

# How come you're the only teacher in maths that gives assignments?

## Setting assignments in Maths

This is the question most frequently asked by my Year 8 class when I set assignments. It is not true, but it is their perception. There is an assignment in the assessment for Year 11 *General* and other teachers do sometimes set assignments.



A workshop using students' assignments to show how students can be challenged and extended mathematically in a small rural high school. The students' use of marking criteria will be discussed. The question in the title, commonly asked by students will be answered.



# Why give assignments in mathematics?

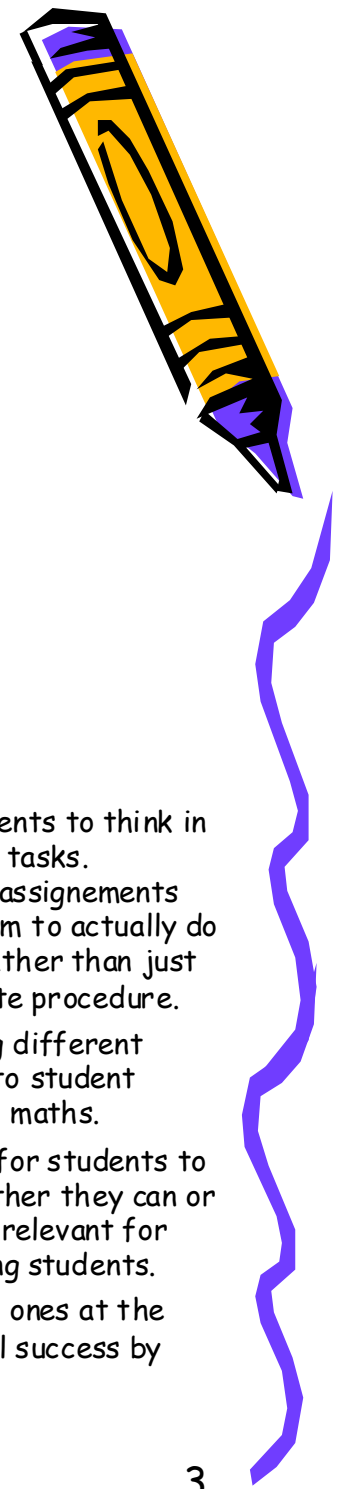
- Thinking mathematically
- Integrating learning
- Alternative assessment
- Experiencing "success"
  - Extension
  - Remedial

Assignments generally require students to think in more advanced ways than other set tasks. Students will often complain about assignments because an assignment requires them to actually do some hard mathematical thinking rather than just choosing and following an appropriate procedure.

Assignments are good at connecting different aspects of maths, or linking maths to student interests or showing applications of maths.

Assignments provide opportunities for students to show what they know, not just whether they can or can't do the set procedure. This is relevant for both low achieving and high achieving students.

Most students, and particularly the ones at the extremes are able to experience real success by doing assignments.



# What factors impact on the effectiveness of assignments in mathematics?

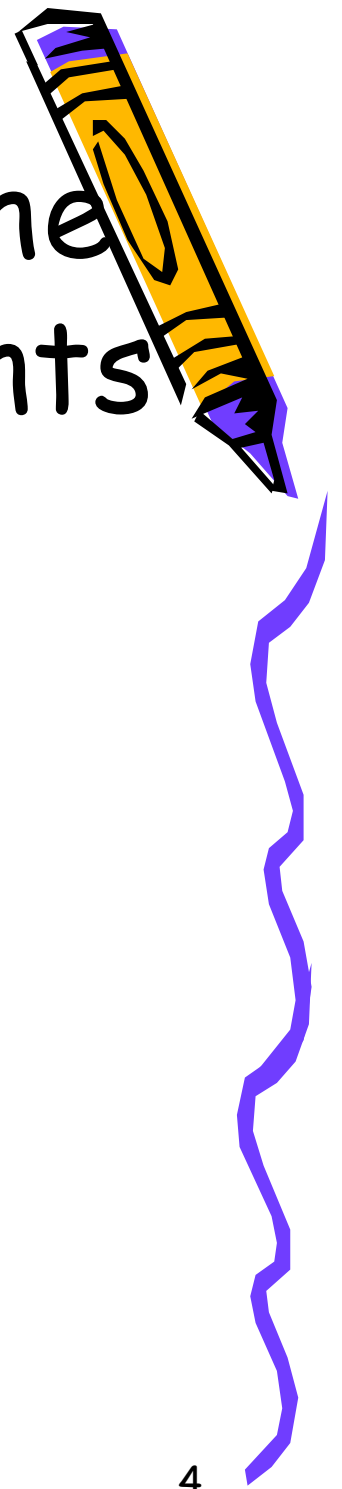
- Experience
- Attitude
- Mathematics "ability"



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# Experience

- Students
  - Have they had prior experience with assignments in Maths?

