

Math Diversion Problem 602

P. Reany

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Mathematical maturity is hard to define. But there's some point in the journey of an undergraduate math student at which point they're able to reason, to abstract, to learn new things on their own, to not have their hand held in tackling new concepts, new definitions, new conceptualizations; and actually being able to formulate and structure new definitions and meanings.
— Abu Ibrahim

The YouTube video is found at:

Source: <https://www.youtube.com/watch?v=BOTqy-OYTzw>
Time Stamp: 5:36
Title: [June SAT Math] 5 Hardest SAT MATH Questions
Presenter: DSAT Hackers

1 The Problem

The function $f(n) = 7(20.44)^{n/4}$ gives each term of a sequence as a function of the term's position, n , in the sequence, where n is a whole number. The value of the term in position 14 is $p\%$ more than the value of the term in position 10. What is the value of p ?

- (a) 20.44 (b) 44 (c) 1,944 (d) 2,044?

2 The Preparation

This is a percent increase problem:

$$p\% \text{ increase} = \frac{\text{New Value} - \text{Old Value}}{\text{Old Value}} \times 100\%, \quad (1)$$

3 The Solution

To apply this formula to the given data, we simply identify the ‘new value’ with $f(14)$ and the ‘old value’ with $f(10)$, then

$$p\% \text{ increase} = \frac{7(20.44)^{14/4} - 7(20.44)^{10/4}}{7(20.44)^{10/4}} \times 100\%. \quad (2)$$

We can do a lot of canceling, to get

$$\begin{aligned} p &= ((20.44)^{(14-10)/4} - 1) \times 100 \\ &= (20.44 - 1) \times 100 \\ &= (19.44) \times 100 \\ &= 1,944. \end{aligned} \quad (3)$$