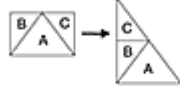


Always, Sometimes, Never True?



When you cut a shape and rearrange the pieces, the area and perimeter stay the same.

As students sit down to the first paper of the new GCSE, we hope you will have a little space look beyond the exams. Make a brew, sit down and digest the Secondary Magazine - better than sitting down with a pile of books to mark? We take a look at a school whose teachers don't mark books, and at a raft of suggestions from other schools looking at ways to cut down on teachers' marking loads, whilst offering more useful feedback to students.

And we pay tribute to Professor Malcolm Swan of Nottingham University, who died last month, and his unique contribution to the world of mathematics education.

Don't forget that all previous issues are available in the [Archive](#).

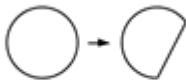
[Less Marking...More Effective Feedback?](#)



How much time do you spend marking student work? Is it time well-spent? Are there more effective/immediate ways to offer feedback, than the traditional ✓ or X in red pen, or the more laborious marking systems that are evident in many schools now? In this article, we signpost NCETM marking guidance, Ofsted's expectations, and look at ways schools can cut marking loads.

[Malcolm Swan: Learning for Deep and Connected Understanding](#)

Always, Sometimes, Never True?



When you cut a piece off a shape you reduce its area and perimeter.

For over three decades, Professor Malcolm Swan worked in maths education, researching effective ways to learn maths. He researched, created and trialled many high-quality resources aimed at promoting mathematical discussion and collaborative learning amongst students. In this article, we revisit some of these resources and examine the innovative approach he took.

And some other things to draw to your attention:

- How much practical equipment do you use in your classroom? Our latest [teaching for mastery case study](#) on use of place value counters in the secondary maths classroom (with slides), is now published.
- The monthly [newsletter](#) from our partner organisation, MEI, is out. Always a good, and helpful read, particularly now in the changing GCSE and A level landscape.
- The Mathematical Association (MA) want your intelligence on likely take-up of A level Maths and Further Maths from September, via a [short survey](#).
- The idea of abandoning setting for maths in secondary schools seems to be gaining traction. Hence this new [website](#), and associated [conference](#) in Sheffield, on 17 June.
- Finally, there is still time to sign up to the [BSRLM-BERA Practitioner-Research event](#), which takes place in London on 17 June; further details and a registration link are on the [BERA website](#).



Less Marking...More Effective Feedback?

How much of your working week (and weekend) is spent marking books? Is the marking done for the student, to inform planning, or to evidence feedback to a third party? Is it a good use of time, or could it be better spent on other tasks to support work in the classroom?

What would happen if you just stopped doing it? How would that go down with your head of department, or the school management? And what would you think of a school - rated Outstanding by Ofsted - that never requires its maths teachers to mark piles of books?

Here we tell the story of a school that believes that the most effective and efficient way for students to receive feedback does not involve teachers taking on that regular chore. But first some background...

The requirement to provide *evidence* of feedback to students, both for school management teams and for outside inspectors has, in recent years, sometimes led to explosive increases in the quantity of written feedback teachers are expected to give. At worst, evidencing feedback takes on a greater importance than maximising the benefit students get from it, or the formative feedback for teachers. Focus on marking, of course, takes time away from other important professional activities such as planning high quality lessons, collaborating with other teachers and responding to student needs in other ways. Getting the balance right is not straightforward.

The NCETM advises this, from its [Guidance on Marking and Feedback for Secondary Mathematics Teaching](#), October 2016:

The most important activities for teachers are the designing and teaching of the lessons. Marking and feedback strategies should be efficient, so that they do not steal time that would be better spent on lesson design and preparation. Neither should they result in an excessive workload for teachers.

The guidance is short, succinct and evidence-based – two pages that are well worth reading for any teacher feeling overburdened by piles of marking, or any manager reviewing marking policy.

