Secondary Magazine
Issue 60

National Centre for Excellence in the Teaching of Mathematics

Welcome to Issue 60 of the Secondary Magazine.

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*Contributors to this issue include: Snezana Lawrence, Sue Madgwick, Mary Pardoe, Adrian Pinel, Peter Ransom and Heather Scott.*

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National Centre
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## From the editor

What do your students believe that mathematics is? What do they think that doing mathematics is all about?

Mathematicians create, invent, conjecture, and experiment. And it is only by doing in school those kinds of things, by thinking mathematically, that students can use mathematics effectively outside and beyond school.

Students who believe that mathematics is a given body of knowledge and standard procedures, a set of truths and rules that they need to be shown, struggle with mathematics in school and in the outside world. They often fear and dislike mathematics, avoiding it if they can. Inspectors reported – in Mathematics: understanding the score (Ofsted, 2008) – that many pupils say *'I don't like maths because I'm no good at it. It's boring. I prefer active or creative subjects.'*

For generations, teaching mathematics was concerned with communicating established results and methods. Teachers tried to prepare students for dealing with mathematics in life by giving them 'a bag of facts'. Consequently avoiding mathematics has become respectable. Many otherwise successful people are happy to announce that they 'cannot do maths', whereas few people would say publicly that they cannot read or write.

In their paper, The Mathematics Education Landscape in 2009, the Advisory Committee on Mathematics Education (ACME) expressed their belief that many students are not doing mathematics as well as they could, or not really doing it at all. We were reminded that mathematics teaching too often depends on telling students methods, rules and facts, and too rarely on helping them to make sense of what they can find out so that they can use mathematics independently.

In the 21st century we want to empower students; we want to help them develop genuinely mathematical ways of thinking. And these can be developed from the natural abilities that all people are born with.

Caleb Gattegno explained in his book What we owe children that we all used natural thinking powers when, as babies, we taught ourselves how to speak a language.

So, what *are* these powers? Well, as human beings we naturally:

- imagine and picture things in our minds, and talk about what we imagine
- notice differences and similarities between things
- find what is the same about things we come across that in other ways are different
- generalise
- specialise
- conjecture – make an 'educated guess' about what is true
- use various forms of reasoning, or argument, to try to convince others that what we believe is true.

One of the best ways to help students to think mathematically is to look out for opportunities for them to make use of their *natural* abilities *naturally*. Then you can point out to them what they did by themselves. While being interviewed in 1985 Caleb Gattegno said: *"Everybody wants to work on weakness, but I work on strengths."*

I hope that this issue helps us think about how we can implement these ideas.

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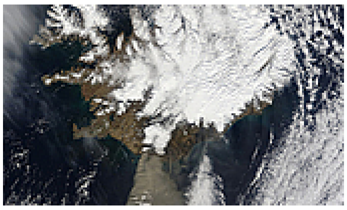

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# It's in the News!
## Long journey home

The fortnightly *It's in the News!* resources explore a range of mathematical themes in a topical context. The resource is not intended to be a set of instructions but rather a framework which you can personalise to fit your classroom and your learners.

During March 2010 the Icelandic volcano Eyjafjallajokull started to erupt. By 14 April, the volcano entered an explosive phase and released clouds of mineral ash which formed a cloud which rose up to 10 km into the atmosphere. Air Traffic Controllers decided that as ash can lead to engine failure they would close the airspace, leaving thousands of travellers stranded across the globe. This resource invites pupils to reconstruct a journey home from Prague to England as a result of the ash cloud.

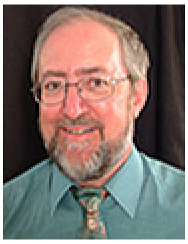
The activity gives students the opportunity to deal with some unfamiliar and, in some ways, complex data – it uses real data gathered (at great expense) during the journey. Students could be asked to suggest some questions they would like to ask about the situation which could be answered using the data given.

This resource is not year group specific and so will need to be read through and possibly adapted before use. The way in which you choose to use the resource will enable your learners to access some of the Key Processes from the Key Stage 3 Programme of Study.

Download this *It's in the News!* resource - in PowerPoint format

## The Interview

**Name:** Adrian Pinel



**About you:** I'm originally from Jersey, in the Channel Islands. Born at the end of the Occupation, I'm old enough to have experienced the 60s as a young teacher – yes, I was there, and no, I do remember it! I've since taught across the board in schools and at university. I was Head of Department at two schools when I found that Mode 3 CSE was a great way to break out of the mundane. Moving into college work, I found myself running a Maths Centre for the LEA. Highlights of this period were devising Loop Cards in 1978, and ATM MATs in 1980. Both of these were in response to urgent teaching needs that I had observed and identified. Such needs have motivated me throughout my career.

