

by nctm a month ago

How to get pupils to ask their own mathematical questions?

A summary of the #mathscpdchat on 6 March, hosted by @Arithmaticks



Kathryn
@Arithmaticks

Good evening everyone - thank you for joining in tonight. I hope this week is much less snowy than last for everyone and we're all back in some sort of a routine! ❄️ #mathscpdchat



A MONTH AGO



Kathryn
@Arithmaticks

As always, housekeeping: 1. Please include the hashtag #mathscpdchat in any tweets relating to tonight's topic - it makes sure they are included in the record. 2. Speaking of that record, it really dislikes polls - please do not set up any polls in the hashtag over the hour!



A MONTH AGO

How do you encourage STUDENTS to ask questions in your lessons?



Kathryn
@Arithmaticks

We often spend time talking about our planning and questioning as teachers - tonight we want to flip that on its head... How do you encourage STUDENTS to ask the questions in your lessons? #mathscpdchat



A MONTH AGO

Do you have any prompts to get students asking the questions FOR you? What topics are particularly good for this?

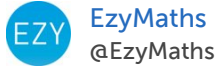


Kathryn
@Arithmaticks

Do you have any prompts to get students asking the questions FOR you? Are there any particular topics that are good for this? #mathscpdchat

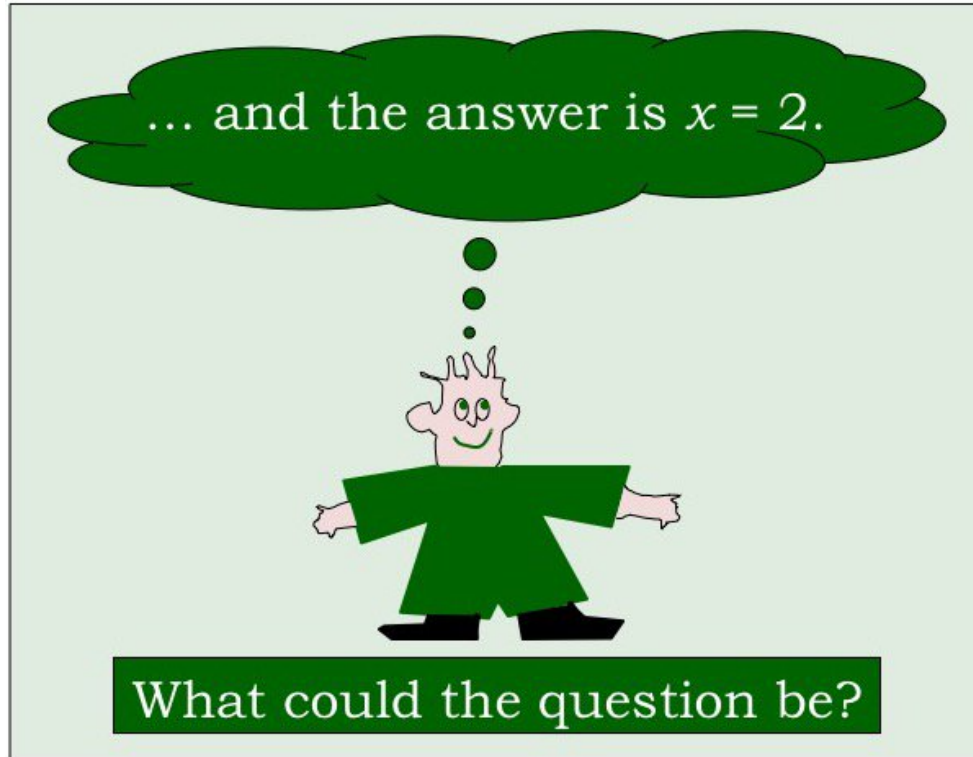


A MONTH AGO



Some open ended tasks and questioning will help to achieve some of this. [#mathscpdchat](#)

A MONTH AGO



A strategy to use from a young age is this kind of challenge ... [#mathscpdchat](#)
pic.twitter.com/eLznHWbfOc

MARY PARDOE @PARDOEMARY · A MONTH AGO



Kathryn
@Arithmaticks

[@EzyMaths](#) Any examples of the kind of tasks do you have in mind here? :) [#mathscpdchat](#)

A MONTH AGO



Kathryn
@Arithmaticks

[@PardoeMary](#) I was just thinking about this! "If this is the answer... what is the question...?" was a big thing in my PGCE training [#mathscpdchat](#)

