

2021 Fall AMC 12B Problems/Problem 2

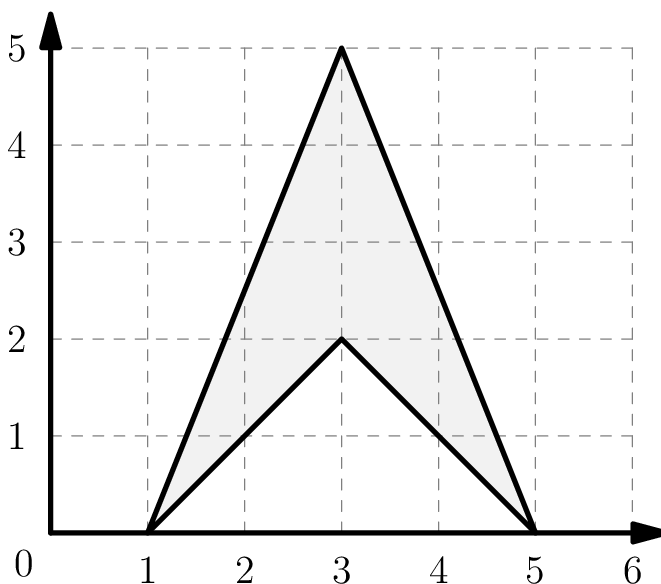
The following problem is from both the 2021 Fall AMC 10B #2 and 2021 Fall AMC 12B #2, so both problems redirect to this page.

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Problem

What is the area of the shaded figure shown below?



- (A) 4 (B) 6 (C) 8 (D) 10 (E) 12

Solution 1 (Area Addition)

The line of symmetry divides the shaded figure into two congruent triangles, each with base 3 and height 2.

Therefore, the area of the shaded figure is

$$2 \cdot \left(\frac{1}{2} \cdot 3 \cdot 2 \right) = 2 \cdot 3 = \boxed{\text{(B)} 6}.$$

~MRENTHUSIASM ~Wilhelm Z

Solution 2 (Area Subtraction)

To find the area of the shaded figure, we subtract the area of the smaller triangle (base 4 and height 2) from the area of the larger triangle (base 4 and height 5):

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$$\frac{1}{2} \cdot 4 \cdot 5 - \frac{1}{2} \cdot 4 \cdot 2 = 10 - 4 = \boxed{(B) 6}.$$

~MRENTHUSIASM ~Steven Chen (www.professorchen.edu.com)

Solution 3 (Shoelace Theorem)

The consecutive vertices of the shaded figure are $(1, 0)$, $(3, 2)$, $(5, 0)$, and $(3, 5)$. By the Shoelace Theorem, the area is

$$\frac{1}{2} \cdot |(1 \cdot 2 + 3 \cdot 0 + 5 \cdot 5 + 3 \cdot 0) - (0 \cdot 3 + 2 \cdot 5 + 0 \cdot 3 + 5 \cdot 1)| = \frac{1}{2} \cdot 12 = \boxed{(B) 6}.$$

~Taco12 ~I-AM-DA-KING

Solution 4 (Pick's Theorem)

We have 4 lattice points in the interior and 6 lattice points on the boundary. By Pick's Theorem, the area of the shaded figure is

$$4 + \frac{6}{2} - 1 = 4 + 3 - 1 = \boxed{(B) 6}.$$

~danprathab

See Also

2021 Fall AMC 10B (Problems • Answer Key • Resources (http://www.artofproblemsolving.com/community/c13))	
Preceded by Problem 1	Followed by Problem 3
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 1	Followed by Problem 3
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All AMC 12 Problems and Solutions	

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