**Why did I choose mathematics?**
Because it *isn't* there – yet it is to be found in everything of interest in the world and in the universe. Finding it and playing with it is such a great way to earn one's living. Also, because it was presented to me in such a mind-numbingly boring way at school that even at primary level I was forced to invent my own games and puzzles based upon mathematics. I guess that the invention of Loop Cards was in part the result of my revolt against that uninspiring teaching.

**Who has inspired me?**
At first, Bill Brookes, who was my PGCE tutor and later my Masters tutor. He is sorely missed. In the late 1980s, Adri Treffers and Ed de Moor, with their Empty Number Line, and Erich Ch. Wittmann and his great group of colleagues at Dortmund for their imagery-based approaches to number. Jeni, for being arguably the best teacher I have ever seen – most naturally talented, and vigilantly true to her principles. 'Reader, I married her'.

**The best book on teaching mathematics that I have ever read is...**
*Starting Points* by Dick Tahta and Ray Hemmings. Indeed, I return often to almost everything I have that was written by Dick Tahta, and fondly recall the many insights he gave me in the long conversations we shared over the years.

**Some mathematics that has amazed me?**
There is so much – but what my sons, aged eight and six, did with ATM MATs when I brought home the first sets that were produced takes some beating. Matthieu (eight) arranged 10 regular pentagons to fit into a flat circular pattern, then he joined these with latex glue, so that they flexed into 3D. He then asked me for another 50 pentagons, and with Oliver's help produced the 60-pentagon space-shape that was later put on the cover of the first ATM MATs Handbook. It was many years later that Paul G worked out the geometrical basis for this figure. I still don't know how Matthieu 'just knew' he needed exactly 60 pentagons!

**A significant mathematics-related incident in my life...**
was visiting the Alhambra and the Real Alcázar with Kev Delaney during ICME in 1996. We spent many hours in the Alhambra rooms absorbing the geometry, as I subtly, permanently reorganised my whole picture of the world of tessellations, and of their projections into domed ceilings.

**The most recent use of mathematics in my job was...**
devising the activities and sessions for a four-day conference on Problem Solving and Problem Posing for

intending secondary teachers: selecting, adapting and devising the problems to use, and then using Marion Walter's ideas to move them into the art of posing problems.

**A mathematics joke that makes me laugh is...**

since the late 90s, the National Numeracy Strategy. Well, a hollow laugh, that is! This is tinged with sadness that so much human effort and expensive resources were used to so little good effect, meanwhile blighting the breadth of the primary curriculum.

OK, there are numerous mathematical jokes in Douglas Adams' The Hitchhiker's Guide to the Galaxy, but the observational humour of Dave Allen, explaining how he tried to teach his son to tell the time is ten minutes of humorous, awareness-raising narrative that always cracks me up. For example: "On each clock there are three hands. The first hand is the hour hand. The second hand is the minute hand, and the third hand is the second hand…"

**What has kept me motivated?**

The dire straits we got into over not having enough mathematics teachers. For the past seven years my main focus has been on developing the best possible Subject Knowledge Enhancement courses, utilising the talents of some old friends and new colleagues in making these happen.

**If I was not doing this job...**

I would probably spend far too long finishing fiendish crossword puzzles – *Azed* used to be my mainstay. I doubt I could kick the habit of inventing mathematical puzzles and problems – you see, I couldn't really stay away! However, without groups of students or teachers to work with, I'm not sure if the source of my inspiration would survive for long. It always seems to be sparked off by what they are doing, saying, asking. I still want to write down more of the mathematical activities and problems I have devised or adapted over the years. I drew great satisfaction from the Mad About Maths set of three books, as well as from my many articles and more recent publications. As I've just retired to become a freelance consultant and author, watch this space!

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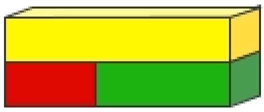
# Focus on…numbers in colour

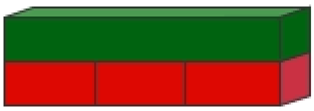
*"Georges Cuisenaire showed in the early fifties that students who had been taught traditionally, and were rated 'weak', took huge strides when they shifted to using the (Cuisenaire) material. They became 'very good' at traditional arithmetic when they were allowed to manipulate the rods."*
The Science of Education Part 2B: the Awareness of Mathematization by Caleb Gattegno.

