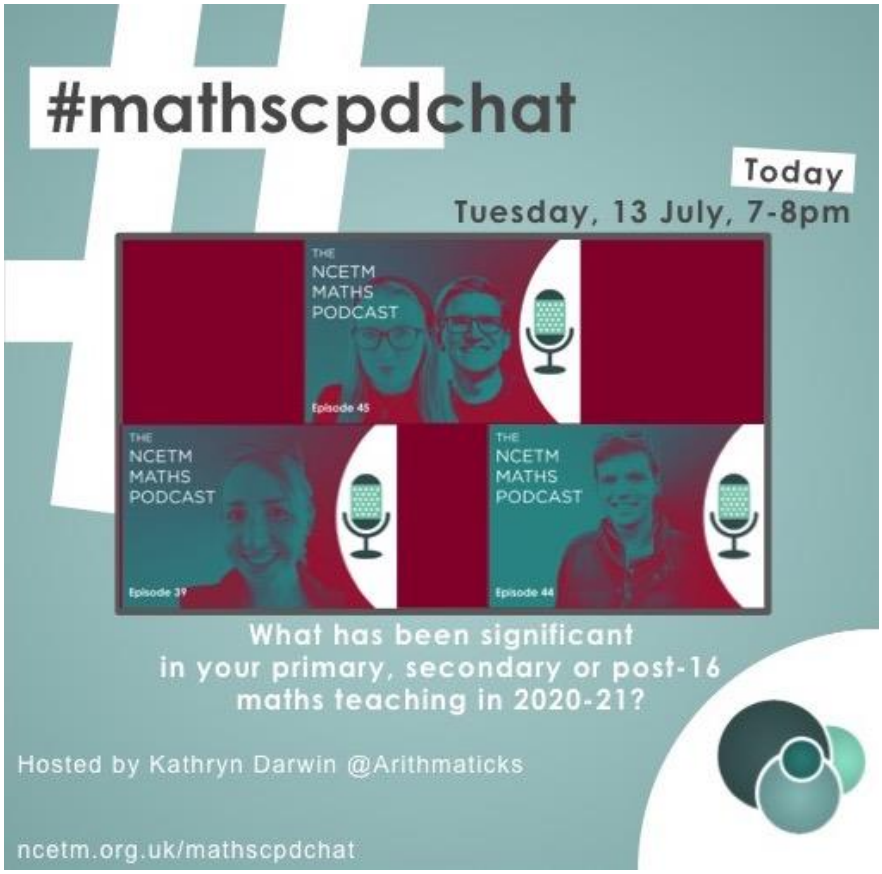
#mathscpdchat 13 July 2021

What has been significant in your primary, secondary or post-16 maths teaching in 2020/21?

Hosted by Kathryn Darwin

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



Among the links shared during the discussion were:

Integral Maths which is an online teaching and learning environment developed by MEI. It supports teachers and students by providing comprehensive high-quality resources for teaching and learning mathematics beyond GCSE level. It was shared by Tayyub Majeed

Mathsbot manipulatives which is a large collection of virtual manipulatives created by Jonathan Hall. It was shared by Catherine Edwards

Teaching Math With Examples which is a book by Michael Pershan. The author explores issues that arise when teachers aim to use worked examples effectively to support problem solving in mathematics, and offers advice. It was shared by Catherine Edwards

GLT Book Club podcast: with Michael Pershan which is an episode of the Greenshaw Learning Trust Book Club in which teachers discuss Michael Pershan's book *Teaching Math With Examples* with the author himself. It was shared by Karen Hancock

Go Teach Maths! which is a website providing resources for maths teachers, such as presentations, worksheets and tasks. It was shared by Katy Sherwin

Rounding!!! which is a short video in which Andrew Jeffrey uses a made-by-Andrew-Jeffrey 'computer' to remind Y5 pupils how to round whole numbers to multiples of ten. It was shared by Andrew Jeffrey

The Fluency Project which is a 'Mathematical 'Facts-ination' (to counteract loss of fluency)'! It contains a variety of material created by Andrew Jeffrey, including times-tables-flashcards, A3 Maths Mats, a *We love maths* home activity pack, *Maths Facts of the Week*, and other delights designed to help primary pupils enjoy developing fluency in doing mathematics. It was shared by Andrew Jeffrey

WHITEBOARD.fi which is a free online whiteboard tool for teachers and classrooms. When using it with a class you can, for example, present something interesting on your whiteboard, and wait for your students to show their responses on their own individual whiteboards. It was shared by Emmaface

Miro whiteboards which is an article explaining an 'Education Plan' provided by miro.com, who are makers of whiteboards that are designed to 'bring interactivity and power of visual collaboration to your classroom'. It was shared by Andrew Parker

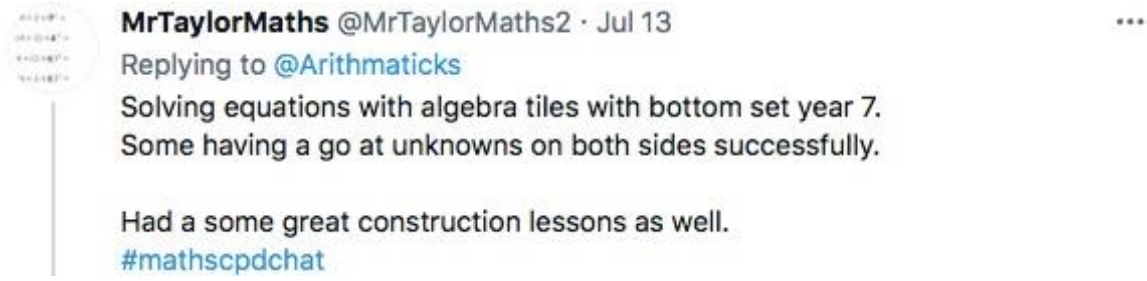
Maths White Board which is a blog by Colleen Young about materials, such as tasks intended for 'retrieval practice', that were created by Matt Woodfine. It was shared by Colleen Young

