MINISTRY OF EDUCATION
Te Tāhuhu o te Mātauranga

These national newsletters are produced by the **Secondary Student Achievement** national facilitation team, as part of supplementary PLD support for schools, from the University of Auckland and Mau ki te Ako project partners (University of Canterbury, University of Otago and Te Rūnanga o Ngāi Tahu).

National Newsletter: Mathematics and Statistics

Information and resources for middle leaders in secondary schools | Term 1 2016

Whakatauki
Ko te manu e kai ana I te mātauranga, nōna te ao.
The bird that partakes of the power of knowledge has access to the world.

Welcome back to school

We hope that you have had a restful break with whanau and have recharged the body to begin the school year refreshed and rearing to support, nurture, and challenge your peers to provide the best possible teaching and learning environment for their students that they can. We say farewell to Facilitator Marc Paterson who has returned to the classroom in Palmerston North and thank him for his contribution to the face of Mathematics and Statistics over the past 3 years. Marc has worked mainly in the Manawatu and Taranaki areas. We welcome Morgan Rangi to the team. He will be working part-time in the Auckland and Northland regions.

NZAMT internal writing camp

The NZAMT writing camp saw 35+ teachers giving their holiday time to support the Mathematics and Statistics community by producing more internal assessment material for levels 1, 2 and 3. Many thanks to those teachers from around New Zealand and Rarotonga who spent these 4 days in January, not counting the time they spent before (preparing) and after (fine tuning) in Auckland.

Only these 2016 tasks can be guaranteed to be secure. It is important to make sure that you update your school file system to reflect this. No NZAMT task can be shared with students electronically at any time for revision etc. (The Statistics papers are a little different in that in order to do research they will need access to the task in a secure manner.) This assists all schools to have tasks that are secure and reduces the risk of not complying with authenticity and using appropriate internal assessment tasks.

National workshops 2016

Theme: "Making Connections" – d/dx (Learning)
In response to your feedback to the survey last year, this year's national workshops will include:

- Updating on all matters 'Mathematical' - what do we need to know?
- Financial capability – alternate courses at NCEA level 2. A look at the significant resource base available.
- Tracking students – how do you respond to data to improve student achievement from year 9 to year 13?
- Using one assessment activity and one context to assess in two different standards in Mathematics at NCEA level 1.
- Across learning area connections.
- Building awareness and opportunities with technology.

These national workshops are free as they are part of the Secondary Student Achievement PLD. Registration is essential. They will run 9.00am – 3.00pm. Tea and coffee will be provided. BYO lunch. See next page for workshop dates and locations.

Contact details

Northland/Auckland
Sandra Cathcart
National Co-ordinator
Team Solutions, University of Auckland
M: 027 555 4660
s.cathcart@auckland.ac.nz

Northland/Auckland
Morgan Rangi
Team Solutions, University of Auckland
M: 027 807 7956
m.rangi@auckland.ac.nz

Auckland
Robyn Headifen
Team Solutions, University of Auckland
M: 027 250 3009
r.headifen@auckland.ac.nz

Waikato, BOP, Hawkes Bay, Gisborne
Jim Hogan
Team Solutions, University of Auckland
M: 027 461 0702
j.hogan@auckland.ac.nz

Wellington, Wairarapa, Manawatu, Taranaki
Derek Smith
National Co-ordinator
Education Support Services, University of Otago
M: 021 913 150
derek.smith@otago.ac.nz

Christchurch, Nelson, West Coast
Derek Glover
UC Education Plus, University of Canterbury
M: 027 405 6725
derek.glover@canterbury.ac.nz

Otago, Southland
Munro Doran
Education Support Services, University of Otago
M: 021 225 3150
munro.doran@otago.ac.nz

Registration details will be on the TKI website shortly: http://nzcurriculum.tki.org.nz/Secondary-middle-leaders/Professional-learning-and-development/Workshops-for-middle-leaders

1 April	Auckland (North)	16 May	Masterton
4 April	Auckland (Central)	18 May	Paremata
8 April	Auckland (South)	23 May	Wellington Central
27 May	Whangarei	11 May	Nelson
10 May	Hamilton	9 May	Greymouth/Westport
12 May	Rotorua	17 May	North Canterbury
19 May	Whakatane	18 May	Christchurch
17 May	Tauranga	5 May	Otago North/Timaru
24 May	Hastings/Napier	12 May	Dunedin
26 May	Gisborne	17 May	Cromwell
9 May	New Plymouth	19 May	Invercargill
11 May	Palmerston North		

NCEA assessment matters

There has been a delay in Level 3 achievement standards being linked to Te Marautanga o Aotearoa (TMoA), so for 2016 the Level 3 internal standards stay as version 1.

AS 91035: The key concept for this standard is that learners are looking at sample data from a population and using this data to make a statement about the population. At all levels of achievement the response needs to demonstrate an understanding that the informal inference is about the population groups and variable, e.g: "My analysis suggests that Year 9 students in Christchurch secondary schools who use public transport generally take longer to travel to school than those who walk or go by car."