Because students who cannot do arithmetic cannot function effectively in most mathematical situations that arise in life, it is worth exploring any resource that may help them. And teachers have found that Cuisenaire materials can help all learners, not only young children. They have found that when students think about and manipulate unmarked Cuisenaire rods the students use their natural thinking skills to learn to do arithmetic competently and naturally. For example, learners see in a single arrangement of rods how numbers are related at the same time by both addition and subtraction:



This arrangement reveals naturally three interchangeable ways of 'seeing' the relationship – that red + green = yellow, yellow – red = green and yellow – green = red. Students observe that no one of those three 'ways of seeing' dominates, and if you can 'see' it in one way you know that you will also be able to 'see' it in either of the other two ways.

And multiplication, division, and fraction facts, and relationships between those ideas, appear naturally to students when they think normally about an arrangement such as this:



(Three red blocks are the same length as a green block, the number of red lengths that there are in a green length is three, and a red block is one third of a green block.)

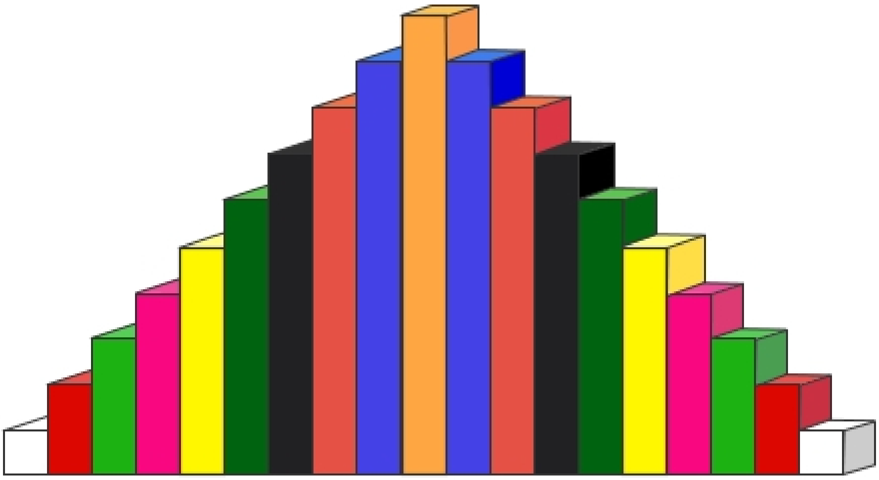
The teacher's role is to prompt students to focus on what they are naturally aware of, to help them realise how much they know naturally so that they develop confidence in their own thinking.

During 1953, Dr Caleb Gattegno saw young students in Georges Cuisenaire's classroom learning to do arithmetic competently and rapidly using only coloured rods. Many years later, Gattegno told English mathematics teachers that "Children could improve their mathematics if they worked with Cuisenaire rods instead of notation and verbiage… …there was something in the manipulation of the rods which made their mind clear about conventions and notations and other things…." (you can listen to Gattegno on the ATM website).

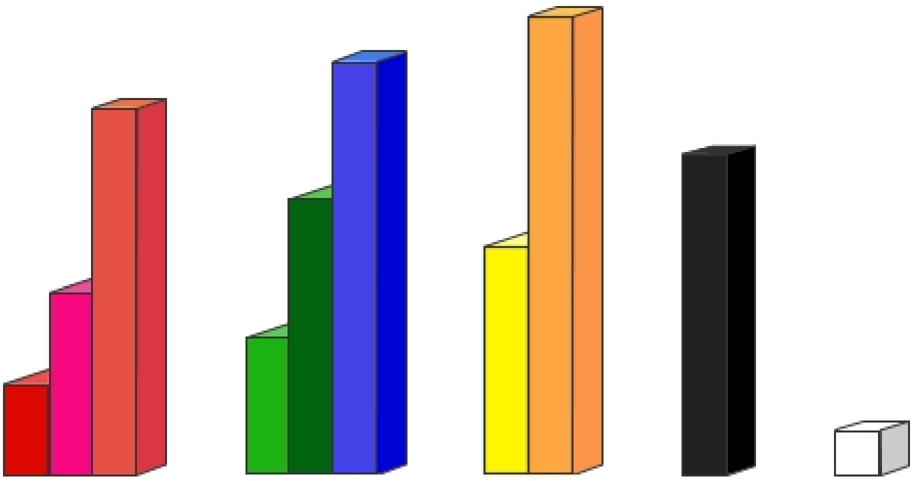
To see for yourself how Georges Cuisenaire worked with pupils using his rods (and nothing else) in an Alpine primary school, it is well worth persevering 07:18 minutes into this French film.