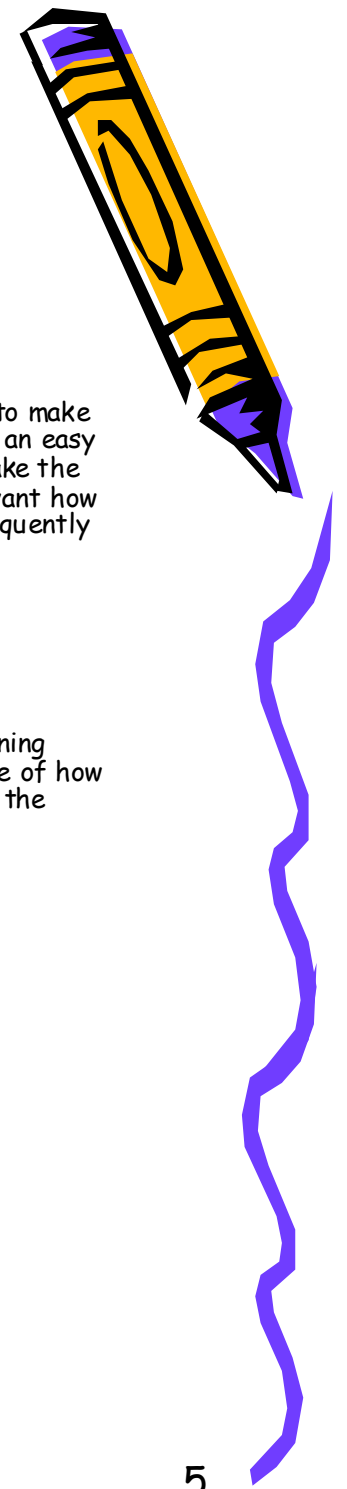
The first assignment can be frightening for students. You, the teacher, have changed the rules. The students will be required to make decisions that are foreign and the safety nets of familiar experience have been removed. The first assignment should be an easy assignment with lots of support and reassurance offered to support students to make the decisions. However, do not make the decisions for them or the next assignment will be an even worse experience, for both teacher and students. It is irrelevant how much experience the teacher has had, it is the students' experience that is crucial. By the way, it doesn't matter how frequently students do assignments in other subjects, it is their experience with maths assignments that is significant.

- Teachers
  - What is your prior experience?

If you have limited experience, give yourself permission to make mistakes and change things. Sometimes you can use it as a learning experience with students by letting them know it is an experiment for you and you will be learning together. Irrespective of how much experience you as a teacher have had, always explain to students why you are giving them the assignments. Emphasise the benefits you expect from their hard work.

- Colleagues
  - Are assignments part of the assessment program?

Lastly, use the expertise and support of your colleagues to help you. Learn from their mistakes and successes. If no one else in the maths faculty uses assignments, seek the support of teachers from other faculties.



# Attitude

- Students
  - What do the students' believe about maths?

What do your students' belief is maths? If they believe that maths is something that always has 1 correct answer, can be done in 1 minute and is done in a book. Welcome to the challenging world of assignment giving in maths. In giving assignments you are challenging all their beliefs about maths. This is very confronting for students. Start small and progress slowly. Later in the workshop, I will give 2 different ways assignments were introduced to 2 very different classes.

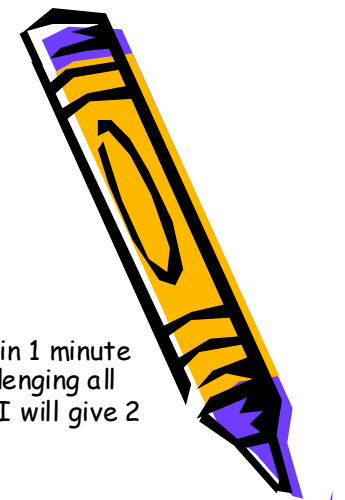
- Teachers
  - What do you believe about maths?

Your answer to this question is central to your success in giving assignments to students. If your beliefs are similar to the views of the students mentioned above, I'm not sure that you will have much willingness or success in using assignments.

I believe maths is what mathematicians do. This involves, team work, solving problems, wrestling with issues and using a range of resources over a significant length of time to explore an maths issue or dilemma. Assignments are one of the ways students are able to work as mathematicians in a school context.

- Colleagues
  - What are the views of your colleagues about maths assignments?

