

Questions Pupils Ask!

How many detentions will I get?

by Colin Foster

At our school we have a ‘penalty points’ system where two or three points (a maximum of five) can be given for minor offences such as running down the corridor, being late for lessons or forgetting your PE kit. When you reach 15 penalty points, you get a detention. A particular pupil had forgotten his calculator for maths two days running.

Me: Well, if you haven’t got your calculator tomorrow then I think I’ll give you *a million* penalty points!

Jack: A million!

Me: That seems fair, don’t you think?

Alex: Woah! How many detentions would *that* be?!

Jack: Er [reaching on the desk for his calculator but then remembering he doesn’t have it] I don’t know!

Me: [As Alex goes to lend him his, I take it] No, since you haven’t bothered to bring your calculator you obviously think it’s unnecessary. How can you do it without a calculator?

Jack: ... Well it’s a million divided by 15 ... I can do a million divided by 10 – that’s 100 000. A million divided by 20 – that’s 50 000, so it must be half way between 100 000 and 50 000, so it’s 75 000 detentions.

Alex: Wow! And how long would it take to do them – one a week [he has his calculator back now] – that’s 1443 years, and that’s not counting holidays!

Me [Looking at Jack] 75 000 is a good approximation but it’s not exactly right.

Jack It is: 50 000 to 100 000 is two lots of 25 000, so it must be 75 000.

Me 12 divided by 4 is 3, 12 divided by 2 is 6, so what should 12 divided by 3 be?

$$\frac{12}{4} = 3$$

[writing it down] $\frac{12}{3} = ?$

$$\frac{12}{2} = 6$$

Jack: 12 divided by 3 is 4.

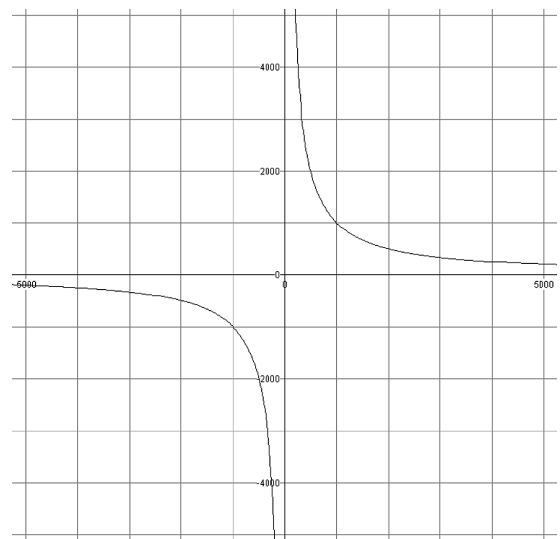
Alex: But it should be $4\frac{1}{2}$, because that’s half way between 3 and 6.

Jack: That’s weird.

Alex: ... A million divided by 15 can’t be exact, because you can divide it by 5 but then whatever you get you won’t be able to divide that by 3, because 3 doesn’t go into a million, because the digits add up to 1 ... [he now uses a calculator] so it’s actually 66666.66667.

Jack: [Looking at the calculator display] That’s 6 recurring, probably. Why doesn’t my way work?

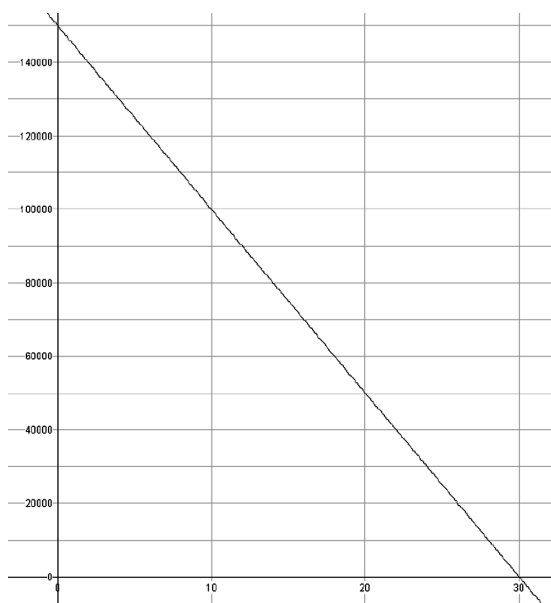
I couldn’t see on the spur of the moment how to develop this for them, and I was needed elsewhere in the classroom, so I said something weak like “That’s interesting; have a think about it” and continued to circulate round the room. I had an image of the graph $xy = 1\,000\,000$ not being a straight line, but the pupils would not be familiar with reciprocal functions. Maybe this would be a way of introducing them to inverse proportion? I remember from my own school days it striking me as odd that direct proportion was a straight line upwards but that indirect proportion was *not* a straight line downwards but a *curve* – why the asymmetry?