In Lessons With Cuisenaire Rods - Notes On The Filmstrip 'Numbers In Color', Gattegno explains that Cuisenaire rods are cuboids in white, black, red, pink, tan, light green, dark green, blue, yellow, and orange. Students should discover for themselves that only those ten colours appear.

When students make 'staircases' using all the colours they discover that the difference between consecutive rods is always the same and equal to the length of a white rod:



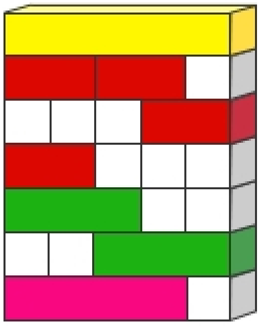
Cuisenaire deliberately chose colours for the rods such that, when students measure each rod by the white rod and then explore relationships, they can make use of, possibly unconsciously, the significance of the colour 'families' – the reds, the yellows, the blues, the black and the white:




**Explorations**

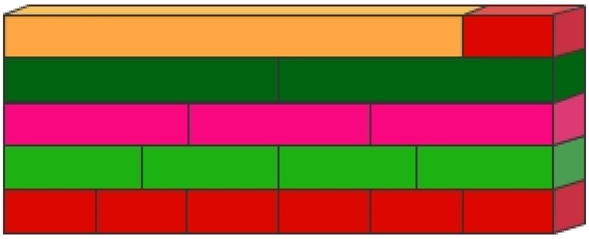
Many explorations of number facts and relationships are possible, such as the few suggested by the following arrangements of rods.

**Decompositions of numbers**



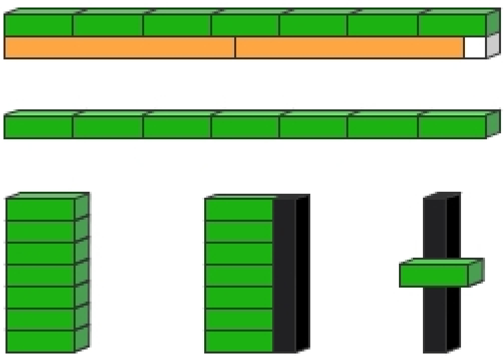
A student can read into this arrangement that 5 = 2 x 2 + 1 or 5 = 3 x 1 + 2 or 5 = 2 + 3 x 1 and so on.

**Pairs of factors**
What lengths can be made up of rods of one colour?



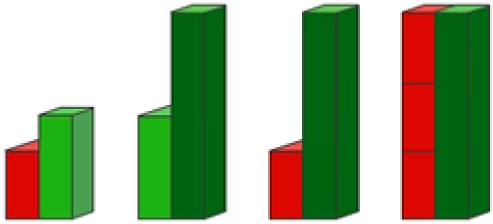
(12, made up of 10 + 2, is also made up of 2 x 6, 3 x 4, 4 x 3 and 6 x 2.)
It becomes natural to make a cross as a symbol for a composite number… the factors are the rods used in the cross.

For example, a student sees that seven light-green rods (each of which is 3 relative to the white rod) placed end to end are the same length as two orange rods (2 x 10) plus one white rod (1). When the seven light-green rods are arranged to make the other possible rectangle, a black rod (7) fits along it. Therefore it is natural to represent 21 (7 x 3) with a cross of one green and one black rod:



**Prime numbers**
What lengths cannot be made using rods of one colour only (excluding repetitions of the white rod) or by a chosen group of rods repeated a certain number of times?