Ofsted has no specific expectations about marking, only that it should be consistent with the school's policy. Its guidance, [Ofsted inspections: myths](#) (the 'myth-busting guide') says:

Ofsted recognises that marking and feedback to pupils, both written and oral, are important aspects of assessment. However, Ofsted does not expect to see any specific frequency, type or volume of marking and feedback; these are for the school to decide through its assessment policy. Marking and feedback should be consistent with that policy, which may cater for different subjects and different age groups of pupils in different ways, in order to be effective and efficient in promoting learning.

These two short [#OfstedMyths](#) video clips emphasise the point:

- [Mike Sheridan on marking](#)
- [Joanna Hall discusses feedback](#).

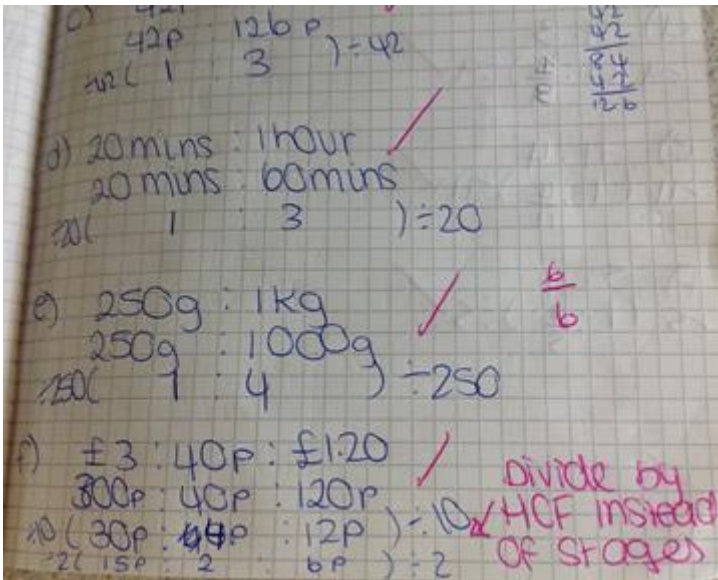
Despite this, some schools are still requiring regular extensive written feedback, including some or all of: statements of what the pupil can do; next steps, targets; worked examples; personalised questions. This 'deep-marking' process that can easily take three hours for a class set. Often there is then a requirement for pupils to 'respond' to the marking, by doing corrections or writing a response to the comments. As the

expectation for this type of marking is typically monthly or half-termly, students are sometimes working on corrections for questions that they got wrong weeks before.

A school that gives feedback without marking books...

Rated 'Outstanding' by Ofsted, St. John the Baptist School (SJB) in Woking, Surrey, uses 'smart marking and feedback' to ensure the students have a thorough understanding of what they do and don't know, in order to make progress. The policy, which has been in place, though continuously developing, for over a decade, never requires teachers to sit with piles of books. Yet despite this, every piece of work is marked – mostly by students themselves, or by/for their peers. The clear advantage with this, says Frances Carr (maths teacher and Maths Hub Lead for Surrey Plus), is that students are involved in the marking process and the feedback they get is immediate and formative. This is particularly important in maths, she says, because of the way the subject builds on skills, meaning that delayed feedback is often too late.

How it works at SJB



In a typical lesson, teachers will stop students after every few questions so that they can mark and then either move on, or troubleshoot any problems with the whole class or individuals. Students are taught, from Y7, to use a 'marking pen' (in a different colour) to mark all work, so that teachers can check it quickly. Students also complete half-termly tests. The tests are marked by the teacher, but no written feedback is given. Students receive meaningful feedback from reviewing questions as a class, and from this, set their own targets. Frances comments that while Y7s often start by writing generic targets such as 'Don't make silly mistakes' or 'Algebra', they quickly become more proficient at identifying specific bits of maths that they need to work on. The recent adoption of a mastery curriculum, focusing on each area of maths for a longer time helps with meaningful target-setting. A test that covers many areas of the curriculum, having only a couple of questions on fractions, might result in the target: "fractions" from a student that hasn't sufficient understanding of the topic to know what they do and don't understand. A test that is entirely on fractions allows students to more clearly see what they can and cannot do within this topic area.

