :_____

Primary Mathematics Association, P.O. Box 635, Salisbury, SA 5108

EMAIL ON primarymaths@bigpond.com



**2020
POWERFUL LEARNERS:
MATHEMATICS &
NUMERACY
CHALLENGE**

**SCHOOL EDUCATOR ENTRY FORM
(to be attached to educator entries only)**

Educator: _____

Year Level of Students you learn with: _____

Site: _____ **Mobile:** _____

Email : _____

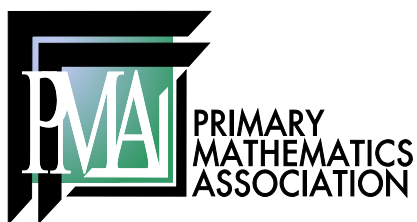
I WISH TO SUBMIT AN EDUCATOR ENTRY IN: (please tick)

- ☐ Reflection on Mathematics Challenge
- ☐ Reflection on implementation of the Australian Curriculum : Proficiencies
- ☐ How Research is informing my practice

One of the aims of PMA is to publish and promote effective learning and teaching practices in Mathematics and Numeracy. Your educator entry may be featured in a future PMA publication, and this is a condition of entry. Please sign the release form below to signal your agreement..

I understand that as part of the conditions of entry to the Educator Entry section of the PMA Mathematics Challenge, I am giving consent for my entry (all or part) to be published as part of a PMA publication for distribution to members.

Signed _____ Date : _____



**2020
MATHEMATICS
CHALLENGE,
“JUDGING” DAY SHEET**

SECTION: A (this section to be completed by entrant and sent in with entry)

Entry Title: _____

Child /Group Name: _____

Site: _____

PLEASE TICK

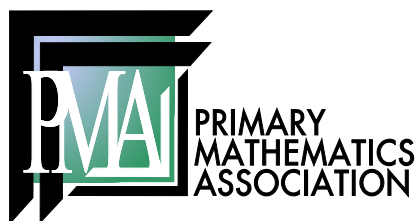
☐ Option One – Own investigation ☐ Option Two – Set Investigation If so, which one?	Year level: ☐ Reception ☐ Year One ☐ Year Two ☐ Year Three ☐ Year Four ☐ Year Five ☐ Year Six ☐ Year Seven	Category ☐ Individual ☐ Small Group ☐ Class Sub-Category (if relevant) ☐ IELC ☐ EALD ☐ SWD ☐ Learning Needs
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Comments for the learner...

Administrative Use Only

Additional Comments for the learner...

Mathematical Focus	50%	Little Evidence	→	Very Evident
- Content Strands ☐ Number ☐ Algebra ☐ Measurement ☐ Geometry ☐ Statistics ☐ Probability - Proficiency Strands ☐ Reasoning ☐ Understanding ☐ Fluency ☐ Problem Solving				
Can the judges clearly see which mathematics (Content and Proficiencies) you were investigating and learning more about?				
Report 50%				
Can the judges clearly see you using your mathematical thinking to explain what you have been learning and investigating in your entry?				
- Description - Mathematics Reflection - Learning Reflection - Conclusion - Acknowledgments - Child Constructed				



**2020
POWERFUL LEARNERS:
MATHEMATICS & NUMERACY
CHALLENGE**

LEARNER ENTRY FORM (to be attached to all learner entries) –

****Please complete Learner Entry Form with a black pen and use BLOCK LETTERS. Place in an A4 plastic sheet protector and staple to entry. Educator, please check names. The learner's name on entry form will be the name printed on certificates.**

Contact Educator _____

Title of Entry:

Name(s): (Please print clearly)	Yr. Level	Name(s)	Yr. Level
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

****Please name individual or small group members (up to 6) / Forename(s) and Surname(s)**

Group/Class Name: _____

Year Level: _____

School: _____

Address: _____

Phone: () _____ **Fax:** () _____ **Courier:** _____

PLEASE TICK

☐ Option One – Own investigation ☐ Option Two – Set Investigation If so, which one?	Year level: ☐ Reception ☐ Year One ☐ Year Two ☐ Year Three ☐ Year Four ☐ Year Five ☐ Year Six ☐ Year Seven	Category ☐ Individual ☐ Small Group ☐ Class Sub-Category (if relevant) ☐ IELC ☐ EALD ☐ SWD ☐ Learning Needs
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CONTEXT STATEMENT FROM EDUCATOR:

(what do the judges need to know to have a sense of your learners and what they done)

ENTRY Components: If your entry has separate components please list them below:

NB. Each component should be clearly labelled.