**Fractions of fractions**
For example, two thirds of one half is one third:



**Mental activities**

You can devise mental activities to practise number relations that are of value in everyday life. For example, using a handful of rods that students are not allowed to touch:

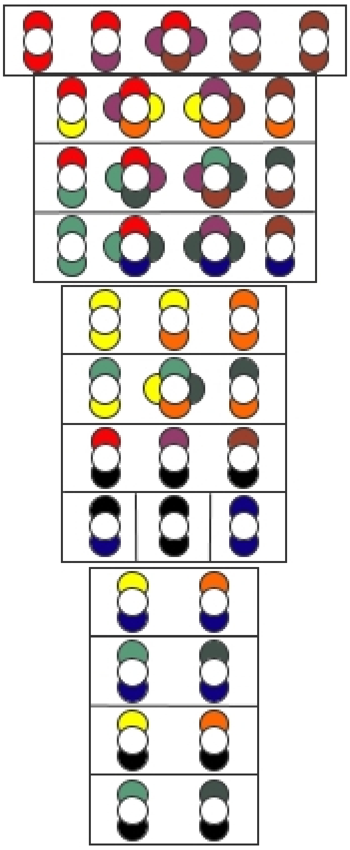
- place a handful of rods in front of students
- ask what length would be made if all the rods were placed end to end
- no-one may touch the rods; they must operate mentally.

What are students' mental methods? What do they think is the best way to proceed? Perhaps they look out for products? Or do they look for complementary numbers forming tens? Do they see other obvious combinations – such as three tan rods and one dark green rod making 30?

There will be lots of possible ways of proceeding.

**The cardboard materials**
To gain practice in rapid mental calculation, students can also use the 'cardboard' materials that Cuisenaire devised to complement his rods. The aim of activities involving them is for products and factors to become 'second nature' to students.

The **Product Chart** shows the 37 different products that can be made by one or two crosses of rods. But no numbers appear on the chart – the colours of the rods are used instead. A white circle that is flanked by coloured crescents represents each product. The colour of each crescent is the Cuisenaire colour of the factor it represents (so a red crescent represents the number 2). Can you work out how Cuisenaire arrived at his arrangement starting from the colour families?



The values of the products shown in the chart are:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **4** | | **8** | | **16** | | **32** | | **64** |
| | **10** | | **20** | | **40** | | **80** | |
| | **6** | | **12** | | **24** | | **48** | |
| | **9** | | **18** | | **36** | | **72** | |
| | | **25** | | **50** | | **100** | | |
| | | **15** | | **30** | | **60** | | |
| | | **14** | | **28** | | **56** | | |
| | | **63** | | **49** | | **81** | | |
| | | | **45** | | **90** | | | |
| | | | **27** | | **54** | | | |
| | | | **35** | | **70** | | | |
| | | | **21** | | **42** | | | |

**The Lotto Game**

Four students play the game together.

The teacher gives three 'master-cards' to the group. The 37 pictures from the Product Chart, of circles surrounded by coloured crescents, are reproduced on the master-cards, distributed randomly between the master-cards in sets of 12, 12 and 13.

A student allocates herself to each master-card, with the fourth student acting as a 'banker' who calls the numbers on counters drawn from a set of 37 counters in a bag. Each counter shows one of the 37 numbers represented on the product chart (listed above).

The banker draws the counters, one by one, from the bag, each time calling out the number.

Each player scans their master-card, and, if they spot on it the pattern showing the factors of the number called, they say 'me'. If this is correct, the student places the counter on the appropriate circle, and scores the number on the circle.

If the student whose master-card contains the factors fails to see that they have it, the banker (if she spots it herself) puts the counter on the circle upside down. If no one can find the right circle, the counter is put to one side.

The banker is responsible for checking claims, counting scores, and so on.

The cards are exchanged for each fresh game, and turns are taken at being the banker.

To encourage discussion several students could share each master-card.

In *Lessons With Cuisenaire Rods* Gattegno warns that it is unwise to call a colour by its figure name (for example, to say 'two' for red). "This creates confusion and is a waste of time."

**Product Cards**

The Product Cards contain the 37 'pictures' of products that are on the chart, with one product on each card. You, or your students, could devise games to play with these cards.

Gattegno describes the following game for two players in Arithmetic - A Teacher's Introduction To The Cuisenaire-Gattegno Methods Of Teaching Arithmetic:

The 37 cards are shuffled and dealt, then played alternately. Each time, the first of the two players who recognises and calls out the product, scores the value of the product. The player with the larger score wins.
Variation: each player plays their top card and the products are compared. The player with the larger product takes over the card with the smaller product (or vice versa) and scores the sum of the two products. Scores are recorded, and added up at the end.

We have introduced only a very few of the many ways in which students can learn with Cuisenaire materials. You will find more guidance about effective ways of working with the materials in The Cuisenaire Gattegno Method of Teaching Mathematics - A Course For Teachers - Volume 1 by: C. E. Chambers.