A MONTH AGO



Amanda Kirby
@mathsteach2000

@Arithmaticks I use the inquiry prompts @inquirymaths to get students to ask questions about what they already know, what they might be able to find out and how they might make links to subject areas #mathscpdchat

A MONTH AGO



dannytybrown
@danieltybrown

@Arithmaticks Hi, I always found this difficult in previous years, but this year have done quite a bit on it, one useful approach is to say create an (easy/hard) example 'like this' #mathscpdchat

A MONTH AGO



Kathryn
@Arithmaticks

@danieltybrown I've actually got written in my notes for tonight "What makes this difficult?" - I think this questioning of question structure can be really beneficial! #mathscpdchat

A MONTH AGO



Kathryn
@Arithmaticks

@mathsteach2000 @inquirymaths How do you make sure they are asking rather than you!? #mathscpdchat

A MONTH AGO



Charlie Dawson
@dawsonmaths

@danieltybrown @PardoeMary @Arithmaticks And ask them to say why it's a hard question or why it's an easy question. #mathscpdchat

A MONTH AGO



Kathryn
@Arithmaticks

I adored this @inquirymaths prompt - I think just getting students to think about the areas of maths they could be asked about in this scenario is very powerful! BUT how can we encourage them to ask questions rather than state facts? #mathscpdchat twitter.com/inquirymaths/s...

A MONTH AGO



Amanda Kirby
@mathsteach2000

[@Arithmaticks](#) [@danieltybrown](#) I'm often nervous at the start of an inquiry lesson as you don't know what the students will come up with, you don't want them to stop asking questions but equally you don't want them heading down the wrong path [#mathscpdchat](#)

A MONTH AGO



EzyMaths
@EzyMaths

[@Arithmaticks](#) the z factor task on bowland as they have to answer their own questions to solve the problem. Your answer of if this is the answer... is good. Another way is to flip the learning. Get students to ask you the questions as if they were teaching and you answers them.
[#mathscpdchat](#)

A MONTH AGO



Kathryn
@Arithmaticks

I sometimes feel this too, especially if the best Qs aren't something I've prepped- I often think they are good for revision of topics with overlap particularly, but this then negates the 'inquiry' of it all. Would love to see how others use it earlier in the SoL [#mathscpdchat](#)
twitter.com/mathsteach2000...

A MONTH AGO



Martyn
@martynyeouk

[@Arithmaticks](#) I've used pictures from [@MathsNoProblem](#) books to start discussions...it has specific exercises to get children to come up with their own questions about a picture
[#mathscpdchat](#)

A MONTH AGO

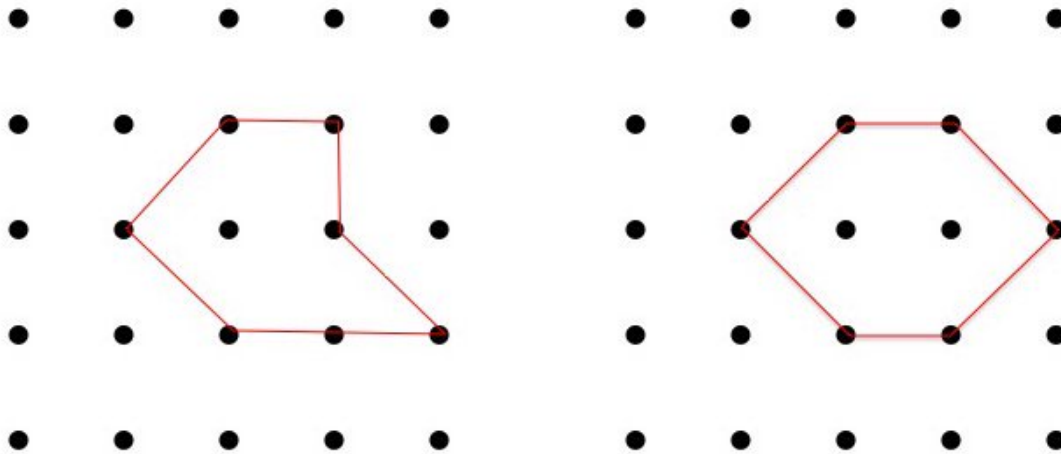


Kathryn
@Arithmaticks

[#mathscpdchat](#) twitter.com/JP_Mc_C/status...