The views of your colleagues about maths will closely correlate with their views about assignments. Having discussions in the staff room about assignments, often becomes a discussion about what is mathematics and how do we learn maths.



# Mathematics "ability"

A tale of two classes with very different levels of mathematical achievement and attitudes towards maths.

- High "ability"
- Low "ability"



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# Year 8 class

A class destined to complete most of Stage 5.3 by the end of Year 10. Already undertaking some Stage 5.1 content.

- **Introductory assignment**

- Criteria marking, choosing topics, setting expectations

This assignment was a geometry assignment given solely for the purpose of introducing maths assignments and marking criteria. Any maths that students learnt from this assignment would be a bonus. My focus was on supporting students to make choices and understand the requirements and criteria. I provided an example assignment that scored 14/20 when we collectively marked it. We had a discussion of how this assignment could have been improved. I did very little support with the maths. It doesn't matter how many times you tell students, particularly girls, that "pretty" assignments are not what you want, they will focus on making the assignment pretty - until you start giving marks back. In this assignment do not expect a lot of quality mathematically, BUT, reward any that is there very highly (see relative marks in criteria).



- **Research assignment**

- Using internet, linking maths

The second assignment was very similar to assignments the students have done in other subjects. It used reference material to find out about famous mathematicians. The amount of time taken was about the amount of time I'd take over a year discussing different mathematicians as we started working on the maths they were involved with. This is an assignment type that students are familiar with and you can start emphasising the maths aspects of the assignment rather than just a biography. The two attached assignments were among the better assignments. The poster assignments were displayed in one of the classrooms.



- **Investigation assignment**

- Doing an investigation

This was a challenging assignment. My emphasis was on the process of investigation. Students were actively discouraged from re-writing their assignments. As the teacher, I was constantly asking them the questions I want them to ask themselves, "What if...?" and "What patterns/relationships did you notice?" and "Why?". It was expected that most students would complete most of their work in class. We started on Wednesday and over the weekend, some students found a lot about their patterns on the internet. On the Monday, I reemphasised "THIS IS NOT A RESEARCH ASSIGNMENT, I do not want to know what someone else found out". I verbally and publically encouraged those creating and using their own patterns as well as those students starting to use algebra to explain what was happening. Some students did some amazing mathematical thinking for this assignment.



- **In Term 4, this class will do the following assignments:**

**Application assignment**

Maths in life and/or work

**Explanation assignment**

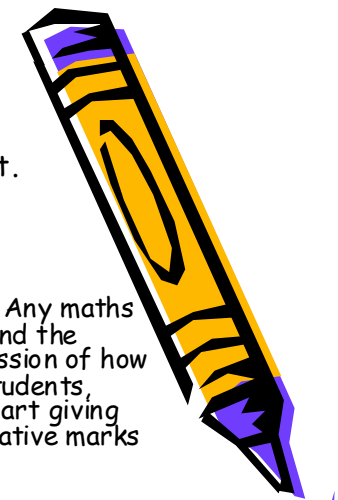
Explaining an aspect to others,



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# Year 7 class

A class with a couple of students attempting Stage 4, however most have not yet achieved Stage 3 and quite a few are yet to achieve some of the Stage 2 outcomes. The wide range of ability is due to the class being formed based on literacy and not numeracy achievement.

- **Literacy assignment**

- Terminology, text types

The purpose of this assignment was to introduce the students to the experience, expectations and marking of assignments. Computers and digital cameras were used to enhance the presentation of the final works and support students to achieve success. On the first day students were asked to make patterns using the tiles provided and photos were taken of the patterns. I used these photos to make example assignments for students to mark. The assignments contained some of the misconceptions of the students and reflected some of the comments made by students during the lesson. Each example assignment was marked by a group of students. For this task I was able to utilise a student teacher and various support staff in the school so that each group of students had an adult scribe who could also facilitate discussion of criteria.

- **Investigation assignment**

- Success, alternative activity

The purpose of this assignment was to introduce the students to an investigation assignment. Four options were presented in the first lesson, with students given only 10 minutes to start exploration. In the second lesson, students were given the assignment and asked to select which option they would further investigate. The work was done in a book so that the focus was on the working that the students were doing. All students spent the next 3 lessons completing and analysing multiplication patterns up to  $20 \times 20$ . The hardest aspect for the students was describing or explaining the patterns. They could show me by pointing but when required to write, they often did an easier pattern or would only do one pattern.

- **In Term 4, this class will do the following assignments:**

## **Geometry Assignment**

The students will complete an investigation of geometric figures using FX Draw 3.

## **Application assignment**

The students will undertake a project to organise and cost an excursion which they will undertake in the last week of term.



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