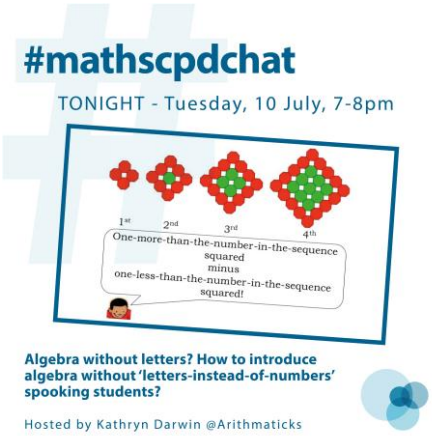
National Centre for Excellence in the Teaching of Mathematics

#mathscpdchat 10 July 2018

Algebra without letters? How to introduce algebra without 'letters-instead-of-numbers' spooking students?

Hosted by @Arithmaticks

This is a brief summary of the discussion – to see all the tweets, follow the hashtag ***#mathscpdchat*** *in Twitter*



Some of the areas where discussion focused were:

- how, and to what extent, **algebraic ideas are encountered by pupils in Key Stages 1 and 2**;
- various **tasks and approaches used in Y7**, and how they relate to pupils' experiences in KS1/2;
- **introducing letters**; letters representing specific unknown values, letters representing variables, that using letters for things ('fruit salad' algebra, 'a' for 'apples', 'b' for 'bananas') leads to **misconceptions and obstacles to learning**;
- when and how to introduce **conventional language and associated concepts**, for example knowing what 'expression' and 'equation' mean; using examples and non-examples;

- sources of **fear and anxiety about algebra**; building the ability to use algebra out of normal reasoning;
- **linking ideas and representations**; connecting straight line graphs, equations and sequences.

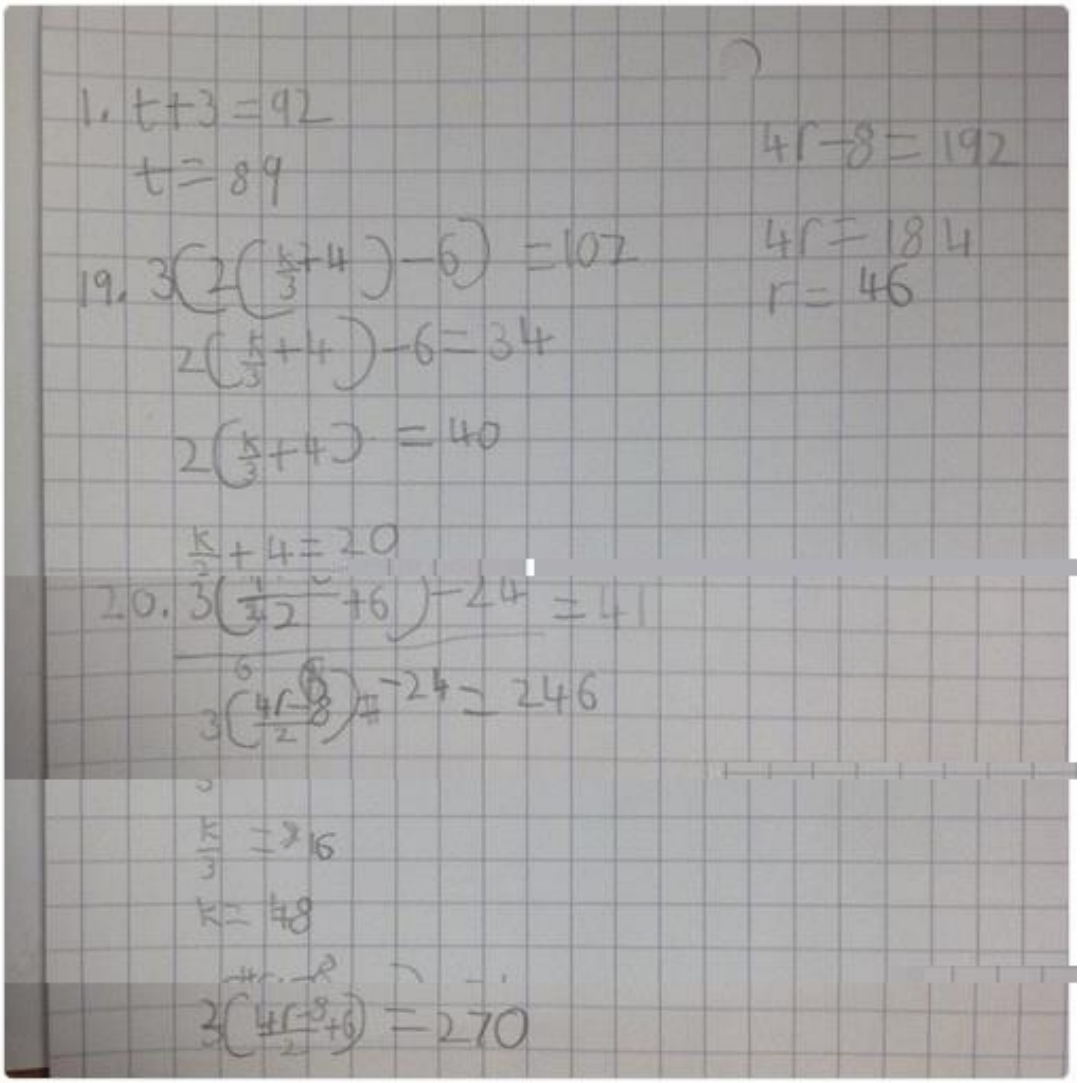
A particularly interesting sequence of tweets, about using Grid Algebra by Dave Hewitt, and ICCAMS algebra tasks, (see links below) to build pupils' understanding and use of algebra on their normal reasoning skills, followed from this tweet by Kathryn Darwin:

including this one from Richard Perring

Richard Perring @LearningMaths · 15h

Flying visit to #mathscpdchat to say Grid Algebra by Dave Hewitt available from @ATMMathematics can help with a lot of the issues raised.