A MONTH AGO

What questions would a mathematician ask?
 What questions would Mrs X ask?
 What questions am I going to ask?



[@danieltybrown](#) [@Arithmaticks](#) Yes. And provide a 'situation' and challenge pupils to think of questions that you (their teacher) might ask; depends on your having asked good questions of them as a 'habit'. [#mathscpdchat](#) pic.twitter.com/0EUOEFENKI

MARY PARDOE [@PARDOEMARY](#) · A MONTH AGO



Kathryn
[@Arithmaticks](#)

[@JP_Mc_C](#) I love teaching A Level because of this. Often a student asks something you have just never thought about before! [#mathscpdchat](#)

A MONTH AGO



EzyMaths
[@EzyMaths](#)

One task I liked doing was a plenary where students asked questions about the work. Wrote them on the board. Students screenshot and answer for the next lesson for your starter [#mathscpdchat](#)

A MONTH AGO



Kathryn
[@Arithmaticks](#)

[@EzyMaths](#) The last part sounds interesting! How does this play out in reality? Some input first? [#mathscpdchat](#)

A MONTH AGO



Kathryn
@Arithmaticks

[#mathscpdchat](#) - an application of students looking at question structure to create 'an easy one' and 'a hard one' [twitter.com/danieltybrown/...](https://twitter.com/danieltybrown/)



A MONTH AGO



Amanda Kirby
@mathsteach2000

[@Arithmaticks](#) [@inquirymaths](#) This was a fab two lessons of inquiry the students all came up with various ideas. Two groups did go down a "dead end" route but they realised that as they saw other students investigations they still gained something from their investigation

[#mathscpdchat](#)



A MONTH AGO



Kathryn
@Arithmaticks

I love this - I often do this as a 'Post it' plenary with 1 thing I have learned and 1 thing I want to know more about! [#mathscpdchat](#) [twitter.com/EzyMaths/statu...](https://twitter.com/EzyMaths/status/)



A MONTH AGO



Kathryn
@Arithmaticks

These question PROMPTS are so useful to get the students thinking in mathematical terms, rather than you simply asking the questions to get to your desired destination! [#mathscpdchat](#) [twitter.com/danieltybrown/...](https://twitter.com/danieltybrown/)



A MONTH AGO



EzyMaths
@EzyMaths

[@Arithmaticks](#) Maybe start with a question on the board. Trying to work out the topic or the answer. Some input first is usually helpful. Could be incorporated as part of a flipped lesson. Even get them to show the processes in front of the class. Asking questions as the go.

[#mathscpdchat](#)



A MONTH AGO

Do you ask students to 'create' questions of a similar type to those they've already seen? Do they get to do a 'trial run' of them with other students?



Kathryn
@Arithmaticks

Do you ask students to 'create' questions of a similar type to those they have already seen? Do they get to do a 'trial run' of them with other students? #mathscpdchat

A MONTH AGO



Amanda Kirby
@mathsteach2000

@Arithmaticks I've been trying this year with top set y9 to use it as a "normal way" of learning a topic and not as a revision. It does require good questioning on the part of the teacher to guide the students to ensure they've met the success criteria of the SoL #mathscpdchat

A MONTH AGO



Kathryn
@Arithmaticks

"Becoming a good questioner is not a matter of using someone else's list of questions, but of developing questioning as a personal activity... Asking oneself: "What can I ask of my students?" rather than "How can I get them to say what I am seeing?" " #mathscpdchat
twitter.com/Arithmaticks/s...

A MONTH AGO



MrsMathematica
@MrsMathematica

@Arithmaticks I train them to (respectfully) question everything I write on the board. Early on with each new group I'll start writing nonsense & see how long it takes someone to call my bluff. If it doesn't make sense "I don't get it" isn't allowed. They have to ask a question! #mathscpdchat

A MONTH AGO



Kathryn
@Arithmaticks

@mathsteach2000 Do you think this has been more beneficial to them as they are 'discovering' these things for themselves? Or are you risking more misconceptions? #mathscpdchat

A MONTH AGO



Amanda Kirby
@mathsteach2000

@Arithmaticks yes this is common in my classroom as students like to set a "difficult" question for their partner/group I do make them create the question and mark scheme so they should know the answer! #mathscpdchat

A MONTH AGO



Kathryn
@Arithmatics

Gorgeous way to get students thinking! #mathscpdchat twitter.com/MrsMathematica...