Homework, for most KS4 classes, and for A level classes, is set every lesson (small but regular amounts in KS4, more substantial at A level) and is given with answers provided. Marking is an expected part of homework. Each subsequent lesson begins with time for students to raise any difficulties they had that



they were unable to sort out from the marking. KS5 students are encouraged to email difficulties to their teacher prior to the next lesson.

In KS3, homework is set fortnightly and usually using an online package which marks automatically. For a bottom set KS4 class, Frances describes how the teaching assistant will spend the first ten minutes of the lesson marking the homework books so that again the feedback is immediate, and the teacher can address any difficulties during the lesson.

The school also has an innovative scheme allowing all pupils to have handheld tablets. Whilst the impact of these is more widespread, for instant assessment purposes, they are used effectively much like mini-whiteboards. Ofsted commented:

Students were eager to show how quickly teachers check and correct work on this resource making suggestions for improvements.

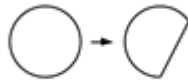
Other models

It seems that there are as many different marking policies across the country, as there are schools (or Multiple Academy Trusts!). Here are some other things that schools are trying, that you might like to consider:

- Marking only work that has first been marked by students, removing any need for responding to correct answers.
- Students use a particular colour pen to show that they want the teacher to look at it so that teachers can quickly review and assess books – this can speed up marking a set of books to half an hour per class.
- Used by many schools now – online and automatically marked homework. The effectiveness, or otherwise, of online homework is worthy of a full article, but it undoubtedly cuts down on time spent marking.
- Test/exam paper marking by only entering marks per question on a spreadsheet, then students receiving a red/amber/green printout.
- Marking the books from pupils requiring more attention first, while you are still fresh – some schools are asking teachers to give pupil premium students this priority treatment to emphasise the importance of closing the achievement gap.

Further reading

- [A marked improvement?](#) The Education Endowment Fund's review of the evidence on written marking, April 2016, which states that: The quality of existing evidence focused specifically on written marking is low.
- For a punchy, and research-backed repudiation of some of the more onerous marking policies around, see Jemma Sherwood's [blogpost](#) from February. For more detailed description of her department's marking policy now, see this [recent post](#) (Jemma Sherwood is an AST/SLE and head of department who blogs and tweets as [@jemmaths](#)).



When you cut a piece off a shape you reduce its area and perimeter.

Malcolm Swan: Learning for Deep and Connected Understanding



Professor Malcolm Swan, from Nottingham University's [Centre for Research in Mathematics Education \(CRME\)](#), formerly the [Shell Centre for Mathematical Education](#), died at the end of April.

Perhaps more than anyone else of his generation, Professor Swan, inspired and influenced countless teachers in their classroom practice. He did this through researching how children, teenagers and young adults learn maths, and through working directly with teachers to explore how the subject can most effectively be taught.

As a trusted friend and advisor to the NCETM, he worked closely with our team on a number of projects. In this article, we look at some of his work, popular and lesser known, and tease out the unique contribution he made to maths education throughout his career.

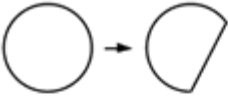
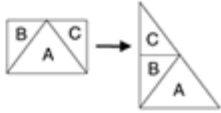






Malcolm Swan was concerned very much with the experience of the learner of mathematics. This cartoon, published in [Improving Learning in Mathematics](#) (2005) (also known as 'The Standards Unit box') gets to the nub of it:



CTRL+Click to enlarge

Whilst he aimed to develop better teachers of mathematics, great teaching was understood by him, through the experience of the learner. The research he undertook, and the resources produced as a result, demonstrate his persistence in promoting deep and connected understanding. He was concerned that students should take time to understand a concept properly and believed that this was best done through collaborative learning and discussion. His GCSE-resit resources bravely pioneered this approach within the time constraints of running a resit course, favouring a deep and connected understanding of fundamental mathematical concepts over complete course coverage.

