

Approximating Multiplying 2 Large Numbers:

A. This method uses the same principles as the [*Double and Half Method*](#).

1. Since we are only approximating, we can add an amount, 'n' to one number and subtract 'n' from the other number.
2. In doing this, the answer you get will only be n^2 off the correct answer.

Ex [1] $385 \times 432 =$ _____.

- a. We can add 15 to 385 to get 400 and subtract 15 from 432 to get 417.
- b. Multiplying 400×417 we get 166800.
- c. The answer can be between 158004 and 174636.

B. Because we are multiplying large numbers, we have a lot of leniency as to what we can do. In Ex [1], we were very close to the right answer. Sometimes, it is not so easy:

Ex [2] $331 \times 498 - 1600 =$ _____.

- a. In this example, we can add 2 to 498 to get 500 and change 331 to 330. Now we can multiply. (*Notice that 1600 is not very large so we can ignore it*).
- b. $330 \times 500 = 165000$.
- c. The answer can be between 155077 - 171399.

Ex [3] $31^4 =$ _____.

- a. In this example first square 31. $31^2 = 961$.
- b. Now we are left with 961^2 .
- c. Since the numbers are really large, add 40 and subtract 40 from each number.
- d. We get 1000 and 920. Multiplying these we get 920000.
- e. The answer can be between 877345 and 969697.

- Ex [4] $875 \times 448 =$ _____.
- In this example, we know the $875 = \frac{7000}{8}$ but it is still easier to change 875 to 900 and 448 to say 420 (Notice: You do not have to subtract the exact amount 'n' from the other number, just get close).
 - $900 \times 420 = 378000$.
 - The answer can be between 372400 and 411600.
 - It is not advised to try and get the right answer even if you know how.
- C. There are numerous possibilities on how you can use this method. Since we are generally dealing with large numbers, this makes it very easy to approximate, so you should not spend much time working these problems out.
- D. If you do not feel comfortable rounding so much, add back in a little to be on the safe side. (*If you use this method, your answer will always be lower than the actual answer.*)