A MONTH AGO



Kathryn
@Arithmatics

@mathsteach2000 I think the mark scheme is a lovely tool too - getting them to think about which parts are important to answer the question correctly! #mathscpdchat

A MONTH AGO

NRICH enriching mathematics

Early Years Primary Teachers Secondary Teachers

Topics Search NRICH Go

Home Students **Teachers** Roadshow Events

Article

Cultivating Creativity

Stage: 1, 2, 3, 4 and 5
Article by Jennifer Piggott
Published February 2011.

Creativity in the mathematics classroom is not just about what pupils do but also what we do as teachers. If we are thinking creatively about the mathematical experiences we offer our pupils we can open up opportunities for them to be creative. In this article, I am going to share some of my thoughts on creative teaching, and how it can encourage creative learners.

Posing problems

Mathematics is as much about posing problems as problem solving, noticing within a situation that there is a question waiting to be asked. At this point, the creativity is in noticing there is something to be investigated. When setting up situations in the classroom we should make an effort to choose contexts that offer students opportunities to pose their own problems. Resources such as the interactive environments I have described above are excellent for this purpose.

There is a useful NRICH article here: nrich.maths.org/5784 with examples of starting points
#mathscpdchat pic.twitter.com/Z757j87Qv0

MARY PARDOE @PARDOEMARY · A MONTH AGO

How do you strike the balance of getting students to ask mathematical questions for the sake of curiosity, and the needs of the scheme of work?



Kathryn
@Arithmatics

How do you strike this balance - of getting students to ask mathematical questions for the sake of curiosity and the needs of the scheme of work? #mathscpdchat twitter.com/Arithmatics/s...

A MONTH AGO



Amanda Kirby
@mathsteach2000

@Arithmaticks It has been beneficial to them as they are discovering facts for themselves. They are showing to have remembered them in the short term. Long term I'll find out at the end of year assessment! #mathscpdchat

A MONTH AGO



Kathryn
@Arithmaticks

#mathscpdchat [twitter.com/panlepan/statu...](https://twitter.com/panlepan/status...)

A MONTH AGO



Kathryn
@Arithmaticks

@mathsteach2000 I'd be really interested to see how this has worked for them 😊 do you plan question prompts to ensure they are still guided to the 'right' path if need be? #mathscpdchat

A MONTH AGO



Amanda Kirby
@mathsteach2000

@Arithmaticks I love it when they find my mistakes, shows they are paying attention and questioning my methods / answers #mathscpdchat

A MONTH AGO

When should student questioning prevail in the classroom? When is it less appropriate?



Kathryn
@Arithmaticks

In what circumstances do you want student questioning to prevail in the classroom? Is there any times that it is less appropriate? #mathscpdchat

A MONTH AGO



EzyMaths
@EzyMaths

@Arithmaticks Could you at various points of the lesson get them to stop what they are doing and get them to write down a question about their understanding or about a question they find difficult and then do a quick fire five mins answering them randomly in class #mathscpdchat

A MONTH AGO



dannytybrown
@danietybrown

[@Arithmaticks](#) Yes, a longer view. But back to the topic of [#mathscpdchat](#) tonight, I only fully appreciated the value of learners generating examples upon reading 'Mathematics as a Constructive Activity' by Watson & Mason, which for me is essential reading for any maths teacher.

A MONTH AGO



Kathryn
@Arithmaticks

[@EzyMaths](#) I like this idea - how would you collate/decide which ones are to be answered? Would you answer them yourself, or get other students to do so? [#mathscpdchat](#)

A MONTH AGO



McBec
@MathsMcBec

[@EzyMaths](#) [@Arithmaticks](#) I like this idea - you could take it further with them writing it on paper and moving around the room to find someone to answer it for them [#mathscpdchat](#)

A MONTH AGO



Amanda Kirby
@mathsteach2000

[@Arithmaticks](#) At the moment I'm using a lot of the inquiry prompt [@inquirymaths](#) as I'm finding my classes enjoy a bit more freedom over what questions they answers. [#mathscpdchat](#)

