Another Boat Puzzle

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This is another typical travel puzzle from the 2024 Math Calendar ([1]).

> A boat travels downriver at 30 mph, then goes back up along the same path at 20 mph. What is the boat's average speed?

As before, recall that all the answers are integer days of the month.

Solution

Let D be the distance traveled down the river. Let t_D be the time the boat took to go downriver, and t_U the time to return back upriver. Then we have the following relations:

$$30\, t_D = D = 20\, t_U$$

So the average speed for the whole journey is

$$\frac{2D}{t_D + t_U} = \frac{2D}{\dfrac{D}{30} + \dfrac{D}{20}} = 2\,\frac{600}{50} = 24 \text{ mph}$$

References

[1] Rapoport, Rebecca and Dean Chung, *Mathematics 2024: Your Daily epsilon of Math*, American Mathematical Society, 2024. July

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