NRICH provides a Cuisenaire 'environment', but it is important to remember that Cuisenaire designed his materials for learners to handle and manipulate physically in three dimensions. You can find problems using NRICH's Cuisenaire 'environment' on the NRICH website.

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# An idea for the classroom – digital operations

Looking at different ways of working with digits can stimulate mathematical discovery and creativity in all learners. With all of these situations, you present the situation to students and see what they can find. Make a collection of their discoveries for display in the classroom. This is a rich topic for exploration and at the same time gives all students an opportunity to use their skills and techniques in a real context.

This activity is particularly suitable for group work.
Give the students copies of all these tables.

Ask students to choose just one of the tables and, working in groups, decide what they notice about it. At the end of the lesson each group should describe to the whole class:

- what they have noticed about the table, giving illustrations
- why they think what they have noticed is happening
- questions that they have asked and answered
- any questions that they have asked and not answered.
- The next step is for students to record their findings, and put them up as a classroom display.

Give students opportunities to make more observations and find out more about each of the tables.

Then challenge students to devise their own tables using the same principles that they have concluded were used to construct these tables. (Different students can tackle different tables.)

Prompt students to answer questions such as:

- what patterns do they find when creating a multiplication table?
- what patterns do they find when creating a subtraction table?
- what patterns do they find when creating a Pascal's triangle?
- what patterns do they find when looking at the Fibonacci sequence?

This is one of those ideas that is suitable for year 7 to year 13 (and beyond), from special needs to grade A* at A level. Give students the chance to explore and discover some fascinating and intriguing mathematics for themselves. It is an activity that can last over time and be revisited when students discover new interesting features.

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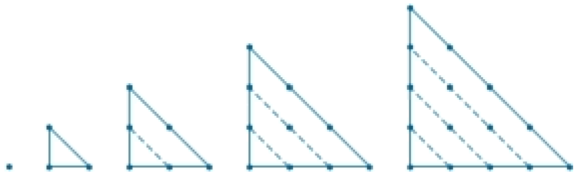
# Historical snapshots: some figurative numbers at Key Stages 3 and 4

Do you sometimes mention triangular and square numbers, and even go on to talk about figurate numbers? These figurate numbers give you a treasure trove of historical references to use in the classroom in a variety of ways – either to support the investigation or to make connections between different topics.

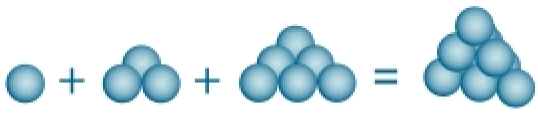
The triangular numbers have been studied at least as far back as ancient Greece, and were apparently of great interest to Pythagoreans. They can be generated by adding rows of pebbles (as the Greeks apparently did). Triangular numbers are sums of successive positive integers:

1
1+2=3
1+2+3=6
1+2+3+4=10 etc.



Triangular based pyramid numbers are, on the other hand, sums of successive triangular numbers:

1
1+3=4
1+3+6=10
1+2+6+10=20 etc.



These are sometimes called tetrahedral numbers – here you could bring in some history of Platonic Solids, and mention their role in Greek thought[1].

To get back to tetrahedral numbers – if you continue with the process by adding successive triangular-based pyramid numbers you will get triangulo-triangular numbers. These are in fact, triangular numbers in four dimensions, and the process can be continued into other dimensions.

Both Viète (1540-1603) and Fermat (1601-1665), two French mathematicians whose work in algebra and number theory was ground breaking, knew of the fourth-dimensional constructs, wrote about them, and called them 'triangulo-triangular' numbers, although presumably they did not think of them as 'numbers' related to different dimensions. Fermat, of the Last Theorem fame[2] (but also the one who came up with a Little Theorem[3]) was the one whose correspondence with Pascal (1623-1662) initiated the mathematical study of probability theory[4].

In fact, Pascal's triangle can be made use of when studying triangular numbers:

1. the numbers in the first row (pointed with a yellow arrow) are the triangular numbers in zero dimension (as any number to the power of 0 gives 1)
2. the second row gives triangular numbers in one dimension, otherwise known as natural numbers, or positive integers ('traditional' definition, excluding 0)
3. the third row is the row of triangular numbers in two dimensions – the triangular numbers as we know them
4. the fourth row gives pyramidal (triangular-pyramid) numbers in three dimensions
5. the fifth row is the row of triangulo-triangular numbers, etc.

