

2021 Fall AMC 12B Problems/Problem 6

The following problem is from both the 2021 Fall AMC 10B #8 and 2021 Fall AMC 12B #6, so both problems redirect to this page.

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Problem

The largest prime factor of 16384 is 2 because $16384 = 2^{14}$. What is the sum of the digits of the greatest prime number that is a divisor of 16383?

(A) 3 (B) 7 (C) 10 (D) 16 (E) 22

Solution

We have

$$\begin{aligned} 16383 &= 2^{14} - 1 \\ &= (2^7 + 1)(2^7 - 1) \\ &= 129 \cdot 127 \\ &= 3 \cdot 43 \cdot 127. \end{aligned}$$

Therefore, the greatest prime divisor of 16383 is 127. The sum of its digits is $1 + 2 + 7 = \boxed{\text{(C)} 10}$.

~Steven Chen (www.professorchen.edu.com) ~NH14 ~kingofpineapplz ~Arcticturn

Video Solution by Interstigation

https://youtu.be/p9_RH4s-kBA?t=1121

See Also

2021 Fall AMC 10B (Problems • Answer Key • Resources (http://www.artofproblemsolving.com/community/c13))	
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2021 Fall AMC 12B (Problems • Answer Key • Resources (http://www.artofproblemsolving.com/community/c13))	
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