The activity SS4 (from [Improving Learning in Mathematics](#)) gives an example of the sort of deep, connected thinking and reasoning that Malcolm's classroom activities promoted (click image to view as enlarged downloadable PDF):

<p>A</p>  <p>When you cut a piece off a shape you reduce its area and perimeter.</p>	<p>B</p>  <p>When you cut a shape and rearrange the pieces, the area and perimeter stay the same.</p>
<p>C</p>  <p>If a square and a rectangle have the same perimeter, the square has the smaller area.</p>	<p>D</p>  <p>Slide the top corner of a triangle from left to right. The area of the triangle stays the same.</p>
<p>E</p>  <p>Draw a triangle. There are three ways of drawing a rectangle so that it passes through all three vertices and shares an edge with the triangle. The areas of the three rectangles are equal.</p>	<p>F</p>  <p>Draw a trapezium and draw its diagonals. The shape is now split into four triangles. Exactly two of these triangles are equal in area.</p>
<p>G</p>  <p>If you join the mid points of the opposite sides of a trapezium, you split the trapezium into two equal areas.</p>	<p>H</p>  <p>If you join the mid points of the sides of a quadrilateral, you get a parallelogram with one half the area of the original quadrilateral.</p>

Briefly, learners work in pairs to:

- Understand the statement on their card
- Decide if it is true for specific examples
- Decide (and justify) if it is always, sometimes or never true
- Write, argue and explain their reasoning.

Malcolm's resources were produced with extensive, thoughtful rationale, teacher notes and lesson suggestions, available for this resource [here](#).

Malcolm's work, based at the University of Nottingham, often followed this structure:



- **Designing lessons to tackle particular difficulties learners have with mathematical understanding.** He was particularly interested in helping them to connect new learning with other areas of maths.
- **Research and trialling** the lessons that he had produced. This was a process that involved working with many practising teachers and their students in order to trial and refine lessons.
- **Producing high quality, fully tried and tested resource packages.** These, as can be seen from the examples linked, were fully resourced with worksheets, teacher notes and rationale.

Malcolm was particularly good at producing lesson resources that had the power to change teachers' ways of thinking when they engaged with them. His work was not just about producing excellent classroom resources – he always had an eye on the professional development of teachers that necessarily went alongside. High quality professional thought and dialogue was provoked and encouraged. His work popularised the now widespread use of 'card-sort' and 'Always, Sometimes, Never?' activities, the latter particularly good for promoting early thought about mathematical proof.

Over more than three decades devoted to his research, and to making that research relevant and useful to teachers of mathematics, Professor Swan influenced and led numerous ground-breaking projects. Here is a selection:

- [Primas \(Promoting Inquiry in Mathematics and Science Education across Europe\)](#) professional development modules explore the pedagogical challenges that arise when introducing investigative, non-routine problem solving activities to the classroom. Extensive guidance for leading professional development is based around a specific lesson planned for each module.
- The [LeMaPS \(Lessons for Mathematical Problem Solving\) study](#) brought teachers together across schools into research groups to investigate the potential of a Japanese lesson study model to support the professional learning of British teachers. The model involved small groups of teachers across schools planning a problem-solving lesson together, watching one another teach it, and following this up with analysis of the learning that they had observed in one another's classrooms.
- The [Mathematics Assessment Project](#), developed in collaboration with the University of California, Berkeley sets out to design and develop well-engineered tools for formative and summative assessment. Although developed to support the US curriculum, the tools are relevant to any curriculum that seeks to deepen students' understanding of mathematical concepts and develop their ability to apply that knowledge to non-routine problems.
- The NCETM's [KS3 Multiplicative Reasoning Project](#) offers a proven model for professional development that can be used with groups of teachers to support development of multiplicative reasoning skills in their pupils. The model consists of a series of professional development workshops together with associated lessons, of which [these](#) are three examples - on fractions, bar modelling and multiplicative structures.