

Right at this second it's September 2nd, with 2 days until the college football season starts, once again with too many teams in the Big Ten. In honor of all of these twos and toos, we present you a GMAT problem that features too many twos:

What is the value of  $2 + 2 + 2^2 + 2^3 + 2^4 + 2^5 + 2^6 + 2^7 + 2^8$ ?

- (A)  $2^9$
- (B)  $2^{10}$
- (C)  $2^{11}$
- (D)  $3(2^{10})$
- (E)  $3(2^{11})$

Please post your answers in the comments field and we'll post the solution later today!

Afternoon Update:

Great solutions, everyone. This question brings up an important point about exponents – we only have a few “core competencies” when it comes to performing with algebra, and those are:

- Multiplying/dividing exponents with common bases
- Finding patterns (units digits, relationships between adding/subtracting common terms, etc.)
- Setting common bases equal to equate exponents

Outside of that, there's very little that we can do without the use of a calculator. So, in order to take advantage of what we do well, we should find ways when we see exponents to:

- Find common bases
- Multiply (using factorization to turn addition/subtraction into multiplication)

Here, we're asked to add several terms together...that's not something that we do well with exponents. However, by blending our abilities to factor terms (to get to multiplication) and to see patterns, we can attack this question relatively efficiently:

$$2 + 2 + 2^2 + 2^3 + 2^4 + 2^5 + 2^6 + 2^7 + 2^8$$

Combine the 2s to be 4, or  $2^2$ , and you have:

$$2^2 + 2^2 + 2^3 + 2^4 + 2^5 + 2^6 + 2^7 + 2^8$$

Now we can add them together, and we have  $2(2^2)$ , or  $2^3$ , simplifying the entire statement to:

$$2^3 + 2^3 + 2^4 + 2^5 + 2^6 + 2^7 + 2^8$$

Notice that we'll be able to combine two more terms, the two  $2^3$  terms, to be  $2(2^3)$  or  $2^4$ , leaving:

$$2^4 + 2^4 + 2^5 + 2^6 + 2^7 + 2^8$$

By now hopefully you've seen a pattern (patterns come up frequently in exponent questions) – the first two terms will add to the third, and then adding those will add to the fourth:

$$2^4 + 2^4 \text{ (the first two)} = 2^5 \text{ (so now we have two of the third term):}$$

$$2^5 + 2^5 + 2^6 + 2^7 + 2^8$$

Do that again and we'll have:

$$2^6 + 2^6 + 2^7 + 2^8$$

If we repeat the pattern, we'll end up with:

$$2^8 + 2^8 = 2(2^8) = 2^9. \text{ Therefore, the correct answer is A.}$$

When approaching exponent problems, keep your core competencies in mind: factor, multiply, find common bases, and look for patterns. These strategies will help you turn complicated problems into efficient solutions.