National Newsletter: Mathematics and Statistics

Information and resources for middle leaders in secondary schools | Term 3 2015

Whakatauki

Mehemea ka moemoeā ahau, ko ahau anake. Mehemea ka moemoeā tātau, ka taea e tātou.
If I dream, I dream alone. If we all dream together, we can succeed.

Welcome to term 3

Congratulations to the organising committee of AMA for a very successful conference. 2017 will see the NZAMT15 conference in Christchurch. This term our teaching transitions from the internals to the preparing of students for externals and in level one, the MCAT (and e-MCAT). It is also the time to take a closer look at your senior student achievement data and actively respond to it.

Some questions you might consider in this process:
- Have students completed at least half their credits for the year? If not, why not?
- Do all Y11, 12 and 13 students have their 10 credits for Numeracy?
- Have you checked total credits gained per student? Are you doing too many (≥22) or too few (<16)? If students are doing 5 subjects, then ≈ 16 of these credits should be coming from mathematics and/or statistics.
- Are the standards all still appropriate for your student cohorts? Perhaps you might need to swap an external for an internal to ensure success?
- Is every student getting an opportunity to get M or E grades? Are your teachers all performing – how do you know? When was the last time you shared strategies for success in your faculty?
- Do you have a faculty process for evaluating achievement standards or the learning as they are completed? Do you capture student voice regularly?
- In years 9 and 10 many courses do not allocate time to all three strands of the curriculum evenly. How does your school address a balanced curriculum delivery?

Kohia and NZAMT school based examinations

These resources are now up on websites or ready to order, www.nzamt.org.nz and resources via the URL you received from registering for 2015. The Kohia practice externals papers are available for Level 1, 2 and 3.
To order go to http://store.educationcentre.auckland.ac.nz/

YouCubed from Stanford University

Recently launched is a week of inspirational mathematics - a set of 5 inquiry based lessons with accompanying videos about mathematics and mindsets. The tasks have been chosen so that students see mathematics as a broad, interesting and visual subject that involves deep thinking. Students will learn important growth mindset messages that will help them feel confident, try harder all year, persist with open and difficult problems and embrace mistakes and challenge. https://www.youcubed.org/week-of-inspirational-math/

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How to solve a problem

RDDDA – Mathematics
This is a literacy strategy and can be a guide used when solving problems.

Read the task: Clarify and question so that you understand what is required. Make sure you know what you have to do!
Draw a diagram of the task: Sketch the task as you see it. Include numbers given, ideas and assumptions. Do not do the calculations; just write the steps.
Draw a strategy line: Through the diagram draw a line from START to FINISH showing the steps you will use to answer the task.
Do the calculations: Describe each step and do the calculations neatly with units. Check with an estimate!
Answer the task: Answer the task and then add other comments about assumptions and improvements. Think critically about what you have done.
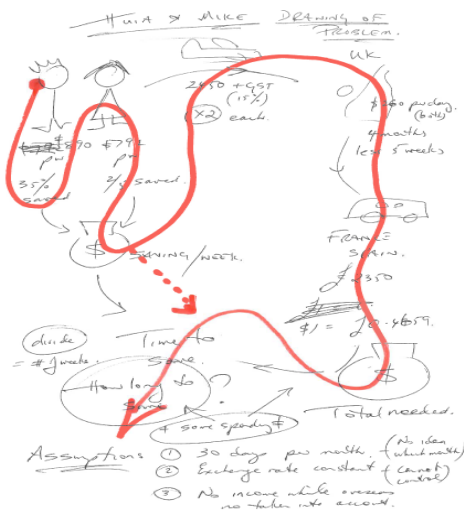
This is from the Huia and Mike assessment for AS91026.

The diagram shows Huia and Mike with what they earn and their plans for a holiday to the UK and France. The task is to **Find the number of weeks they need** to save the amount of money they need to pay for the trip. Aspects that could change are the monetary exchange rate, the time of the year for taking the trip and expenses during the trip.