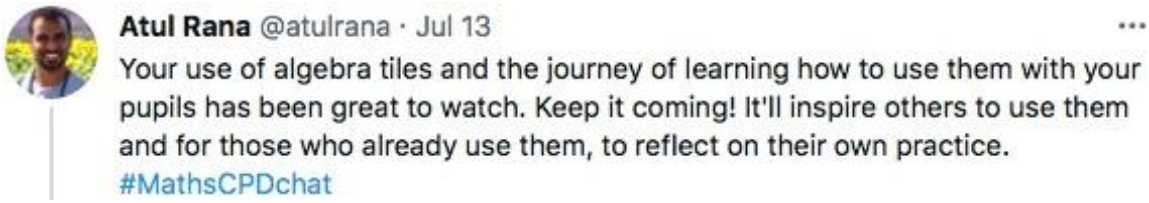
Last lesson, last week, last topic, last term / mathswhiteboard.com which is a tool that can be used to compile sets of questions about mathematical 'topics' for people to try to answer. It was shared by Hannah

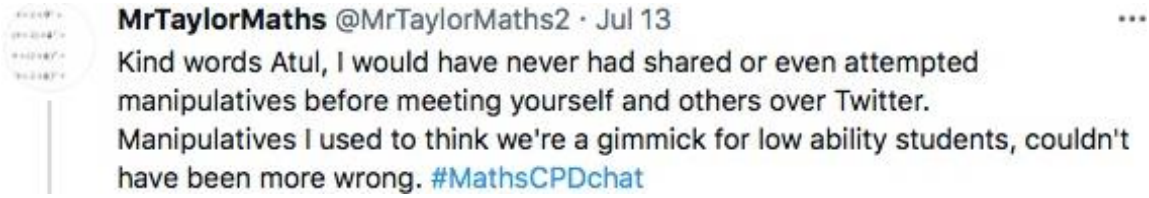
The screenshots below, of chains of tweets posted during the chat, show parts of five conversations about what teachers believe were some of their best lessons during the year. Mr Taylor's first tweet is reproduced twice because it prompted two different discussions. **Click on any of these screenshots-of-a-tweet to go to that actual tweet on Twitter.**

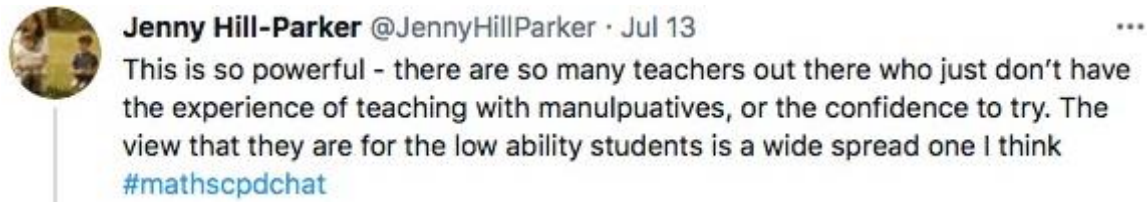
The conversations were generated by this tweet from Kathryn Darwin:

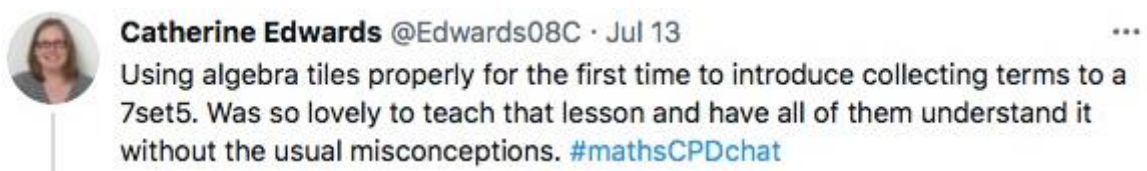
and included these from Mr Taylor, Atul Rana, Catherine Edwards, Jenny Hill Parker and Alice Ward-Gow:











Miss Ward-Gow @mcwardgow · Jul 13

Replying to @Edwards08C and @Arithmaticks

With you there on the algebra tiles 😍 I finally got round to using them with my Y10s - they really liked the visual aspect and it seems to have helped with their knowledge of expanding and factorising 😁 #mathscpdchat

Atul Rana @atulrana · Jul 13

I ought to integrate manipulative use with spreadsheets! Trialling some number bond stuff with tutees on google sheets. Cell A1+ Cell A2 = 10; so what must go in the two cells? They really like having control on programming stuff into spreadsheets 🙂
#MathsCPDchat

these from Mr Taylor, Kathryn Darwin and Atul Rana:

MrTaylorMaths @MrTaylorMaths2 · Jul 13

Replying to @Arithmaticks

Solving equations with algebra tiles with bottom set year 7.
Some having a go at unknowns on both sides successfully.

Had a some great construction lessons as well.
#mathscpdchat

Kathryn MCCT 🙋‍♀️ @Arithmaticks · Jul 13

Replying to @MrTaylorMaths2

Well, we all need to know more about how to do constructions lessons so well we boast about it on twitter :P do elaborate! #mathscpdchat

MrTaylorMaths @MrTaylorMaths2 · Jul 13

I love construction now, no compasses to begin with. Badly drawn circles (potatoes) are fine, build up the understanding (lots of chat about the radius being the same length), build up the process, then deal out compasses to do more accurately.

Kathryn MCCT 🙋‍♀️ @Arithmaticks · Jul 13

Replying to @MrTaylorMaths2

Interesting! Why no compasses first? #mathscpdchat

MrTaylorMaths @MrTaylorMaths2 · Jul 13

Students get so caught up in the compass-use they miss all the wonderful geometric reasoning going on, and they forget what they're aiming for.
#mathscpdchat

Kathryn MCCT 🙋‍♀️ @Arithmaticks · Jul 13

I like that... so you'd get them to freehand draw loci first to 'feel it'?
#mathscpdchat

MrTaylorMaths @MrTaylorMaths2 · Jul 13

Replying to @Arithmaticks

Yep, after a discussion about the radii of circles.

