

NSF Math Column



Problem of the month

Allen, a hapless algebra student, sees the expression $\log A/\log B$. He mistakenly cancels the “log”s, to get the expression A/B . Luckily for him, when he plugs in values for A and B , he gets the correct answer. Assuming A and B are not equal, find the sum of all possible values of the product AB .

Would you like submit your answer? Please click on the following link:

<https://spreadsheets.google.com/viewform?formkey=dHR6ek5BazVnRVM3d01nbG1fNVdybXc6MA>

Names of everybody who submitted correct answers will be published in the next edition!



Interested to know the solution for last column’s problems? Refer to the end of this document!

For any questions or comments, please contact the team at NSFMathColumn@gmail.com

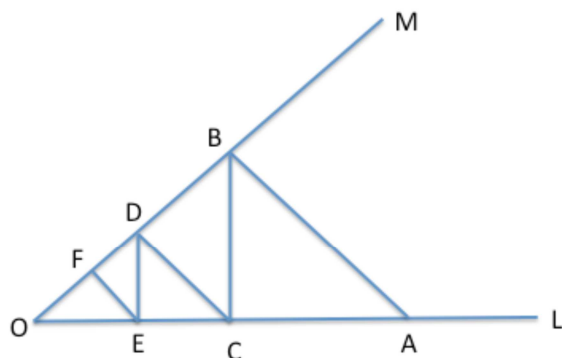
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Answer to Problem of the month (Vol 2-11)

$\sqrt{2} + 1$

Solution:

Let's mark the various points as follows. "A" is the starting point. First, we draw a line from A to B.



We are given that length of OA = 1 and line AB is perpendicular to OM and angle MOL is 45° . Therefore angle BAO = 45° . Since OA = 1, AB = BO = $1/\sqrt{2}$. Next, we draw the line BC perpendicular to OL. Triangle ABC is again 45-45-90 and hence BC = $1/2$. Next, we draw the line CD perpendicular to OM. Now, BCD is 45-45-90 triangle and hence CD = $1/2\sqrt{2}$. Thus, the pattern for the lengths of the lines will be $1/\sqrt{2}$, $1/2$, $1/2\sqrt{2}$, $1/4$, $1/4\sqrt{2}$, $1/8$, ...

We need to know the total length of the lines if we continue this forever.

$$\begin{aligned}
 &= 1/\sqrt{2} + 1/2 + 1/2\sqrt{2} + 1/4 + 1/4\sqrt{2} + 1/8 + 1/8\sqrt{2} + \dots \\
 &= (1/\sqrt{2})(1 + 1/2 + 1/4 + 1/8 + \dots) + (1/2 + 1/4 + 1/8 + \dots) \\
 &= (1/\sqrt{2}) + (1/\sqrt{2})(1/2 + 1/4 + 1/8 + \dots) + (1/2 + 1/4 + 1/8 + \dots)
 \end{aligned}$$

Using the formula for an infinite geometric series we get:

$$= 1/\sqrt{2} + 1/\sqrt{2} + 1 = \sqrt{2} + 1.$$



Who submitted correct answers?

- Akshaj Kadaveru (Fairfax, VA)
- Sanjeev Jha (NH)
- Rahul Jayaraman (San Jose, CA)
- Anup Hiremath (Fremont, CA)
- Vishal Agarwal (San Diego, CA)
- J Mani (Fairfax, VA)
- Gita Balakrishnan (Sunnyvale, CA)
- Sreekar Chitti (Bangalore, India)
- N Shankar (NJ)
- Venkatesh Madapoosi (St. Louis, MO)
- Anirudh Kuchibhatla (Hyderabad, India)
- Tarang Saluja (Nashua, NH)
- Anupam Sharma (FAIRFAX)
- Sameer Lal (Macungie, PA)
- Chiru Koiloth (Plainsboro, NJ)
- Sashidhar Guduri (Ann Arbor, MI)
- VIJAYA MADALA (Chantilly, VA)
- Tanushree Pal (Ventura, CA)
- Anurag Dhawan (San Jose, CA)
- sankar mahadevan (Dayton, NJ)
- Narahari Bharadwaj (Berwyn, PA)
- Shwetark Patel (Herndon, VA)
- Aneesh Agarwal (NC)
- Siddarth Guha (Missouri City, TX)
- Sushovan Guha (Missouri City, TX)
- Neha Khandelwal (FAIRFAX)
- Parmesh Bachina (Pleasanton, CA)
- Anirudh Udutha (US)
- Ajit Kadaveru (Fairfax, VA)
- Mythri Challa (Coralville, IA)
- Preetham Bachina (Pleasanton, CA)
- Anudeep Udumula (Bear, DE)
- Leela Pakanati (Dunlap)
- Jesse Dhaliwal (Bakersfield, CA)
- Josh Dhaliwal (Bakersfield, CA)
- Anish Chaluvadi (Simpsonville, SC)
- Pranam Kalla (Simi Valley, CA)
- Vamsi Subraveti (Nashville, TN)
- Divya Goel (Bloomfield Hills, MI)
- Sachin Raghavendran (Cary, NC)
- Mounisha Kovour (Algonquin, IL)
- Yash Nalla (Concord, NC)

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- Rahul Madala (Chantilly, VA)
- Anish Madala (Chantilly, VA)
- Aayush Gupta (Saratoga, CA)
- Anjali Nambrath (Marlboro, NJ)
- pooja puttaraju (Channapatna, India)
- SriLakshmi Guduru (Fremont)
- Rama devi kodali (Cary, NC)
- Rohith Sai Edupuganti (Cary, NC)
- Srivani Edupuganti (Cary, NC)
- sri jaladi (St louis, MO)
- Hemanth Chitti (Bangalore, India)
- Desigamoorthy Nainar (Champaign, IL)
- Meena Shankar (Bridgewater, NJ)
- Dhivya Senthil Murugan (Denver, CO)

Thanks to all who attempted to solve the problem of the month. We look forward to your continued interest and increased participation!