This is some work from a group of primary students after a couple of weeks with Grid Algebra...



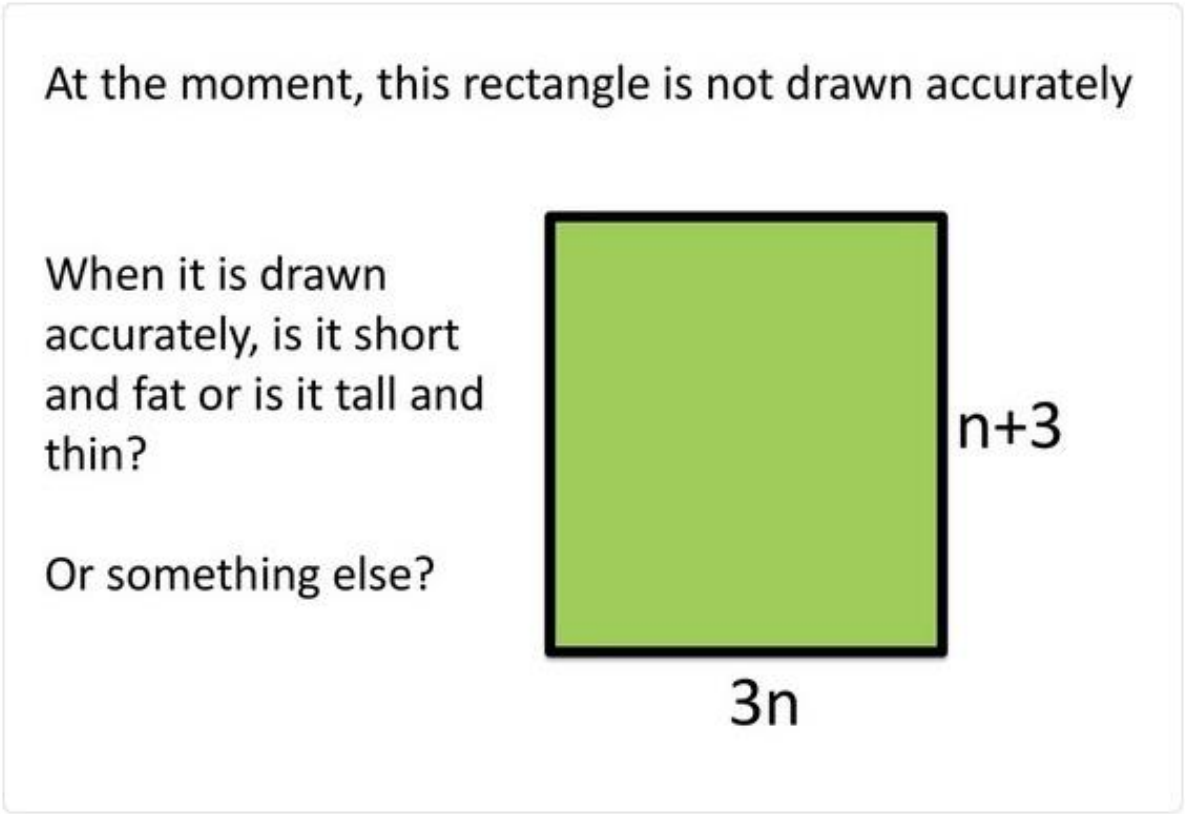
this one, again from [Richard Perring]

Richard Perring
@LearningMaths

Following

Replying to @PardoeMary @Arithmaticks @ATMMathematics

Interesting topic! Following work on the @iccamsadmin I'm thinking about geometry as a way to access the idea of a variable - for example...



8:05 PM - 10 Jul 2018

and this one from Kathryn Darwin

Kathryn @Arithmaticks · 15h

Replying to @LearningMaths @PardoeMary and 2 others

In our SoL area falls in the same place as multiplication, and then algebra comes after so we do a lot of this. That is a stunning question!

and this one from Richard Perring

(to read the discussion-sequence generated by any tweet look at the 'replies' to that tweet)

Among the links shared were:

ICCAMS Maths which is the website of a research project investigating ways of increasing competence and confidence in algebra and multiplicative structures, shared by @LearningMaths

Grid Algebra which is software by Dave Hewitt, from the Association of Teachers of Mathematics (ATM), a visual and kinaesthetic way to learn number and algebra and pre-algebra, shared by @LearningMaths

Visual Patterns which contains blog posts and photographs from teachers and students who have used visual patterns in their classrooms, including to support the learning of algebra, shared by @DavidKButlerUoA

Key Ideas in Teaching Mathematics - Algebraic reasoning which is an article, that focusses on Algebraic Reasoning, in the NCETM Secondary Magazine 109, written by Anne Watson, Keith Jones and Dave Pratt, the authors of *Key Ideas in Teaching Mathematics*, shared by @PardoeMary

Key Ideas in Teaching Mathematics which is a website and accompanying book for teachers and other education professionals interested in how secondary school students best learn mathematics, shared by @PardoeMary

Using Algebra to Reconcile Different Ways of Seeing which is an entry in the NCETM Mathemapedia showing an example of a way of working with pupils to help them understand and use equivalent algebraic expressions, shared by @PardoeMary