2021 Fall AMC 12B Problems/Problem 3

The following problem is from both the 2021 Fall AMC 10B #4 and 2021 Fall AMC 12B #3, so both problems redirect to this page.

Contents

Problem

At noon on a certain day, Minneapolis is N degrees warmer than St. Louis. At $4:00$ the temperature in Minneapolis has fallen by 5 degrees while the temperature in St. Louis has risen by 3 degrees, at which time the temperatures in the two cities differ by 2 degrees. What is the product of all possible values of N?

$\textbf{(A)}\ 10 \qquad \textbf{(B)}\ 30 \qquad \textbf{(C)}\ 60 \qquad \textbf{(D)}\ 100 \qquad \textbf{(E)}\ 120$

Solution 1 (Two Variables)

At noon on a certain day, let M and L be the temperatures (in degrees) in Minneapolis and St. Louis, respectively. It follows that $M = L + N.$

At $4:00,$ we get

$$\begin{aligned} |(M-5)-(L+3)| &= 2| \\ |M-L-8| &= 2 \\ |N-8| &= 2. \end{aligned}$$

We have two cases:

1. If $N-8=2,$ then $N=10.$
2. If $N-8=-2,$ then $N=6.$

Together, the product of all possible values of N is $10 \cdot 6 = \boxed{\textbf{(C)}\ 60}$.

~Wilhelm Z ~KingRavi ~MRENTHUSIASM

Solution 2 (One Variable)

At noon on a certain day, the difference of temperatures in Minneapolis and St. Louis is N degrees.

At $4:00,$ the difference of temperatures in Minneapolis and St. Louis is $N-8$ degrees.

It follows that

$$|N-8|=2.$$

We continue with the casework in Solution 1 to get the answer $\boxed{\textbf{(C)}\ 60}$.

~Steven Chen (www.professorchenedu.com) ~MRENTHUSIASM

See Also

2021 Fall AMC 10B (**Problems** • **Answer Key** • Resources (http://www.artofproblemsolving.com/community/c13))	
Preceded by **Problem 3**	Followed by **Problem 5**
1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • 10 • 11 • 12 • 13 • 14 • 15 • 16 • 17 • 18 • 19 • 20 • 21 • 22 • 23 • 24 • 25	
All AMC 10 Problems and Solutions	

2021 Fall AMC 12B (**Problems** • **Answer Key** • Resources (http://www.artofproblemsolving.com/community/c13))	
Preceded by **Problem 2**	Followed by **Problem 4**
1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • 10 • 11 • 12 • 13 • 14 • 15 • 16 • 17 • 18 • 19 • 20 • 21 • 22 • 23 • 24 • 25	
All AMC 12 Problems and Solutions