Used a radii of 2m due to social distancing which was easy for them to engage with.

Jenny Hill-Parker @JennyHillParker · Jul 13

Do you start with story telling, ie a goat on a rope for a circle and so on? #mathscpdchat

Kathryn MCCT 🙋‍♀️ @Arithmaticks · Jul 13

GOOD QUESTION! I usually do a dog outside a shop, pacing for its owner! #mathscpdchat

Atul Rana @atulrana · Jul 13

I agree with this. There's incredible dynamic geometry software for construction, time to plug @autographmaths which brings the topic alive. I just do it all on Bitpaper. Sort of like AutoCAD drawings vs paper ones. #MathsCPDchat

these from Karen Hancock and Kathryn Darwin:

Karen @karenshancock · Jul 13

Replying to @Arithmaticks

Ratio.... All the way... Bar modelling for the first time and seeing them get all the questions! #mathscpdchat

Kathryn MCCT 🙋‍♀️ @Arithmaticks · Jul 13

How did it go? Was it different to how you 'used to' do it? #mathscpdchat

Karen @karenshancock · Jul 13

I did it twice - once with Year 8 and once with Year 9.
I was also using "Teach Maths with Examples"- so gave them a full worked example. Which meant I could use the self-explanation prompts to address other types of question... Will try to find a picture. #mathscpdchat

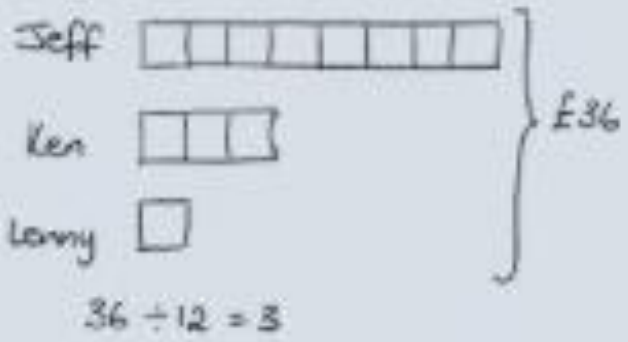
Karen @karenshancock · Jul 13

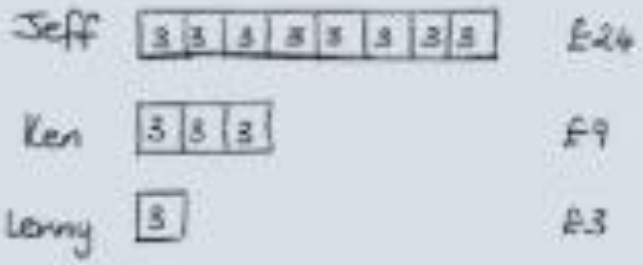
Replying to @karenshancock and @Arithmaticks

Here's lesson 1 and then lesson 2:
#mathscpdchat

Worked example:

Share £36 between Jeff, Ken and Lenny in the ratio 8:3:1





- How can I quickly check whether I have made a mistake?
- What if I was told that altogether Ken and Lenny received £20, how would that make the question (and answer different)?

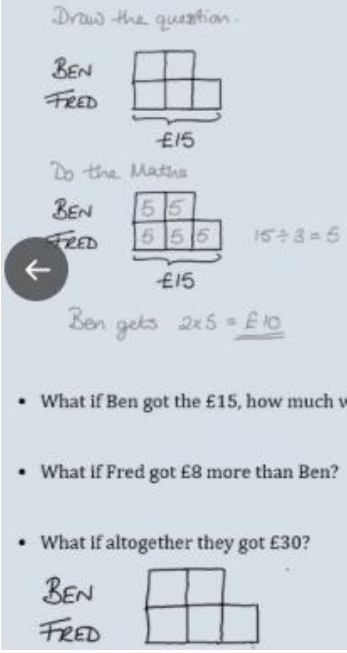
Your turn:

Divide £240 between Anna, Bess and Charlie in the ratio 5:2:1

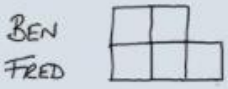
Worked Example:

Ben and Fred share some money in the ratio 2:3.

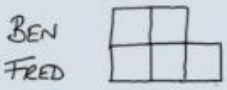
Fred gets £15, how much does Ben get?



- What if Ben got the £15, how much would Fred get?



- What if Fred got £8 more than Ben?

