Parabola Volume 30, Issue 2 (1994)

HELPFUL HINTS FROM AN OUTSTANDING INTUITIONIST

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While browsing through the science section of our local A.B.C. bookshop, I leafed through the autobiography of Richard Feynman (1918-1988) titled **'Genius'** by James Gleick. Inside the book cover it mentioned that Richard was a mathematician/physicist of the highest order, Nobel Prize winner and architect of quantum theories: a man who has changed science forever.

Apparently Richard excelled in mathematics competitions and I quote from the book:

"But nothing gave Richard the thrill of math team. Squads of five students from each school met in a classroom, the two teams sitting in a line, and a teacher would present a series of problems. These were designed with special cleverness. By agreement they could require no calculus – nothing more than standard algebra - yet the routines of algebra as taught in class would never suffice within the specified time. There was always some trick, or shortcut, without which the problem would just take too long. Or else there was no built-in shortcut; a student had to invent one that the designer had not foreseen. For these competitions the mind had to learn indirection and flexibility, for head-on attacks were second best. The team's number-two student, sitting directly behind Feynman, would calculate furiously with his pencil, often beating the clock, and meanwhile he had a sensation that Feynman, in his peripheral vision was not writing-never wrote, until the answer came to him. You are rowing a boat upstream the river flows at 3 km/hr; your speed against the current is 4.25 km/hr. You lose your hat in the water. Forty five minutes later you realise it is missing. How long does it take to row back to your floating hat? A simpler problem than most and given a few minutes, the algebra is routine. But a student whose head starts filling with $3v$ and $\frac{17v}{4}$ has already lost for this is a problem about reference frames. The river's motion is irrelevant – as irrelevant

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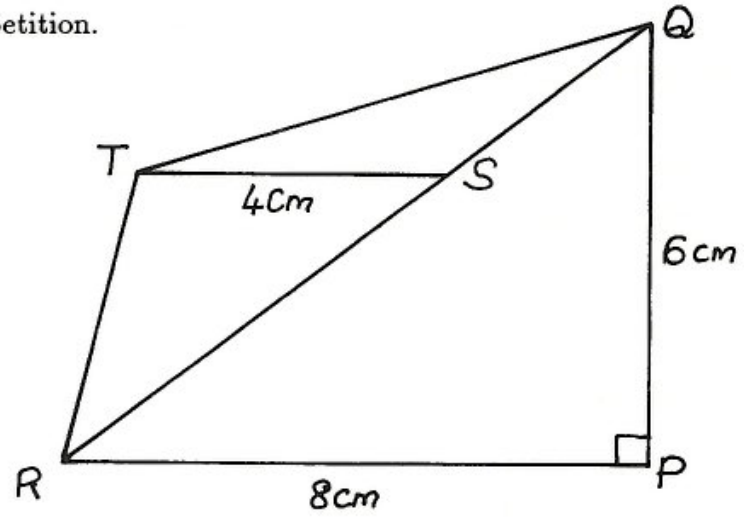
as the Earth's motion through the solar system. Ignore the velocities, place your point of reference at the floating hat – think of yourself floating like the hat, the water motionless around you, the banks an irrelevant blur – now watch the boat and you see at once, as Feynman did, that it will return in the same forty-five minutes it spent rowing away!"

An interesting approach and I will now think a little more carefully before launching into an algebraic attach on such problems!

Also in high school Richard has not solved Euclidean geometry problems by tracking proofs through a step by step logical sequence. He had manipulated the diagrams in his mind: he anchored some points and let others float, imagined some lines as stiff rods and others as stretchable bands, and let the shapes slide until he could see what the result must be.

Now, consider the following problem from the Senior Division of the Australian Mathematics Competition.



Given ST is parallel to PR, find the area of the triangle RQT.

So anchor the points Q, P, R. Let T and S float: imagine TS as a stiff rod, slide S down to R or up to Q and there you have it, the area is 12 cm^2!