PARKING PROBLEM

Colin Foster and a Year 8 group work with mathematics in the real world.

I am often suspicious of 'real-life contexts' in mathematics lessons. Frequently they turn out to be rather *unrealistic* and risk trivialising both the context and the mathematics. However, just occasionally I do come across an opportunity to work on a genuinely real-life problem in the mathematics classroom. A little while ago I bumped into our head teacher in the corridor and he asked me to step into his office for a moment. It turned out that I wasn't in trouble; instead, he wanted to ask me about the school car park adjacent to the field. Currently there were no parking spaces marked out - it was a 'free for all' - and the space was sometimes being used inefficiently and not everyone could get their cars in. He wanted to have the surface tarmacked and white lines drawn for spaces. But where should the spaces be placed to make best use of the area? It seemed like an interesting mathematical problem. He was also considering removing a strip from the edge of the grass and including that in the car park. Would doing that create enough additional spaces to be worth the trouble?

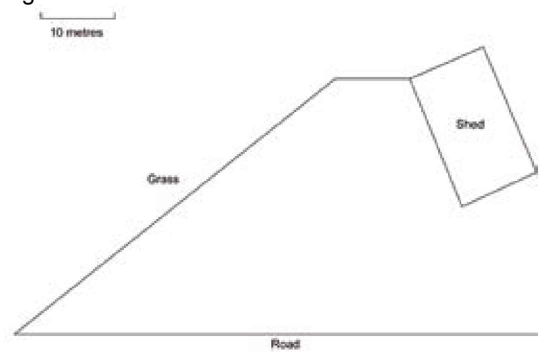
I asked if I could share the problem with my Year 8 class, who I thought might enjoy working on it, and in the following lesson I explained the problem and asked them to list whatever they considered to be important factors. They had various ideas for maximising the number of spaces, including a multi-storey system (with lift!), and they discussed how big a parking space needs to be, as well as how much room a car needs to manoeuvre into and out of it. They raised the need for disabled parking spaces and for emergency vehicles to be able to get in and out. They also had concerns about minibuses and coaches being able to park or turn around.

Using measurements from *Google Maps*, I had printed out a scale drawing (1 cm to 2 m) on A3 paper (Figure 1), and I gave one of these to each group and asked them to come up with the best solution they could. I had discovered on the internet that a standard parking space is 2.4 m × 4.8 m, and I suggested that there should be 6 m gaps between rows to allow cars to get in and out safely. The fact that the car park was not a simple rectangle made the problem more interesting. Several different arrangements were tried, with and without stealing a strip of grass. Some groups drew out each individual car, (see Figure 2), but others just drew blocks and wrote how many cars would be contained in each one, (see Figure 3.) Some tried rows parallel to the edge of the grass, (see Figures 2 and 4); others, parallel to the edge of the road. Some had an island of cars in the middle, (see Figures 3 and 5.) It seemed that the problem offered considerable scope for varied approaches, leading to a selection of possibilities for the head to consider.

The class enjoyed working on the problem, and it drew on and helped to develop several topics, such as area, length, scale and estimation. More importantly, perhaps, learners were able to use their powers to tackle a problem that someone actually cared about and wanted to know the answer to. At the end of Derek and Barbara Ball's opening plenary at the 2003 ATM conference (Ball and Ball, 2004), they described an end-of-term school concert and asked what an equivalent event might be for mathematics teaching. Where in school life do children have the opportunity to display their mathematical skills publicly? When one learner jokingly suggested having a plaque saying 'Designed by 8FN' at the entrance to the car park, it reminded me of this challenge. Perhaps something as tangible as a car park layout, which other people would see and use regularly, might be one answer to this.

I am left wondering whether there are other aspects of the school site that might be designed or improved on by learners. If there is a parking problem at your school, might it be possible, by redesigning the layout, to fit in more cars? Is this something that learners might enjoy working on? Or maybe there are other opportunities in your school for some problem solving that could allow learners to use their mathematics to improve something for everyone? Perhaps the best way to value learners' mathematical solutions might be to implement them?