$$y \propto \frac{1}{x}$$

$$y = \frac{1\,000\,000}{x}$$

Jack had been assuming a linear decrease ($y \propto (k - x)$), or, specifically, $y = 15\,000 - 5\,000x$) rather than a hyperbolic one. The incident reminded me of how persistent and



$$y \propto (k - x)$$

$$y = 150\,000 - 5\,000x$$

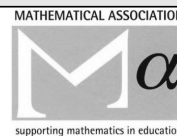
ubiquitous are people's assumptions of linearity, and also of the way in which informal approaches to arithmetic can sometimes unexpectedly go awry. ☒

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Author

Colin Foster, King Henry VIII School, Warwick Road, Coventry CV3 6AQ.
e-mail: colin@foster77.co.uk

More Creative Use of Odd Moments



New
This Year



Odd moments are the occasions when half the class arrives late for some reason or when the main business of the lesson is completed before the bell or whenever you as a teacher contrive to find a short period of time to discuss an interesting problem. The contents of this book provide a variety of ideas to use creatively in such odd moments. Each item contains something to discuss or explore which can be adapted or extended to suit a wide range of students. These odd moments originally appeared in *Mathematics in School* and are reproduced in the book with additional notes on each idea.

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The Mathematical Association
259 London Road
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LE2 3BE

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Making sense of Maths at BETT 2009

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Are changes to the Primary Framework leaving you overworked or confused? Are changes to Key Stage 3 leaving you baffled and bewildered? Well rest assured that you are not alone. If a little clarity is what you need, then make sure the **14-17 January** is a firm date in your diary, for this is when BETT 2009 will be opening its doors to your questions. BETT has more in store for maths teachers in 2009 than ever before.

Mathematical Mania – If hard facts are what you need then a visit to BETT's *Subject Association Advice Centre* will offer the opportunity to explore how ICT can help achieve more effective teaching and learning within the field of maths. Experts from the *The Mathematical Association* will be on hand to answer all your questions and you will find them in the *National Hall Gallery, Stand W51*

For those requiring independent information and advice about the show's latest software and digital content, expert advice is available from sources including the *'BESA Information point'* on **D46** and the *'TEEM Software Information Point'* in the *National Hall Gallery*.

Futuristic Features – New for 2009 is *'Learning Elsewhere'* (**C62 & D62**). Developed in conjunction with Professor Stephen Heppell, this feature explores the concept of extending education beyond the classroom. Returning to BETT in 2009 is *'The New Technologies Zone'* which gives visitors a chance to road-test the very latest resources and if learning how to implement these new technologies is more of a priority, then *The Best Practice Seminar Theatre* should be included in your visit.

Practical Advice – Here is a taster of the seminars to be keeping your eyes peeled for. **Wednesday 14th January at 14.30**, Nick Asker from **National Strategies**, is exploring some of the lessons learnt through the 'ICT pilot: improving learning in mathematics and English'. Participants are invited to engage with ICT inspired mathematical/language activities.

Saturday 17 January at 13.15, Alison Clark Wilson will be presenting the annual *Mathematical Association* seminar at BETT. Here is an opportunity for delegates to update themselves on the work that the *Mathematical Association* and *Association of Teachers of Mathematics* have jointly carried out for *Becta*. This year's seminar launches the **Key Stage 4 ICT enriched mathematics curriculum grid** and features classroom examples from the "Using ICT to support hard to teach topics in mathematics" project.

Exhibitors – Not to be overlooked is the array of resources on display for you to touch and test. **Texas Instruments** on stand **J20**, is exhibiting **TI-Nspire**, a flexible tool for personalised learning, combining a handheld device and software. Documents, statistics, spreadsheets, graphs, geometry, financial functions and a calculator application (all dynamically linked) encourage exploration of multiple representations of a problem and its solutions. On stand **B50 SMART Technologies**, together with **Global Grid for Learning**, a Cambridge University Press company, will be demonstrating the new **SMART Learning Marketplace**, an online service offering educators more than one million pieces of premium digital content. Teachers can move beyond the confines of a textbook to create compelling learning experiences with the Marketplace's resource library of video files, images, audio files and SMART Notebook activities. Content for the SMART Learning Marketplace, often stored on a school's Learning Platform, includes resources from the world's top education publishers, technology and software educators, and museums. On stand **P45, Whizz Education** are launching Maths-Whizz Tutoring for Schools. This personalised learning tool with detailed reporting and management tools for teachers and parents gives unlimited access to online maths lessons for students in the classroom or at home.

For more information on the features and exhibitors at BETT 2009 and to register for free, visit the website at www.bettshow.com