

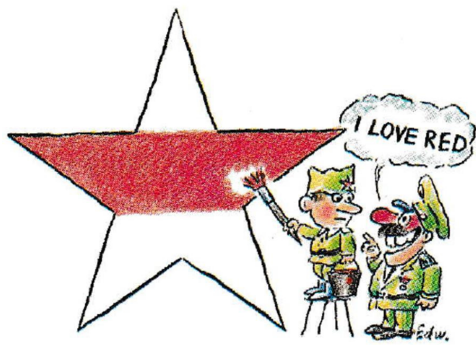
Red Star (Красная Звезда)

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Here is another Brainteaser from the *Quantum* magazine ([1]).

Prove that the area of the red portion of the star is exactly half the area of the whole star. (N. Avilov)



Art by Edward Nazarov

This is a relatively simple problem, but I wanted to include it because of its cartoon. Its implied gentle post-Soviet humor reminded me of that strange decade in US-Russian affairs between the end of the Cold War and the rise of Putin in the 21st century. The strangeness was brought home when we had our annual security checks of our classified document storage. Being mostly anti-

submarine warfare (ASW) material the main concern was that it would not fall into the hands of the Soviets. But with the “demise” of the Soviet Union in 1989 no one cared any more about the classification. After decades of painfully securing these documents we could not suddenly turn them loose and throw them into the public trash. So we kept them secure anyway. You can imagine how we old cold-warriors feel about the current regime.

That is not to say that I didn’t welcome the thaw. Russian literature, both classical and even “Soviet realism”, as well as Russian cinema, is some of the world’s best. And Russian mathematicians have always been superior, and especially adept at communicating with novices. The collaboration of the American mathematicians and *Kvant* contributors in *Quantum* produced excellent results during the thaw. It is unfortunate that it could not survive the rise of Putin and his oligarchs.

Solution

Figure 1 shows the simple solution. Adding the central regular pentagon and its partitioning diagonals to the regular star reveals the answer. The light red triangles form a parallelogram that implies they are congruent, and therefore congruent to all the other star points. Further, the diagonals of the pentagon produce two more congruent triangles as indicated. Therefore the colored and uncolored regions of the star have the same triangles and so the same area.

This solution is also the same as that provided by *Quantum*.

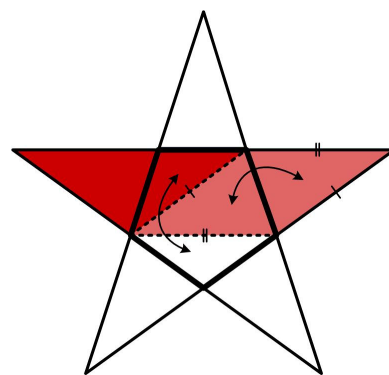


Figure 1 Solution

References

- [1] “Brainteasers” *Quantum Magazine*, National Science Teachers Assoc., Springer-Verlag, Vol.2 No.4, Mar-Apr 1992 p.20 B48

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