A MONTH AGO



MrsMathematica
@MrsMathematica

[@Arithmaticks](#) Some Ss find it hard to understand that the introduction of a topic is just the start and that if they stick with the teacher (rather than begging for the "method") they will have an understanding that will aid with understanding and retention. 😞 [#mathscpdchat](#)

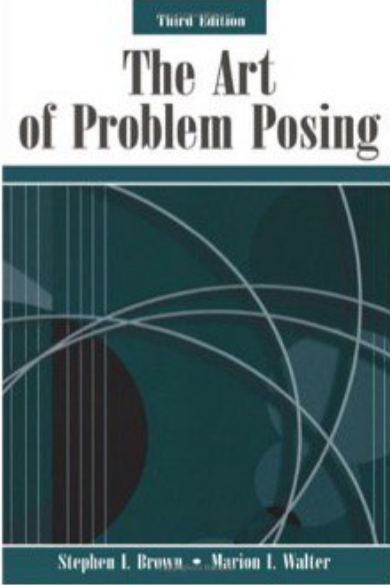
A MONTH AGO



EzyMaths
@EzyMaths

[@MathsMcBec](#) [@Arithmaticks](#) Good idea. The ones that don't get asked/answered could either form a starter activity or personalised feedback from yourself. [#mathscpdchat](#)

A MONTH AGO





Where do problems come from, and what do we do with them once we have them? The impression we get in much of schooling is that they come from textbooks or from teachers, and that the obvious task of the student is to solve them. Schematically, we have the following model:

	Problem	Solve
Given by authority	←	
Task for student		→

The purpose of this book is to encourage a shift of control from “others” to oneself in the posing of problems, and to suggest a broader conception of what can be done with problems as well.¹ Why, however, would anyone be interested in problem *posing* in the first place? A partial answer is that problem posing can help students to see a standard topic in a sharper light and enable them to acquire a deeper understanding of it as well. It can also encourage the creation of new ideas derived from any given topic—whether a part of the standard curriculum or otherwise. Although our focus is on the field of mathematics, the strategies we


This is a very useful book to read. Suggest that you Google it and look for a copy that is still available. [#mathscpdchat pic.twitter.com/XTFSy5U08e](#)


 MARY PARDOE @PARDOEMARY · A MONTH AGO



Kathryn
@Arithmatics


[@MrsMathematica](#) How do you help to change this 'method' mindset into mathematical questioning that aids that understanding? [#mathscpdchat](#)

 A MONTH AGO




Amanda Kirby
@mathsteach2000

[@Arithmatics](#) [@inquirymaths](#) Practical lessons have also been working well e.g. Straws and paperclips to make congruent triangles and relational solids to understand the volume of cones and pyramids. [#mathscpdchat](#)


 A MONTH AGO

How do you respond to "I don't know"? Can you transform this into some mathematical questioning to get the student 'unstuck'?



Kathryn
@Arithmatics

This one is a biggie.... How do you respond to "I don't know"? Can you transform this into some mathematical questioning to get the student 'unstuck'? [#mathscpdchat](#)

 A MONTH AGO



dannytybrown
@danielybrown

[@MrsMathematica](#) [@Arithmaticks](#) It was revelatory for me, I left reading it too late, I would say [#mathscpdchat](#)



A MONTH AGO



Amanda Kirby
@mathsteach2000

[@Arithmaticks](#) What do you know? How might this help? Can you draw a diagram to help? Are a few of the questions that might get the students started. [#mathscpdchat](#)



A MONTH AGO



EzyMaths
@EzyMaths

[@Arithmaticks](#) Brain book buddy boss (4bs) [#mathscpdchat](#)



A MONTH AGO



MrsMathematica
@MrsMathematica

[@Arithmaticks](#) Persistence and consistence in emphasising the value of the problem not just the solution. Currently trying to build in "wow" moments into my lessons to build on this so that Ss see the inherent creativity and beauty in maths. /1 [#mathscpdchat](#)



A MONTH AGO



Kathryn
@Arithmaticks

We seem to be inviting student questions in a few ways: 1. Inquiry approaches with an initial prompt 2. Ss writing their own questions on the topic after initial input 3. Ss asking questions to deepen their mathematical understanding Which is most common for you? [#mathscpdchat](#)



A MONTH AGO



Amanda Kirby
@mathsteach2000

I also like to pose questions that might not have a known answer or solution so that students don't have to be right or wrong but the emphasis is on the trying to find out [#mathscpdchat](#)