Figure 1



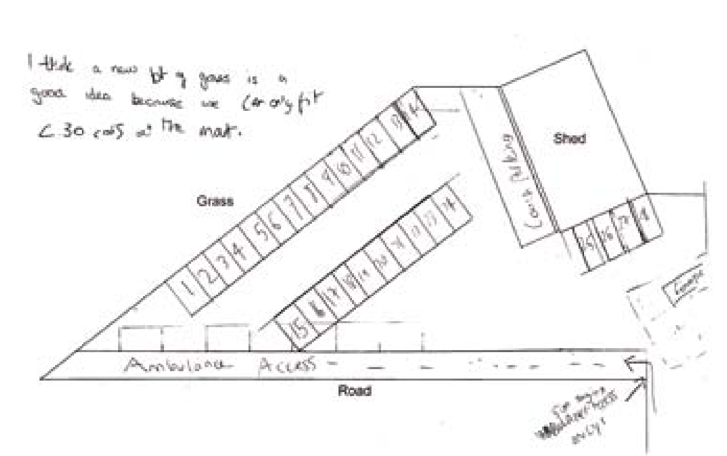


Figure 2

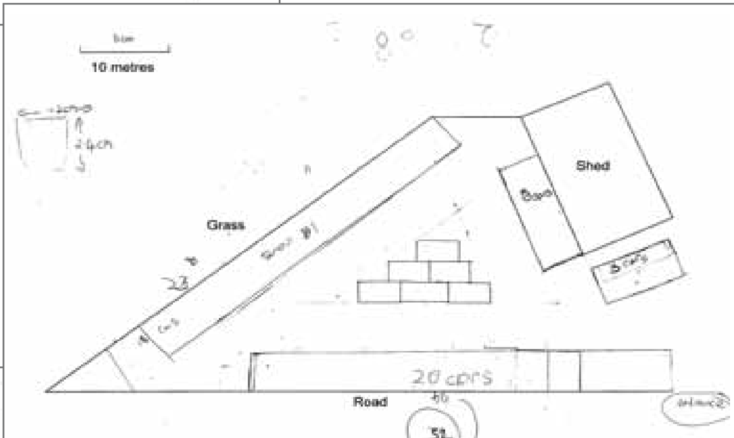
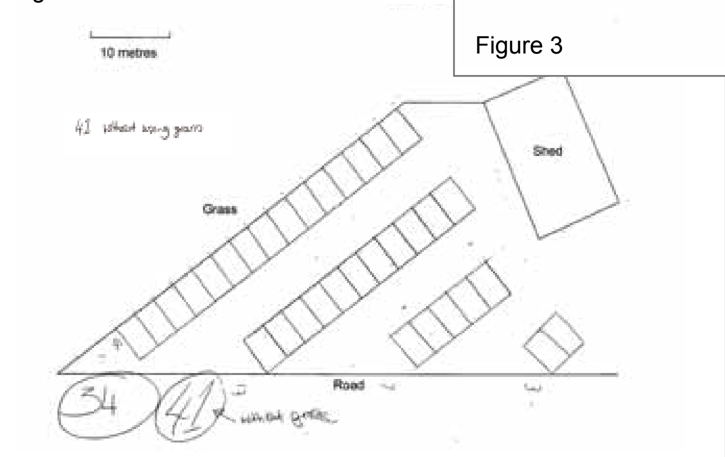


Figure 3

Figure 4


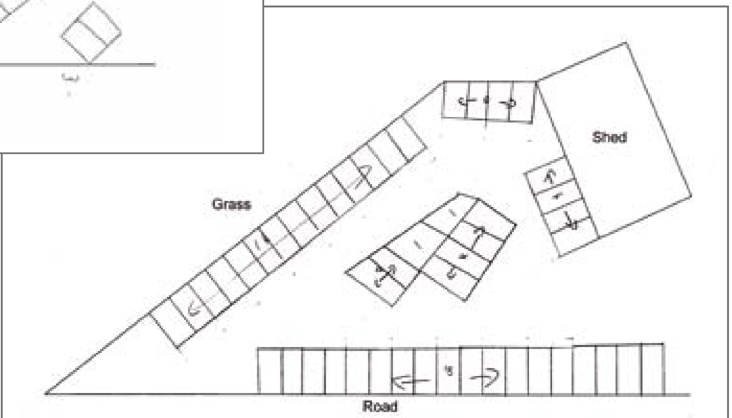


Figure 5

Colin Foster is a Senior Research Fellow in the School of Education at The University of Nottingham. This article was written when Colin was teaching at King Henry VIII school, Coventry.

Reference

Ball, D. and Ball, B. (2004) Maths is more than you bargained for, Opening address to the 2003 ATM Easter conference, reproduced as a supplement to MT183: available at www.atm.org.uk/journal/archive/mt183files/ATM-MT183-19-21-Extra-Ball.pdf