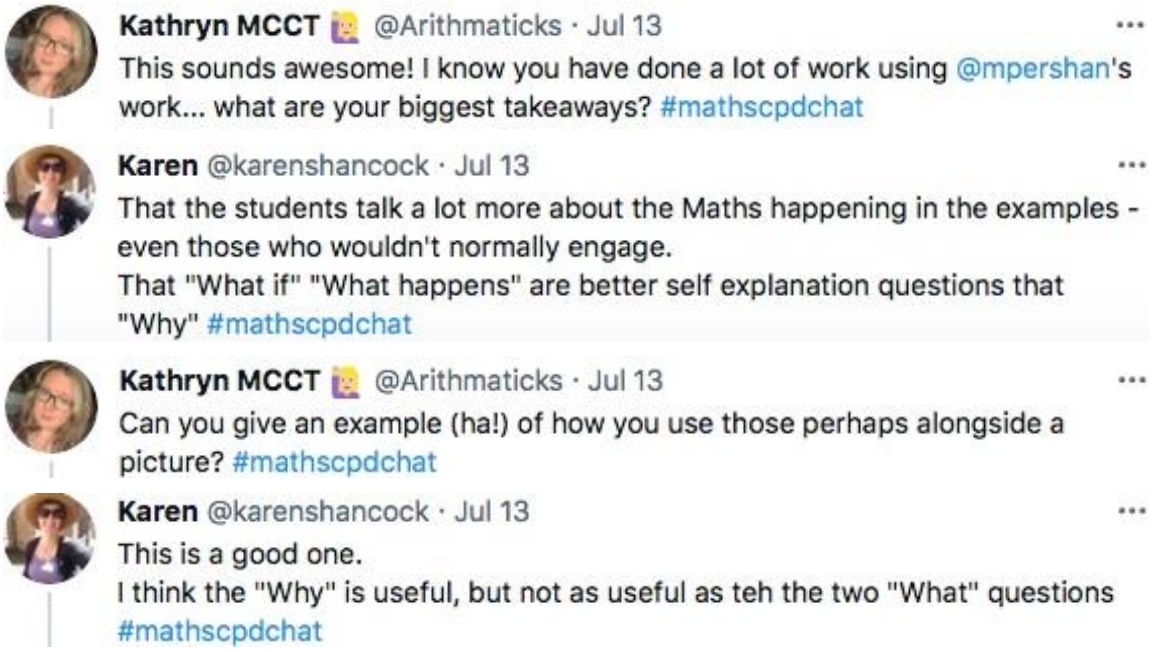


- What if altogether they got £30?

Your Turn

In a recipe the ratio of butter to sugar to flour is 2:1:4.

I use 25g of butter, how much flour and sugar do I need?



Worked example:

Calculate the area of the following circle:

$A = \pi r^2$

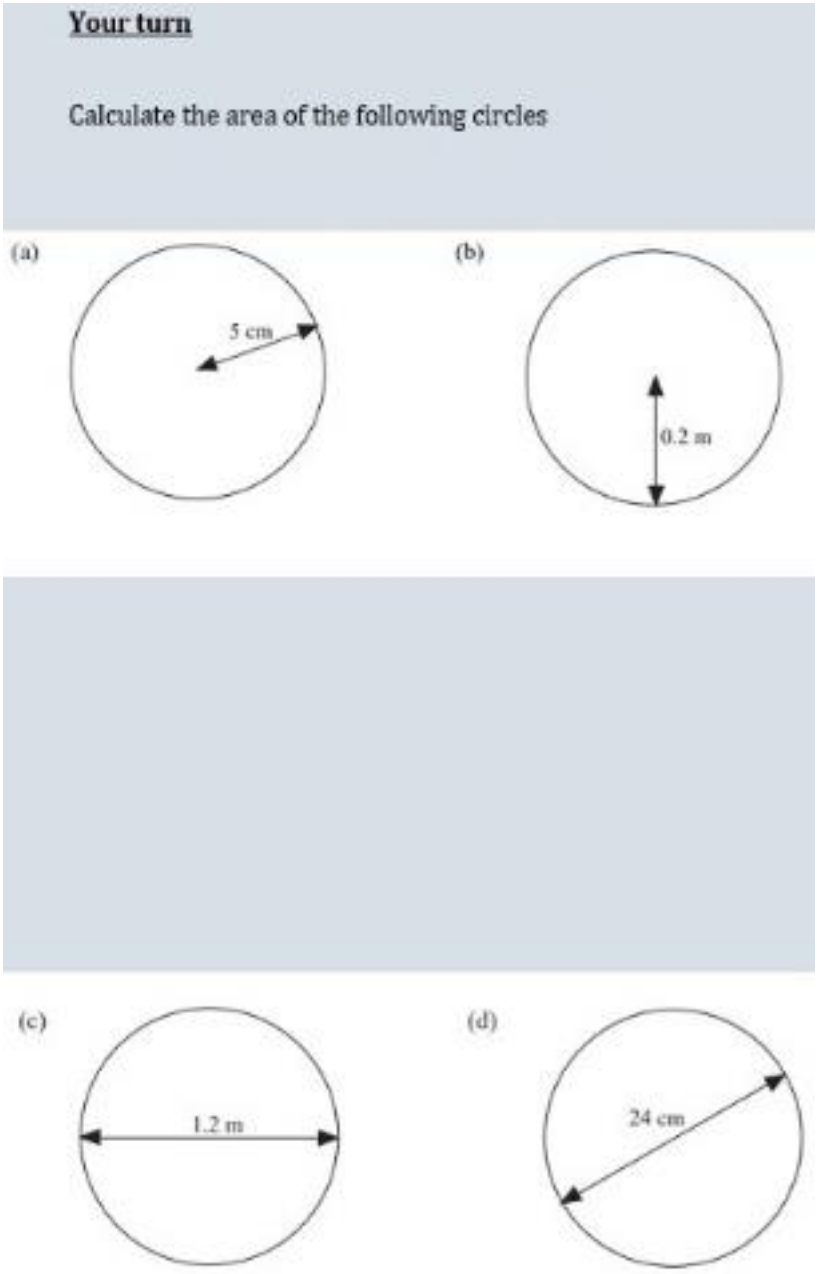
$d = 5 \quad r = 2.5$

$A = \pi (2.5)^2$

$= \frac{25}{4} \pi$

$= 19.63 cm^2$

- Why in the example do they only square the 2.5?
- What happens to the area if the diameter is doubled?
- What if you were asked to find the area of this shape next - can you see any shortcuts?



these from Sudeep and Kathryn Darwin:

Sudeep @boss_maths · Jul 13

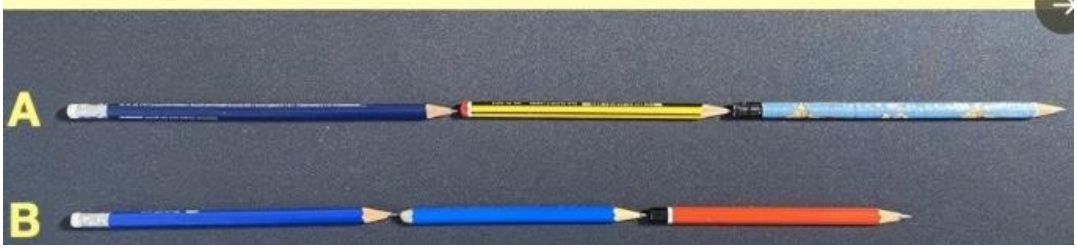
Replying to @Arithmaticks

This activity (following a previous look at the mean) went really well. Compared to showing animations and towers, I found that playing with paper folding really made the concept "stick" for them. #mathscpdchat

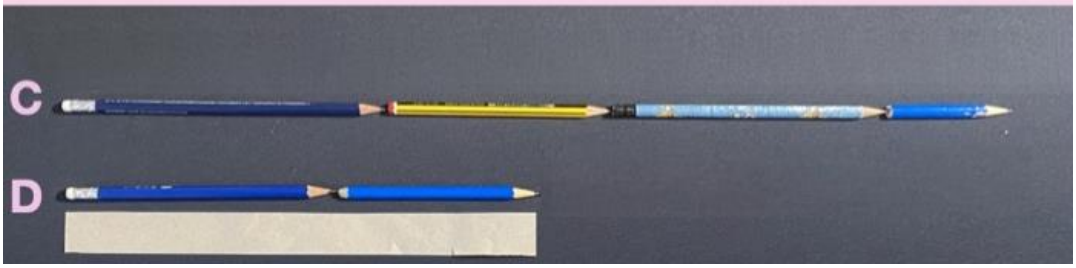
> **Sudeep** @boss_maths · Jan 11
>
> Thinking about the mean, and what can be explored *without* numerical computation.
> (I think the latter Qs would ideally be explored in person with real objects & paper strips, rather than just presented on screen as shown.)

Mean

Here are two sets of pencils, set A and set B, each with three pencils.
In which set is the mean length of pencil greater?
Explain how you know.



Here are two more sets of pencils.
You don't have a ruler or tape measure, but you are given a strip of paper whose length is equal to the total length of the two pencils in set D.
Using no other equipment, how could you determine which set has the greater mean pencil length?



Here are another two sets of pencils.
You still don't have a ruler or tape measure, but you now have a strip of paper whose length is equal to the total length of the pencils in set E.
Using no other equipment, how could you determine which set has the greater mean pencil length?

Kathryn MCCT @Arithmaticks · Jul 13
Oooh this looks interesting! Tell us more! #mathscpdchat

Sudeep @boss_maths · Jul 13
I think folding a real life paper strip the length of eg 4 pencils into quarters was a more visceral way for them to appreciate the mean compared to seeing me draw a model or watching a geogebra on a screen. #mathscpdchat

Kathryn MCCT @Arithmaticks · Jul 13
Something to be said for letting students really 'feel' the maths... I think @mrshawthorne7 and @giftedHKO would agree after our similarity lesson we planned! #mathscpdchat

and these from Andrew Jeffrey and Kathryn Darwin:

Andrew Jeffrey @AJMagicMessage · Jul 13
Replying to @Arithmaticks
I think my favourite was making a rollercoaster out of trunking and a marble to explain rounding! #mathscpdchat

Kathryn MCCT @Arithmaticks · Jul 13
Right. I need more details on this please! #mathscpdchat

Andrew Jeffrey @AJMagicMessage · Jul 13
Here it is @Arithmaticks ! #mathscpdchat

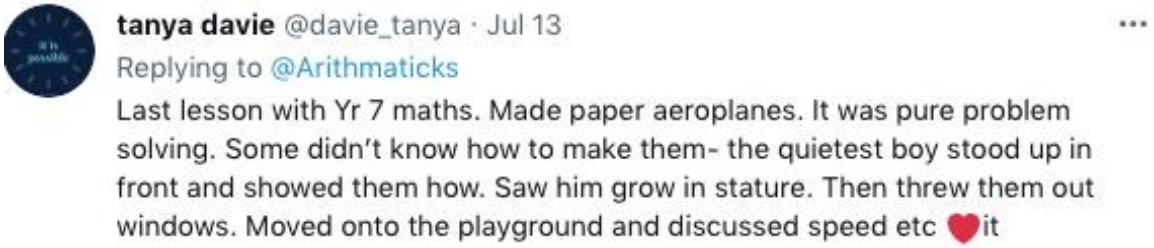
> **Andrew Jeffrey** @AJMagicMessage · Mar 9
> Made a computer today to help remind Y5 how rounding looks. (It's just a piece of trunking!) #EduTwitter #RecoveryNotCatchup

(video)

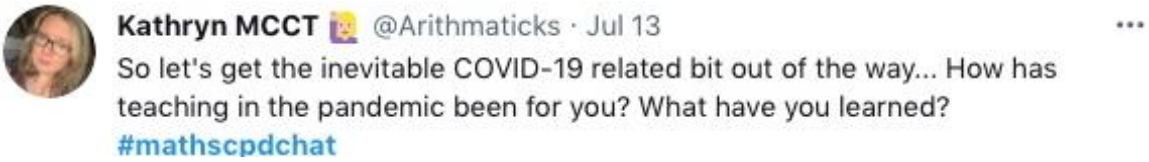
(to read the discussion-sequence generated by any tweet look at the 'replies' to that tweet)

Other areas where discussion focussed were:

a teacher posted a tweet in response to the host's greeting-tweet at the start of the chat:



the host's first question was:

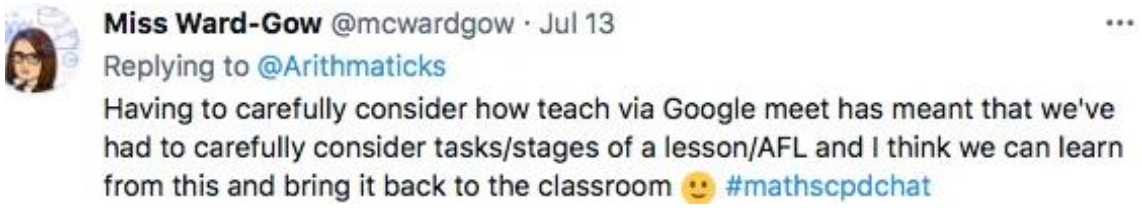


- teachers agreed that the year had 'been a coronacoaster, some real ups, some downs and some long hard slogs' … many also said that **interacting with other maths teachers on Twitter** had been helpful and sometimes inspirational … the consequent feeling of 'togetherness' is valued, for example:

- teachers tweeted about how 'teaching between the desks' is important to them, and that they feel they are 'better teachers' when they can do that … there were comments about how the **circumstances of their teaching this year 'have made us more inventive'**, for example 'with our use of mini-whiteboards and questioning techniques';
- admiration of the **resilience** of both students and fellow teachers was expressed;

the host asked whether having to teach in pandemic-conditions had changed teachers' practice for the better, and if so in what ways:

- several teachers commented that during remote teaching they **asked diagnostic questions more frequently** than ever before, and that they had carried this custom on into classroom teaching;
- teachers mentioned that they would continue to use most of the **hardware and software that they had learnt to use during the yea**r … such as OneNote, Desmos, Whiteboardfi, a graphics tablet, a visualiser, …;
- some teachers, as a result of their practice during the lockdowns, have now established procedures in which after every lesson they post, for the benefit of absent students or as revision material for all students, **a recording of the lesson or PDF versions of slides used during the lesson** … at least one teacher sends slides containing the questions/problems/tasks worked on during the lesson together with more slides containing the teacher's 'hints' and other notes on them;
- this was a typical comment …



- other teachers wrote comments such as **'online lessons made me think so carefully about clarity of exposition and quick checks of understanding'**;
- many teachers mentioned that a consequence of teaching through the pandemic is that they **can now create/edit their own videos** …

- the host asked whether they will **continue to create video 'lessons'** …

the host's third question invited teachers to describe their 'best lesson this year', and most of the replies, with any discussion generated, is shown in the sequence-of-screenshots-of-tweets given above, but there were a few other comments:

- a teacher described what happened during a Zoom lesson when her internet connection went down … when eventually she got back into the lesson she discovered that 'one of the kids has screen shared the example slides from the VLE and they're teaching each other';
- a teacher added this tweet after the chat was over …

Carl Horwitz @Mathowitz · Jul 14

Replying to @Arithmaticks

Honestly, I love how I introduce log notation. They've done powers, then just as them to solve a series of exponential equations: 5^x=125, 8^x=1/2, 9^x=27... That's all this strange format is saying. They have a solid basic understanding in minutes.

the host invited teachers to describe what they had learnt from any 'failures' during the year:

- a teacher wrote that he had **wrongly assumed that his Year 4 students had previously acquired understanding** of, and knowledge about, 'telling the time' that they did not actually display when he began to work with them on it … so he 'changed course' to work with them on this topic as if they were KS1 students … he **learnt not to make such assumptions** in the future … a teacher responded by describing an incident in which her own five year old child had behaved in front of a new teacher as if he couldn't do something (when he could) because he 'didn't want to read to a stranger';
- a teacher mentioned that an **online lesson about multiplying fractions had left her students in a state of confusio**n … she **started again** using a Desmos presentation in which every numerator and dominator of the fractions being multiplied was a two-digit number with 'obvious' factors … so that students could more-easily think about and discuss ways of simplifying the numerical expressions (the products);
- a teacher had trouble trying to help KS3 students reason about angles …

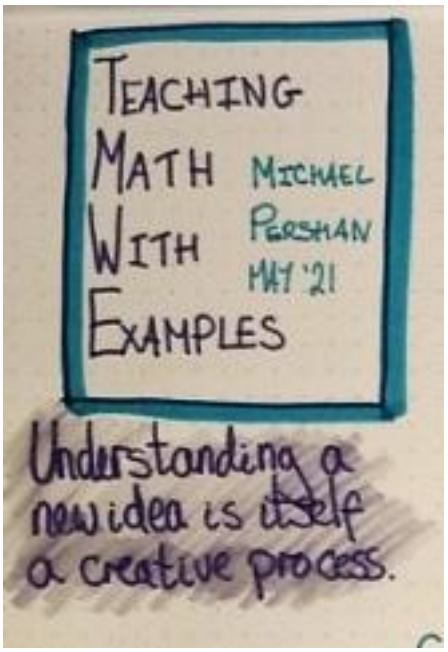
Catherine Edwards @Edwards08C · Jul 13

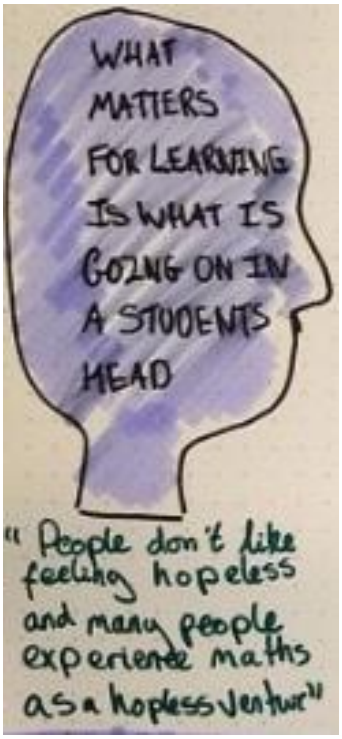
Replying to @Arithmaticks and @mrbartonmaths