A MONTH AGO



MrsMathematica
@MrsMathematica

@Arithmaticks My reasoning is that once they KNOW the rules they can start to bend, break, combine or redefine them in context. Classifying quadrilaterals with venn diagrams really helped with this #rulebreakers #mathscpdchat /2

 A MONTH AGO



Kathryn
@Arithmaticks

@MrsMathematica A woman after my own heart! I love it when you're able to get to that point in a topic #mathscpdchat

 A MONTH AGO



Amanda Kirby
@mathsteach2000

Students have also responded well to prompts on the board where they have to prove the teacher wrong by finding a counter example #mathscpdchat

 A MONTH AGO

Designing a Framework for Problem Posing: young children generating open-ended tasks

TOM LOWRIE

Charles Sturt University, Wagga Wagga, Australia

ABSTRACT This article describes the type of problems young children (aged six) generated in problem-posing contexts. With support, the children began to generate increasingly sophisticated problems that were open-ended in nature. The problem-solving situations provided opportunities for the children to pose problems they enjoyed solving and promoted both a more complex and motivating learning environment. The results indicate that the problem-posing actions of students can be nurtured by teachers' actions.

There is a useful article here: [researchoutput.csu.edu.au/ws/portalfiles...](https://researchoutput.csu.edu.au/ws/portalfiles/...) #mathscpdchat
pic.twitter.com/hLXZo2Hbu3

 MARY PARDOE @PARDOEMARY · A MONTH AGO



MrsMathematica
@MrsMathematica

[@Arithmaticks](#) If you need to inspire Ss with the power of questioning and creative thinking just talk to them about Ada Lovelace and how her mum raised her to reject everything Lord Byron stood for and yet she was created the first algorithms 100 YEARS ahead of everyone else!
[#mathscpdchat](#)

A MONTH AGO



Amanda Kirby
@mathsteach2000

Students love wow moments - try and create as many as possible [#mathscpdchat](#)
twitter.com/MrsMathematica...

A MONTH AGO



Kathryn
@Arithmaticks

[@MrsMathematica](#) This is why I often think the 'inquiry' prompts are also useful for revision so that students can see links they may not have been aware of before - one starting point for proportion, becomes ratio, becomes probability etc etc [#mathscpdchat](#)

A MONTH AGO



MrsMathematica
@MrsMathematica

[@Arithmaticks](#) Same! I had a double lesson with my year 7s today and the leaps they made from getting the next term in a simple sequence to nth term of a descending linear sequence involving fractions over those 2 hours left me (and them buzzing). [#mathscpdchat](#)

A MONTH AGO



Em
@EJmaths

[#mathscpdchat](#) twitter.com/danieltybrown/...


A MONTH AGO




Amanda Kirby
@mathsteach2000

[@danieltybrown](#) [@MrsMathematica](#) [@Arithmaticks](#) adding this to my wish list too
[#mathscpdchat](#)


A MONTH AGO

 **MrsMathematica**
@MrsMathematica


@Arithmaticks It's one of the things I like about the new GCSE, students are being explicitly questioned on these links and it's making our students stronger mathematicians because teachers NEED to make the connections explicit in their teaching 🙌 #lovemaths #mathscpdchat

 A MONTH AGO

How do I promote mathematical questioning by my students? Something I can do tomorrow? And in the longer term?

 **Kathryn**
@Arithmaticks

10 mins left: How do I promote mathematical questioning by my students? If you could, answer in 2 parts: (i) Something I can do tomorrow? (ii) One action for the long term? #mathscpdchat

 A MONTH AGO

NRICH enriching mathematics

Early Years Primary Teachers Secondary Teachers

Topics Search NRICH Go

Home Students Teachers Roadshow Events

Article

Generating Curiosity in Mathematics Learning

Article by Charlie Gilderdale
Published February 2011.


Music teachers challenge students to listen and participate.
English and History teachers invite students to journey in other worlds.
Art and Drama teachers offer students opportunities to explore.
What are we to offer students if they are to function mathematically?

What do you understand by 'functioning mathematically'?
What characteristic behaviours do your highly achieving mathematicians exhibit?