PPDAC - Statistics
This literacy frame is to be used when **making sense of data**. It summarises the steps of the **statistical enquiry process** for bivariate, inference and time-series.

P is for Problem: "I wonder if …." is the usual start to an investigation. Questions should be sensible and have a purpose. A **comparative** question compares two groups and whether one group **tends** to be more (or less) than the other.
P is for Plan: This is about what you intend to do to answer the question you have asked. It may involve taking a **sample** to infer back to the **population**.
D is for Data: The data you collect may be a sample or something measured. The population being investigated needs to be identified in the question. An experiment is only ever about that group or groups!
A is for Analysis: This is the displays and measures and the associated discussion about them. It includes describing the **shape, middle 50%, spread and oddities**. **WWM – What, Where and Meaning.**

NZQA Best Practice workshops – reminder

Mathematics Content: Measurement level 1 91030, graphs level 2 91257, networks level 2 91260, conics level 3 91573 and linear programming level 3 91574 and a mythbuster quiz for some of the most commonly asked questions related to the Mathematics standards.

Statistics Content: Probability level 1 91038, inference progression levels 1 (91035) 2 (91264) 3 (91582) Experiments levels 2 (91265) and 3 (91583) and a mythbuster quiz for some of the most commonly asked questions related to the Statistics standards. NZQA advises you to register early to avoid the workshop either being rescheduled to another date or of being cancelled.

Venue	Mathematics	Statistics
Whangarei	September 8th	September 9th
Auckland	August 24th	August 25th
Christchurch	July 21st	July 22nd
Dunedin	July 28th	July 29th

Assessment matters

For both 91035 and 91264 an important understanding is students working with sample data to say something (infer something) about a population.

For 91035, an informal inference is being made which is about a tendency as to whether one group is bigger/smaller than the other, therefore if "tends to be" is in the question then it is much more likely to be in the conclusion.

For 91264 the inference is a conclusion about the population parameter using the informal confidence intervals for the population medians.

It is suggested for assessment purposes data sets should be 'cleaned', before given to students to work on the task.

There are examples of suitable questions for the inference standards in the clarification documents and are the same as the questions in the document by Pip Arnold that can be found from S6-1 on TKI.

Posing questions needs to be practised and the question type will be linked to the analysis that is happening. At curriculum level 7 the analysis includes the informal confidence intervals for the population medians, which is the reason for an investigative question involving the comparison of the population medians. The phrasing of the comparative question is important; it ensures the students make a correct inference when the answering the question. Remember: **VGPCD|M** is a good mnemonic to support students with the comparative question writing.

Another useful message is about the use of the statistical inquiry cycle. The inference standards have the focus on the first P, A and C. In the conclusion, students need to come back and answer their question.

Specific reference to the context - for example, identifying the actual variable in the discussion, including units with numeric quantities and identifying the actual population (rather than just saying 'in the population') may be useful reminders. Another reminder is about the checking investigative questions for NCEA level 1 - teachers should refer to the Conditions of Assessment (COA) in this regard.

Technology is expected to be used when drawing the statistical graphs.

Writing in Statistics: The eyes have it…👀

When writing about features of a statistical graph from Year 7 to Year 13, the first comments should be about what they see from a visual perspective. A useful tool for describing each feature is **WWM.**

What do I see?   **W**here do I see it?   What does it **M**ean to me in this context?

Using this tool helps students write full statements in context about each feature they see.
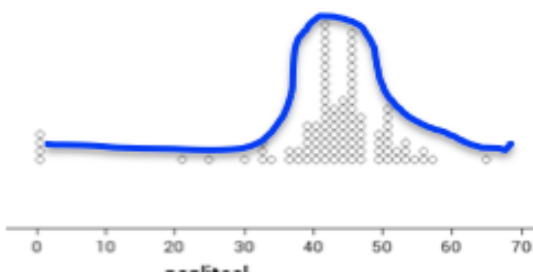
"I see a peak. The peak is between 35cm and 50cm. This makes me think that the majority of these students have a length of between 35 cm and 50 cm."

From curriculum level 5, students are working with samples, so it is important they understand the data they analyse is part of a larger entity (the population).