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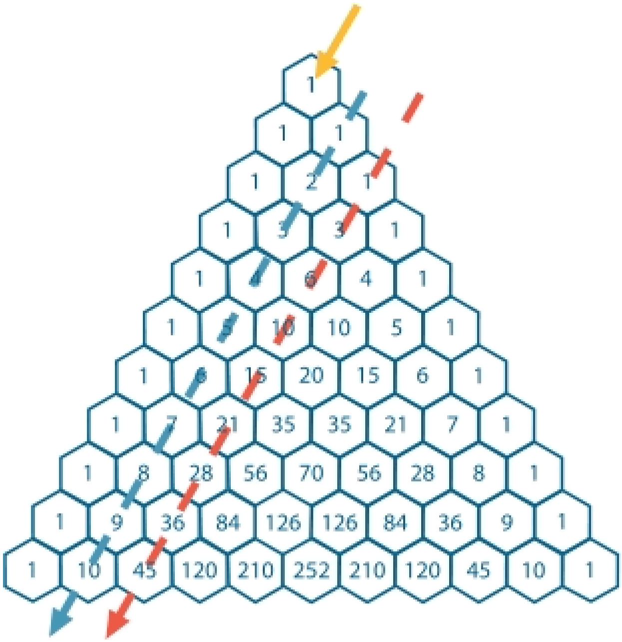
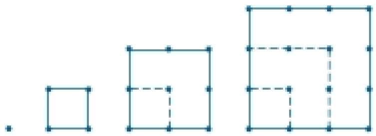
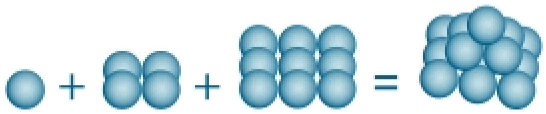



At key stage 3 you may want your students to build numbers using physical objects - but they will get stuck after the triangular-pyramid numbers! So then you can start them on investigating square numbers. Let's see how these work out.

The first four square numbers are 1, 4, 9, 16, 25

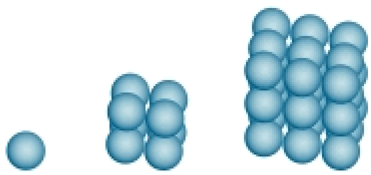


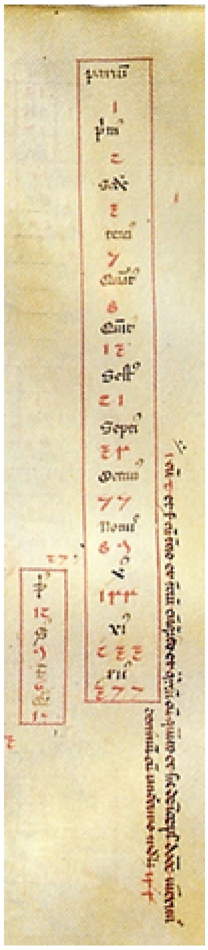
and their successive sums give square-pyramid numbers:



This was a result proved by Fibonacci (1170-1250), whose famous problem about rabbits gave birth to Fibonacci numbers and the sequence by the same name, but more of this to come in a future issue. Fibonacci in fact described the square pyramid numbers as sums of square numbers in his Liber Abaci, published in 1202, the same book which also gave us instructions on how to use the Hindu-Arabic numeral system.

The students can build cube numbers: they are also figurate numbers: 1, 8, 27, 64.



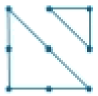


Part of the page from Fibonacci's *Liber Abaci*, where the Hindu-Arabic numerals first appeared in 1202



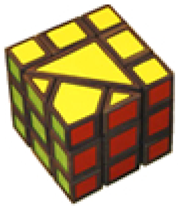
A Department for Education initiative to enhance professional development across mathematics teaching

But if you add cube numbers, the cumulative sums will result in a series of square triangular numbers: 1, 9, 36, 100, 225 and so on. This may complete the investigation in a kind of loop – we started with triangular numbers and we return to them via square and then cube numbers. Of course you can expand this investigation in many other directions: for example, square numbers are equal to the sum of two triangular numbers.



**Notes**

[1] Plato (c428-c348 BC) identified them as being tetrahedron (which he identified with fire), cube (earth), octahedron (air), icosahedron (water), dodecahedron (living force)
[2] Which every student should know, states that no three positive integers *a*, *b*, and *c* can satisfy the equation $a^n + b^n = c^n$ for integer $n>2$
[3] Which states that if p is a prime number, then for any integer *a*, $a^p - a$ will be evenly divisible by *p*
[4] A copy of a translation of this letter can be downloaded from the University of York Department of Mathematics website.