Conjecturing and generalising

- Multiples of **3** can be written as the sum of three consecutive numbers.
- Multiples of **5** can be written as the sum of five consecutive numbers.
- I wonder if multiples of **7** can be written as the sum of seven consecutive numbers'?!
- I wonder if multiples of **9** can be written as the sum of nine consecutive numbers'?!
- I wonder if multiples of **x** (where x is odd), can be written as x consecutive numbers'?!

This is another useful NRICH article (by Charlie Gilderdale): rich.maths.org/5795 #mathscpdchat
pic.twitter.com/wtLPq7CYaP

 MARY PARDOE @PARDOEMARY · A MONTH AGO



Kathryn
@Arithmaticks

[@MrsMathematica](#) I had a lesson like that recently with my Year 10 set, they are not very strong at all with algebra and seeing them suddenly 'get it' almost made me cry with pride!
[#mathscpdchat](#)

A MONTH AGO



Amanda Kirby
@mathsteach2000

[@Arithmaticks](#) [@MrsMathematica](#) but why leave those links to revision when they can play such an important role in their learning of the topic first time round [#mathscpdchat](#)

A MONTH AGO



Kathryn
@Arithmaticks

[@mathsteach2000](#) [@MrsMathematica](#) Definitely agree - I think that the new GCSE is changing how we all work. For current Year 11 this has sometimes been left out until now though, so useful to use them at this point in those cases [#mathscpdchat](#)

A MONTH AGO



Amanda Kirby
@mathsteach2000

[@Arithmaticks](#) i) Allowing them to set up their own questions on a topic or by giving them the "this is the answer what was the question" ii) Plan and develop prompts that develop that mathematical thinking and deepening understanding and make it a common activity in my classroom [#mathscpdchat](#)

A MONTH AGO



Kathryn
@Arithmaticks

[#mathscpdchat](#) twitter.com/Leanne581/stat...

A MONTH AGO



McBec
@MathsMcBec

[@Arithmaticks](#) Love a plenary. Starter/Settler 'MathsMcBec says Prove her wrong' - need to work on the wording. Longer term need to think about questioning. Was pleased with how this was going but need to review it after tonight. [#mathscpdchat](#) A lot of great ideas that I want to work in

A MONTH AGO



Kathryn
@Arithmaticks

This has been such a fantastic discussion tonight guys, thank you so much for joining in. Certainly given me food for thought! Speaking of food... I know we all want to watch Bake Off 🍰 so I will wish you all goodnight! See you next week for [#mathscpdchat](#) 7-8pm!

A MONTH AGO



EzyMaths
@EzyMaths

Try getting students to explain processes while you translate on the board (a little too literally to make them understand [#mathscpdchat](#)

A MONTH AGO



MrsMathematica
@MrsMathematica

[@Arithmaticks](#) (i) give them explicit opportunities to question things. (ii) plan for "wow" moments as a result of THEIR questions [#mathscpdchat](#)

A MONTH AGO



EzyMaths
@EzyMaths

The processes required and clear up their thought processes. [#mathscpdchat](#). And now bake off!

A MONTH AGO



Mary Pardoe
@PardoeMary

Very many thanks to Kathryn, [@Arithmaticks](#) for hosting [#mathscpdchat](#), and asking important questions. And thanks to all contributors for interesting observations and suggestions. Read the whole chat tomorrow at: nctm.org.uk/resources/41729

A MONTH AGO



Kathryn
@Arithmaticks

[@MathsMcBec](#) I often use my mum in these circumstances! 'Debbie says....' All of my students know my Mum got her GCSE in her 50s with my help and often makes many mistakes 😊
[#mathscpdchat](#)

A MONTH AGO



Amanda Kirby
@mathsteach2000

Feeling excited after my first [#mathscpdchat](#) why have I never done this before?
[twitter.com/PardoeMary/sta...](#)

 A MONTH AGO



Kathryn
@Arithmaticks

[@mathsteach2000](#) It's one of my favourite parts of the week - always feel so energised after taking part! Thanks so much for all your insights! [#mathscpdchat](#)

 A MONTH AGO



Barbara Gray
@barbaragray58

[@PardoeMary](#) I use this a lot - a great starter for the day - very inclusive - all can take part
[#mathscpdchat](#)

 A MONTH AGO



Martyn
@martynyeouk

[@Arithmaticks](#) Know im really late but is there a way of engaging students through social media and questioning? We have a secure learning platform [@WhitestoneInfs](#) that children can leave posts...[#mathscpdchat](#)

 A MONTH AGO