A useful reference is the Key Mathematical Ideas on nzmaths:
(http://nzmaths.co.nz/key-mathematical-ideas?parent_node)
The progression through the Statistical Investigation strand makes it clear that students are working with samples at level 5.

The Mathematics achievement standards where students are writing equations in:
- 91257. When students are writing an equation they need to be encouraged to identify the properties of the functions that they select to choose are appropriate.
- 91575. The properties of trigonometric functions that are used to form an equation need to be communicated as well as the equations and features used to form the function.

Young People's Success at Secondary School - ERO Report

This report presents the findings of ERO's evaluation of how well 68 secondary schools in term 1 2014 promoted and responded to student wellbeing. The URL is:
Wellbeing for Young People's Success at Secondary School ERO Report

Inclusive Practice ERO report

This report examines how well students with special education needs are included in New Zealand schools. The URL is:
Inclusive practices for students with special needs in schools

NZGrapher
You can sign up at:
http://eepurl.com/4JD3v

iNZight
Updated to version 2.2 (with a new logo). Download from this link. iNZight now also comes in a 'lite' version from your browser.
https://www.stat.auckland.ac.nz/~wild/iNZight/index.php

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

Maths Week

Register here: http://www.mathsweek.org.nz/registration.html
Once you register, further information will be emailed to you.

Some thoughts on technology

We need to keep talking about technology as most schools are putting a lot of resources into hardware and software. Statistics and Mathematics makes excellent use of the computers.

Let's stop talking about technology and start talking about learning. Are my students learning? Technology:

- Is a tool - which is anything used to perform an operation more efficiently or achieve an end more effectively. When using technology in the classroom teachers must ask themselves if this is making the learning more efficient and more effective.
- Has the power to offer us a more efficient way to deliver content and a more effective way to collaborate with students.
- Does not completely engage students; great lessons engage students.

Instead of saying this ...	We could say this ...
My students all have digital portfolios.	My students show evidence of their learning.
I'm trying to put all of my resources in a learning management system.	I'm working on giving my students better access to learning resources this year.
I use clickers and surveys in my class.	I collect feedback really fast in my class, so I know immediately when I need to re-teach something.
I've really worked on making my classroom paperless and digital. My students use cloud collaboration software in my class.	My students can access their work from anywhere and can work together on the same files.
I'm working on flipping my classroom and using a blended learning approach.	I'm working on giving my students better access to learning resources.
I want my students to have 21st-century skills and be university and career ready.	I want my students to have the skills they need NOW, in today's world.

"SAMR is a model designed to help educators infuse technology into teaching and learning. Developed by Dr. Ruben Puentedura, the model supports and enables teachers to design, develop, and infuse digital learning experiences that utilize technology. The goal is to transform learning experiences so they result in higher levels of achievement for students." (Kathy Schrock.)

Check out the following – it may change the way you think about technology. Visit http://www.schrockguide.net/samr.html

Planning and supporting PLD for 2016

The Mathematics and Statistics facilitators will be setting up a survey to seek information for support requests for 2016 late in term 3. Please take the time to complete this survey to assist the facilitators in supporting you, your faculty and your students next year.

NZQA is going digital...

A series of videos showcasing three schools that are early adopters of technology in teaching, learning and assessment.

View videos at:
http://www.nzqa.govt.nz/about-us/innovation-at-nzqa/

You cubed

A rich array of activities.
https://www.youcubed.org/task/seven-flipped/

Gapminder

gapminder downloads
gapminder data
gapminder videos

Facebook sharing...

Following the success of the Stats Teachers' Facebook page, there are now 3 groups sharing ideas, discussing and supporting each other in Senior Statistics, Senior Calculus & Mathematics.
Stats teachers on Facebook
Calculus teachers on Facebook
Maths teachers on facebook

Zaption

Turn online videos into interactive learning experiences.
https://www.zaption.com/
A free account allows you to:

- **Watch**
- **Find**
- **Create**
- **Share**
- **Track**
- **Copy and edit**