## 5 things to do this fortnight

- You might read a newly published, and entertaining, book about mathematics, *Alex's Adventures in Numberland* by Alex Bellos. You can also listen to the interesting and informative talk that was given by Alex at the RSA on 29 April.

- Do you still have a Rubik's Cube? Bram Cohen's Uncanny Cube is a descendent! As is his Canny Uncube! Watch Bram's collaborator, Oskar van Deventer, showing you how to manipulate the Uncanny Cube, and then comparing the Uncanny Cube with the Canny Uncube.

- Have you visited the Excellence in Mathematics Leadership (EiML) microsite recently? Six self-study modules have now been added to these valuable professional development materials.

- Whether or not your school is an institutional member of the Mathematical Association (MA), you could try to win £50 worth of MA publications before 1 July.

- If you live or work in London, the next meeting of the London Branch of the Association of Teachers of Mathematics (ATM) is about some roles that the history of mathematics can play in the learning of your students. It will take place from 10:00 am to 12 noon on Saturday 5 June at King's College, in the Department of Education and Professional Studies.

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# Diary of a subject leader

**Issues in the life of an anonymous Subject Leader**

Well, just as I predicted, the books did not mark themselves over the Easter vacation, but I did get them marked for the start of term. I find that peer assessment is very useful with many classes since students are quite sensible in providing formative comments. Their comments are sometimes more direct than mine, but I always check what's been written, and make sure that I mark students' products regularly myself – students appreciate seeing that I have studied their work, and they do read my responses and prompts (though they don't always follow them up!).

During the first week of the holiday, I went out regularly with my partner and still managed to attend to some department matters, such as planning the two days of interviews – I chose the classes to use for demonstration lessons, making sure that the candidates would be working with similar students and that no class would be used more than once. Communicating via email speeds things up.

Two of us provided six hours of revision for Y11 students, and coursework catch-up for Y10, spread over two days.

The faculty do went very well, with the babies breaking the ice. We ate plenty of sausages, a fish dish and chicken breasts stuffed with a mystical ingredient generally found in an ellipsoid – I waited until it was eaten before revealing that it was a haggis ellipsoid. I enjoy experimental cooking; I find that beating up cake mixtures and stuffing things into orifices relieves stress! If my experiments work, some of it goes into school, if not we eat it. A word of warning however – speaking from experience, don't experiment with garden fungi!

The end of the holiday was busy. I had a meeting with Texas Instruments about exciting new STEM materials that integrate hand-held technology into cross-curricular work in mathematics and science. I made a mental note to advise the faculty to check the TI-Nspire website for some excellent free resources. I'm a member of the Yenka Senate, so there was their weekly questionnaire to complete – this one was about the latest version of their software, which now includes short videos suggesting ways of using their software. It is a great resource to help you get started with this innovative software, which includes a new modelling tool for experimenting with 3D geometry.

I tried to find out which teachers would not be in school at the start of term due to the volcanic ash: only one mathematical casualty (and since it was SLT there were not many lessons to cover). I was going to be out at an NCETM meeting on the first day, so I dropped off Y8's exercise books and work at a colleague's house (near the recycling bin which was due to be emptied). Come to think of it, that's an excuse I haven't heard – 'my homework got recycled'!

Term has started – at the NCETM meeting on Monday it was great meeting up with people that I hadn't seen for over a decade. That was a really rich day!

Back in school on Tuesday, I had one of those days that make you glad to be alive when so much happens and everything falls into place. At the staff briefing we heard that Ofsted has put us on a list of the top 20 schools for behaviour management. We had a visitor, who hopes to do a GTP or PGCE, observing mathematics teaching in the faculty. And we had two excellent candidates for interview. Each candidate taught a 'sample lesson'. Some of the faculty were involved in observing those lessons, and everyone met the candidates at break while I went off to get some feedback on the lessons. Then I went straight over to do the interviews with the headteacher, chair of personnel and an assistant headteacher. This was followed by discussion and an appointment. I took the spare sandwiches and fruit back to the faculty because active teaching requires consuming many calories. Finally, I sorted out all the messages that had come through, prepared an after-school revision session and then delivered it. Oh, in case you are wondering, I did teach a lesson that day.

On the way home, I called in to see my daughter and grandson, and later in the evening I watched Waterloo Road to keep my CPD up to date!