Contextual knowledge for internally assessed Statistics achievement standards

The importance of contextual knowledge in the statistical enquiry cycle comes from the NZC.

- Level 6 students will be 'identifying and communicating features in context.'
- Level 7 students will be 'using relevant contextual knowledge.'
- Level 8 students will be 'using informed contextual knowledge.'

The Secondary Teaching and Learning guides

http://seniorsecondary.tki.org.nz/Mathematics-and-statistics/Achievement-objectives/AOs-by-level/AO-S7-1/Statistical-graphs provides further guidance. The progression for contextual knowledge from level 6 to level 8 is as follows.

- At level 6 students should be working with contexts that are familiar to them. See Statistical investigations: Level 6.
- At level 7 students should be provided with relevant contextual knowledge about the situation under investigation. See Statistical investigations: Level 7.
- At level 8 students should be sourcing relevant contextual knowledge about the situation under investigation from places such as the internet, the school or local library, newspapers and magazines. See Statistical investigations: Level 8.

It is important, for assessment purposes, that students have access to appropriate contextual knowledge. If they do not have such access then their ability to "integrate statistical and contextual knowledge" for Excellence may be compromised. Please ensure your faculty is aware of the CoA for all of the Mathematics and Statistics achievement standards.

PLD links

- Latest news for middle leaders
- TKI PLD resources
- Other curriculum area national newsletters
- TKI Literacy Online: Literacy in Mathematics
- ERO Report: Supporting school improvement through effective teacher appraisal

Useful web links

- NZ Maths for Level 1-5 information
- NZAMT for teaching & assessment resources
- TKI for Level 6+ information
- Census at School NZ for statistics resources
- NZQA documents

NZGrapher updates

Points are now easier to see on most graphs, and the colours go through the whole rainbow spectrum rather than just red to green.

It is possible to bootstrap single variables.

It is now possible in Time Series to choose between multiplicative and additive models.

Blank/non-numerical points in the re-randomisation and bootstrapping process are no longer plotted.

The data menu changed so finding functions is easier.

MathsNZ website has been adjusted to make everything easier to find. Many of the booklets have been updated to reflect recent changes in NZGrapher.

Students can now view typed notes as well as video lessons. The adverts have been from the videos.

The MathsNZ Question Generator is a free tool to generate questions.

New question types are being added regularly.

Financial literacy unit standards

The review panel have met to review all of the financial literacy unit standards. They also developed a new standard to cover personal credit history. NZQA are planning to have the full suite of standards available for national consultation on the website this month. The use of these standards and their associated resources will be part of our national workshops this year.

Secondary Student Achievement (SSA) PLD

The face of PLD is beginning to change and in 2017 will see a significant shift to supporting the 'Communities of Learning'. In 2016, the Mathematics and Statistics facilitators will be working within the following strands:

Strand 1: Focused Inquiry Clusters. Develop a shared approach to inquiry and build capacity within and across learning areas, within communities of learning/schools.

Strand 2: National learning area workshops. Key focus is to identify and share curriculum, learning and assessment practices.

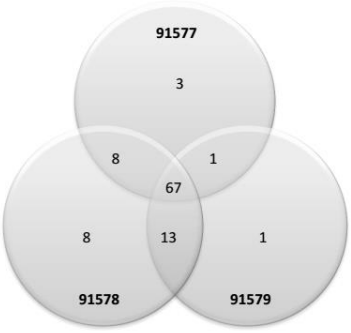
Strand 3: Regional subject/learning area clusters. Build sustainable communities of practice at a local level that focus on building curriculum, learning and assessment practices

Strand 4: In-depth support to allocated communities of learning and individual schools.
Outcomes of PLD will focus on raising the achievement of priority leaners.

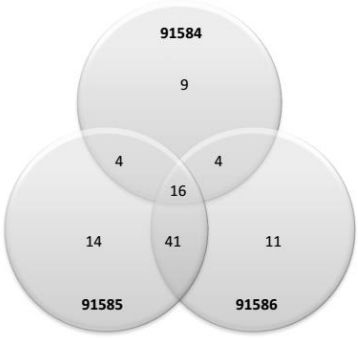
2014 information on the use of the Level 3 Statistics and Mathematics external standards

So, how are we doing collectively? What do you do in your school? How do your results compare with the national statistics? Are we doing a disservice to students by only offering one external in a course? Some questions to provoke discussion at the next faculty meeting.

The Venn diagrams below illustrates the percentage of students from the cohort enrolled for the NCEA Level 3 external achievement standards for 2014, what percentages of students are engaging in mixes of these Achievement Standards.



(%) N = 8,748 students.



(%) N = 14,228 students.

[Venn diagrams provided by NZQA.]

John Hattie on education

This link is a podcast from RNZ's National Radio – interview with Kathryn Ryan (24 minutes in length). Recorded on Nine To Noon on 17 June2015.

