

Hi, I'm Greg. I'm a NYC tutor! I love helping students. I tutor many subjects, assist with homework help, etc. I mainly specialize in specialized tests.

As it turns out, I haven't been able to get to do as many livestreams as I have in past years (yet, hopefully that changes). Therefore, I thought it would be fun to start a Problem Of The Day Series. I will put up a problem and leave it running for a while. You guys will then analyze it, and come up with possible solutions and alternative solutions on your own. I'll eventually post the answer in some manner.

For now we'll play it by ear how that will happen and for how long I'll leave up a problem. But right now I'm thinking of keeping the problem up maybe 2 hours minimum and maybe even in some cases 4 or 5 hours depending upon the dynamics and my situation. Unlike my AMA (Ask Me Anything) lifestream sessions, I will not be checking in every few minutes although I may from time to time join into the discussion. Again, the idea is for you guys to discuss out the problem.

Please be respectful to each other in this endeavor and let's make this fun, educational and forward-thinking. Keep the comments within the spirit of what I'm doing here. Please email me at GregsTutoringNYC@gmail.com if needed.

HERE'S THE PROBLEM: <—  
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Which of the following expressions results in an odd number?

- A)  $99 \times 1234$  B)  $6543 - 4567$  C)  $66^2$  D)  $9991 / 99$  E)  $123 \times 4567$

HERE'S THE SOLUTION:  
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In this kind of question, it's requiring you to take the time to evaluate every answer choice. It's a time waster for sure. So let's go through each in turn:

Which of the following expressions is equal to an odd number?

- A)  $99 \times 1234$

This requires a multi-digit multiplication. Boo.  
It evaluates to 122166.

- B)  $6543 - 4567$

This requires subtraction with borrowing. Boo-hiss.  
It evaluates to 1976.

- C)  $66^2$

This again requires a multi-digit multiplication. Grrrr.  
It evaluates to 4356.

- D)  $9991 / 99$

A multi-digit division. Oh yet.  
This evaluates to 100.919192

- E)  $123 \times 4567$

Here we go again.  
This evaluates to 561741

So the answer is E. However, if you notice, the only thing that really matters is the last digit. In other words, we really do not need to do all these computations. It's bad enough the question is asking us to interrogate each expression but to solve them in full is a sure time killer.

So don't. Instead, let's see how we could optimize things. Taking each in turn again. Which of the following expressions is equal to an odd number?

A)  $99 \times 1234$

Since the ones digits involved is 9 and 4, we multiply them:  $9 \times 4 = 36$  This means the ones column of the product must be a 6. This is even. Move on.

Note that with some products we could use the 99 to our advantage. That is, make it 100 and instead do  $100 \times 1234$  and then subtract one 1234 from the product. But in this example that's a solution worse than the problem as  $123400 - 1234$  tends to be an error prone and annoying subtraction. But keep this idea in your back pocket.

B)  $6543 - 4567$

Once you see there will be a carry just do it (the 4 in the 10s column becomes 3 and the 3 in the ones column becomes 13 upon which we subtract 7) and you're done. That yields a 6 in the ones column. Move on, move on down.

C)  $66^2$

As with (A) all we care about is the 6s in the ones columns so we have  $6 \times 6 = 36$  and the ones column of the product, another 6, is even. Move way down.

D)  $9991 / 99$

This requires you to do the actual division in part. 99 divides into 99 once. Then you immediately see that 99 doesn't divide into 91. So this can't be an integer and therefore can't be an odd number.

It might be tempting to look at this problem backwards using the logic for (A) and (C), hence figuring  $99 \times \text{something ending in a 9}$  will give us something ending up with  $9 \times 9 = 81$ , and oh yeah we got the 1! But math don't play like that. Be careful!

E)  $123 \times 4567$

Finally as with (A) and (C)  $3 \times 7 = 21$  and the ones digit is a 1 and that's odd! Don't move anywhere, you got it!

With these insights you can solve this problem in a few seconds and more cleanly.

Remember your math mastery is just as important as your math knowledge as then you can use it in many contexts, which is exactly in part what math is for and how it should be used!

- Greg / GregsTutoringNYC@gmail.com LLAP ☺