The Pros and Cons of Contests

Karl Dilcher

Mathematical contests and competitions have long been among the main components of the Canadian Mathematical Society's educational initiatives. Indeed, the second entry under Education on the CMS website (http://cms.math.ca) is about competitions, and the introduction to those extensive and well-organized pages states that "competitions are an important part of learning mathematics and a fun activity for students of all ages." It then goes on to describe the CMS's support for competitions. The society has a Mathematical Competitions Committee, and at least four more of the 14 standing committees are partly or indirectly involved with competitions.

Over the years I have also been involved with competitions, both within the CMS and at Dalhousie. As a member and then chair of the Endowment Grants Committee, I played a role in the awarding of grants to several excellent proposals involving local, regional and national competitions. In my own department, before I became chair, I was involved for many years in organizing training sessions for the Putnam and the Science Atlantic (then called APICS) competitions. I supervised the Putnams and organized travel and accommodation to the APICS competitions. I even designed a (now discontinued) problem-solving course featuring competition-type problems, aimed at preparing students for various contests.

Before I go on, let me state my unambiguous support for problem solving as a mathematical activity. It was perhaps not such a coincidence that my colleague and office neighbour Swami (S Swaminathan) independently chose a topic quite similar to what I was going to write about.[1] We both have similar mathematical tastes, and our approaches to mathematics are largely problem-based. Along with many other mathematicians, we take delight in beautiful problems, and usually even more delight in our efforts to solve them. For us mathematicians the word *problem* has a positive connotation, which is certainly not the case in everyday nonmathematical usage of the word. In fact, it is difficult to convince a nonmathematician (or, to be fair, a nonscientist) that a problem can actually be beautiful.

It is also true that "mathematics is not a spectator sport" (the title of a book by George M Phillips [2005]). But is it a sport, in the competitive sense? You learn by doing; this is the premise of Phillips's book, and this is what we tell our students as we give them homework and practice problems. But do we learn better and faster by doing mathematics fast and under time pressure?

This ambiguity was also the topic of a brief article, "Pros and Cons of Math Competitions," by Richard Rusczyk,[2] founder of the very interesting and engaging web resource Art of Problem Solving. Referring to competitions for middle school and high school students in the United States, Rusczyk writes,

> The most immediate value of these math contests is obvious—they pique students' interest in mathematics and encourage them to value intellectual pursuits. Kids love games, and many will turn just about any activity into a contest, or in other words, something to get good at. Math contests thus inspire them to become good at mathematics just like sports encourage physical fitness. Eventually, students put aside the games. By then, hopefully an interest in the underlying activity has developed.

These are indeed very strong and convincing arguments in favour of math competitions. But Rusczyk goes on to caution that there are some pitfalls. In particular, he warns against what he calls "curricular contests" and contests that greatly emphasize speed or memorization. Contests need to be well designed, he argues, and should help students develop the ability to think about and solve complex problems. Rusczyk mentions two further pitfalls, namely extending children beyond their abilities, with the danger of the experience going from humbling and challenging to humiliating and discouraging. Finally, he cautions against burnout, with the danger of students not just turning against competitions, but against math in general.

I'm giving so much space to Rusczyk's article because it puts into words my own ambiguous feelings about math competitions, both as someone involved in them as an educator and minor administrator, and as a participant in a different era (the early '70s) and a different country. I myself was always attracted to mathematics because it was, and remains, one of the least competitive endeavours around. I could (and still can) be slow, very slow, and get away with it. Anything competitive has always turned me off, and I instinctively stayed away from "hot topics."

Partly for this reason, I must dispute one argument that Rusczyk brings forward in favour of math competitions: "For better or worse, much of life is competition, be it for jobs or resources or whatever." No, it doesn't have to be that way. Collaboration is always better in all spheres of life and society. So, by all means, let's build on children's love of games and competitions. But let's be mindful of the pitfalls and dangers of instilling too much of a sense of competition in children.

What does this mean for the CMS and the wider mathematical community? In spite of my words of caution, I believe we are doing all right; many of the competitions are collaborative, and there are Math Camps, Math Circles, Math Leagues, and other less competitive and more collaborative initiatives. So, in most parts of the country, there are programs for the slow kids, as well as for the fiercely competitive, and everyone in between. In any case, I hope that most will be able to say, as Terence Tao (2006) did at the beginning of his *Solving Mathematical Problems: A Personal Perspective*, "But I just like mathematics because it's fun."

Notes

1. See "Problem Solving," by Srinivasa Swaminathan, on page 15.

2. www.artofproblemsolving.com/Resources/articles.php?page=pc_competitions&

References

Phillips, G M. 2005. *Mathematics Is Not a Spectator Sport.* New York: Springer.

Tao, T. 2006. *Solving Mathematical Problems: A Personal Perspective.* New York: Oxford University Press.

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