Go to: http://www.radionz.co.nz/national/programmes/ninetonoon
Then in the 'Search Episodes' box, type in 'John Hattie'.

The Pond

http://www.pond.co.nz/
http://www.nzqa.govt.nz/qualifications-standards/qualifications/ncea/understanding-ncea/re/

DigiStore

http://www.nzmaths.co.nz/digital-learning-objects

Data sets

Time Series

https://datamarket.com/data/list/?q=provider:tsd
http://aws.amazon.com/datasets/
http://www.economicswebinstitute.org/ecdata.htm
https://stat.duke.edu/~mw/ts_data_sets.html
https://www.census.gov/econ/currentdata/datasets/
https://datamarket.com/data/list/?q=provider%3Atsdl
www.figure.nz

Bivariate

http://www.geonet.org.nz/quakes/statistics
http://www.gns.cri.nz/Home/Our-Science/Environment-and-Materials/Air-Quality/Project-Examples/Winter-home-heating-air-pollution
http://www.carbonzero.co.nz/calculators/school_emissions_calc.asp
www.figure.nz

Links to STATCHAT

http://www.statschat.org.nz
Articles for Statistical Reports
http://sumo.ly/dxMd

Some ideas for statistical experiments

Does changing your appearance change people's reaction to you?

Do after school jobs or sports affect grades?

Taste of food or beverage vs container type.

Does reading your horoscope affect your day?

Reaction time or running speed vs food intake or sleep or exercise.

Is gender related to success on multiple choice vs. essay or short answer?

eMCAT and MCAT update

It is likely that there will not be an eMCAT this year, as NZQA trial other curriculum areas. In any of the Level 1 external assessments, candidates may be expected to demonstrate evidence through an investigation. This may involve the investigation of an algebraic, statistical or geometric relationship and begin with only a word problem or situation. Within 91028, candidates are expected to demonstrate the drawing of graphs, construction of tables and/or forming equations as required by the achievement standard.

In the 2015 external examination of achievement standard of 91028, question 3 involved an investigation. This question was not as well done as the other two questions. There was a significant level of scaffolding within the question. This may have created a problem for some students. It may be that this scaffolding is not provided in some questions in the 2016 paper. There may be situations that require the candidate to investigate a situation and they can choose to do this through the construction of tables, graphs and/or equation. If this is the case there will be working space provided for the candidates.

Assessor support: Making assessment judgements in Mathematics and Statistics

NZQA's National Assessment Moderators for Mathematics and Statistics can be contracted to provide workshops to teachers to increase assessor confidence in making assessor judgements consistent with the national standard for the internally assessed NCEA standards. NZQA welcomes requests from national and regional subject associations to provide guest speakers to meet their specific needs. Once the needs have been identified, a request can be made to Lynne Gill, Team Leader Teacher Support, lynne.gill@nzqa.govt.nz. Trial workshops of this nature ran successfully with regional associations in Manawatu, Taranaki and Northland during 2015. Feedback from participants indicated that teachers valued the opportunity to have significant input into the content of the workshops; appreciated the personal contact with moderators; and enjoyed significantly reduced participant cost by associations using school facilities in some cases.

As a guide, the needs identified for the 2015 workshops were:

- The inference progression for Levels 1, 2 and 3
- Transforming assessment practice, highlighting successful innovative assessment practice by practising teachers
- L2 Graphs AS 91257
- L3 Trigonometry AS 91575.

Workshops in 2016 could utilise these sessions or assessor groups / regional associations could request other content that is relevant to their own participants. Workshops can vary in length. They could be held after school for a couple of hours, for a half day or for a whole day or a Saturday. It is possible to run video-conferencing versions of the workshop sessions so that teachers in more remote or distant locations can access the teacher support. Charges for the workshops are made on a cost recovery basis which includes the NZQA presenter's preparation and presenting time plus associated travel and preparation costs.

Vocational Pathways

http://www.youthguarantee.net.nz/vocational-pathways/profile-builder/
Pathway documentation and guidance material have been changed to an online format. There are four examples of learning programmes from Manufacturing and Technology, Primary Industries, Services Industries and Social and the Community Services pathways.

Old copies of these national newsletters

These can be found at: http://nzcurriculum.tki.org.nz/Secondary-middle-leaders/Professional-learning-and-development/E-newsletters

Educational Review Office national reports

Raising student achievement through targeted actions
(December 2015)
http://www.ero.govt.nz/National-Reports/Raising-student-achievement-through-targeted-actions-December-2015

A Probability model to investigate: Pass the pig game

The approximate frequencies for the various positions:

Position	Percentage
Side (no dot)	34.9%
Side (dot)	30.2%
Razorback	22.4%
Trotter	8.8%
Snouter	3.0%
Leaning Jowler	0.61%

Links to rules and other information:
http://passpigs.tripod.com/rules.html
http://www.hasbro.com/common/instruct/PassThePigs.PDF
https://www.youtube.com/watch?v=eFWvxGbdjI8