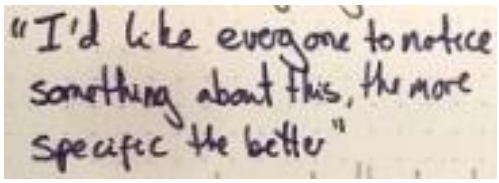
Trying, and emphasise the trying, to teach Y8 angle chasing. They just were not getting it, and then refused to try. I learnt that talking through the model isn't always the best way. In the end I used a written worked example as suggested by @mpershan in his book. #mathscpdchat

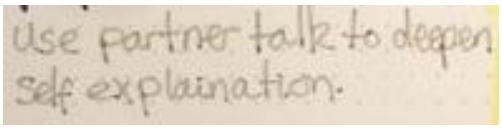
- several teachers described **difficulties they experienced when they were trying to explain remotely to KS4 students how they should submit their work online** using Google Classroom or OneNote … they **learnt** that with most students **'online submission needs REAL LIFE training first'**;
- as a consequence of struggling from the start of the year to teach a Year 7 'bottom set' containing students from various different primary schools, **a teacher concluded that effective strategies when working with this group included 'keeping content 'simple' but challenging thinking'** and 'making the gap between (concrete?/existing?) knowledge and abstract more explicit', for example by means of manipulatives such as algebra tiles;
- another teacher mentioned that he has **'struggled to challenge the top end students'** in 'a mixed ability Year 9 group with a lot of challenging kids and a few more able students' … 'still haven't got an idea of what to do if I get a similar class again';

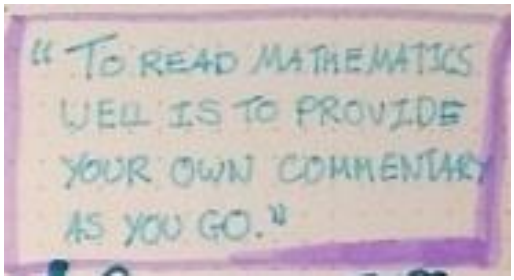
- a teacher commented that this year she has been **'attempting to work on too many things at once and expecting too much too soon (with regards to my own CPD)'** … so in future she will **'focus on one thing at a time'**;
- there was a derivative discussion about 'teaching maths with examples' during which a teacher posted an image of a page of her sketchnotes … on Twitter it is difficult to read what is written on her whole image, so we have enlarged and reproduced a few parts of it here:

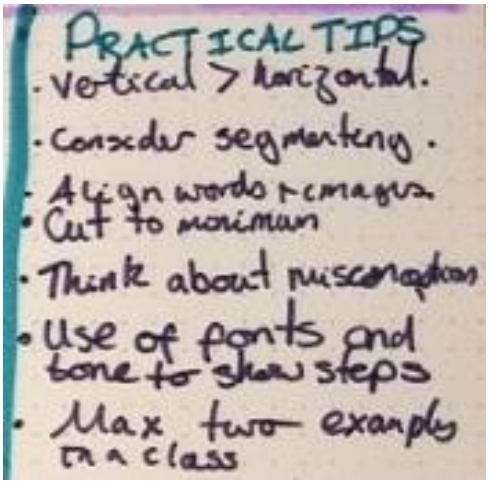






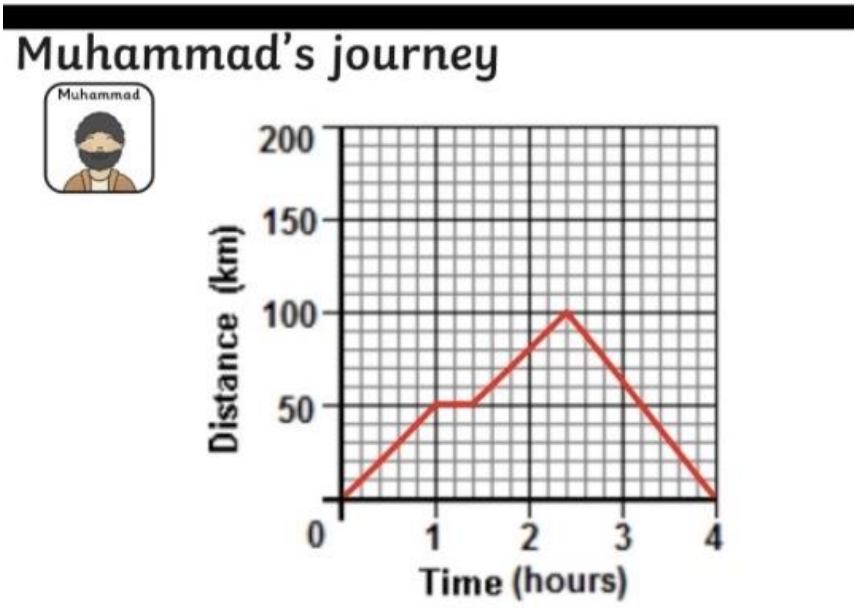




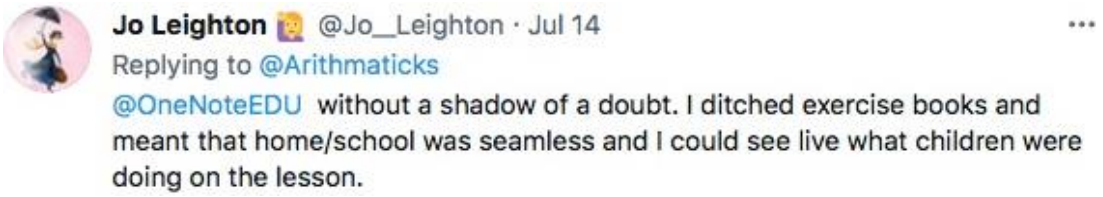


the host asked what teachers thought is the best resource that they have used this year; links to most of the resources that were mentioned above:

- a teacher described a task that she created:



- other teachers mentioned online platforms … for example:

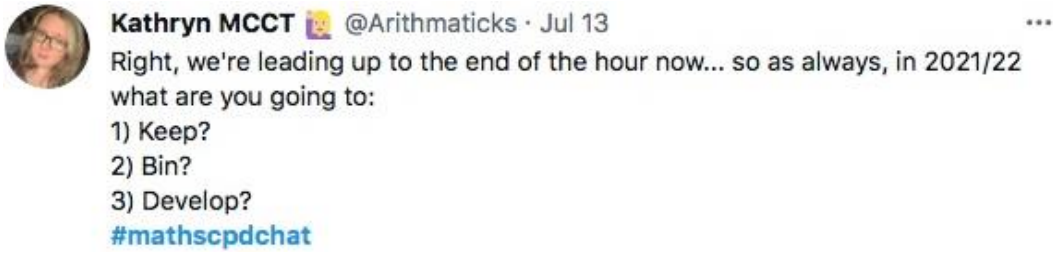


Jo Leighton @Jo__Leighton · Jul 14

Replying to @Arithmaticks

@OneNoteEDU without a shadow of a doubt. I ditched exercise books and meant that home/school was seamless and I could see live what children were doing on the lesson.

the host tweeted these questions …



Kathryn MCCT @Arithmaticks · Jul 13

Right, we're leading up to the end of the hour now... so as always, in 2021/22 what are you going to:

1) Keep?

2) Bin?

3) Develop?

#mathscpdchat

… to which she received these responses:

Karen @karenshancock · Jul 13

Replying to @Arithmaticks

1) Catching up with teachers from around the country (s that presumptuous?)

2) Uploading work before it is marked (assuming I'm in school to check it's done)

3) Using worked examples

#mathscpdchat

Andrew Parker @ParkerMaths · Jul 13

Replying to @Arithmaticks

1) DrFostMaths key skills.

2) Teams assignments

3) Miro online whiteboard

Michelle Cole @CNE98MFC · Jul 13

Replying to @Arithmaticks

1) google classroom. 2) 48 hr quarantine on student work before marking. 3) properly implemented skills retrieval in starters. #mathscpdchat probably a bit late submitting though. 😂

Andrew Jeffrey @AJMagicMessage · Jul 13

Replying to @Arithmaticks

1) video resources

2) the word 'mastery'

3) support for Y3

Rute Castro Silva @RuteCastroSilva · Jul 13

Replying to @Arithmaticks

#mathscpdchat

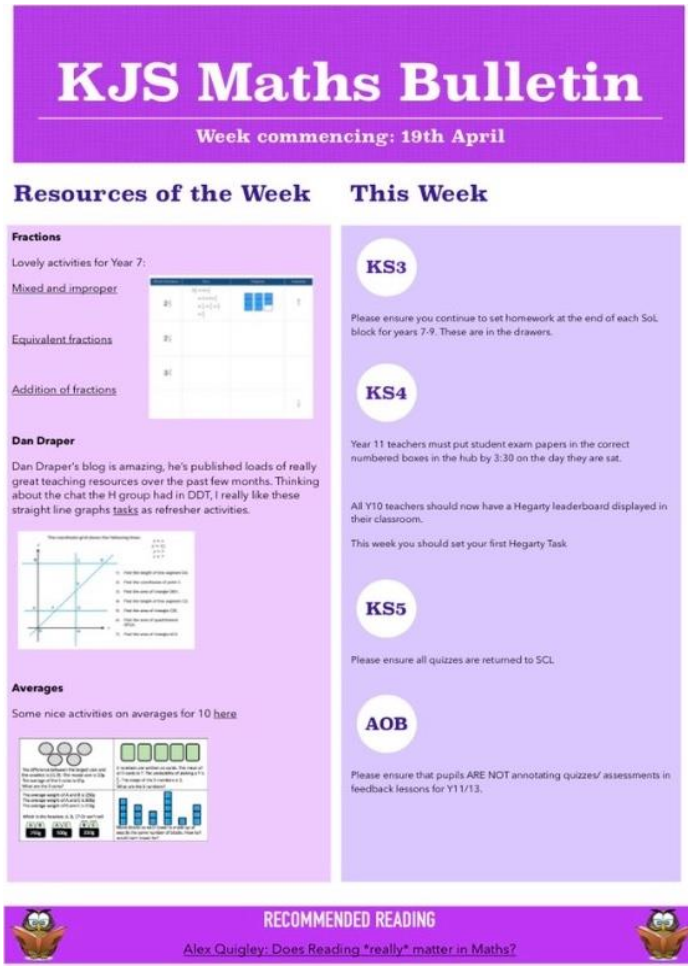
1) keep using manipulatives, visualise and drawing tablet

2) bin the idea of "catch up" due to lockdown (and focus on general learning gaps widened by lockdown but there previously too)

3) develop gamification in class

Catherine explained that she has written her booklets herself 'although a lot of the tasks have come from @mrbartonmaths variation theory', and that, although her department has a set of Dienes blocks, a set of Numicon, counters, and a set of algebra tiles, they are 'hoping to get funding for some more bits';

Hannah, when asked how she intended to 'embed the manipulatives', replied that she would use 'regular slots in department time to show how they could be used with upcoming topics' and 'use of my weekly bulletin, maybe focussing some learning walks on them' … she tweeted an image of one issue …



finally the host invited people to describe their 'biggest goals' for the next academic year:

- one teacher hopes to 'work with experienced colleagues to perfect the things we're good at and make us great at them … Job one – find a critical friend!';
- a teacher is aiming to 'create a package of support materials for Year 3 teachers by the start of September';
- another teacher's 'maths goal is manipulatives embedded … read the book 'Visible Maths' and watch videos on complete maths';
- a similar aim of another teacher is 'planning to use manipulatives other than algebra-tiles/counters' … she hopes to look at 'using Cuisenaire® rods for fractions';
- this was another reply involving manipulatives:

- one of the host's aims for next year is 'step one in some sort of coaching programme';
- and this tweet completes the last #mathsCPDchat summary of 2020/21: