1. 0 is an even number – an important number property to keep in mind. Even means “divisible by 2”, and since 0/2 = 0 (with no remainder or decimal places), 0 is even.

2. The answer is 81, because 81 is a perfect square (the square of an integer). Another useful number property to have at your disposal – the only positive integers that have an odd number of factors are those integers that are perfect squares (1, 4, 9, 16, 25, etc.)

3. 183. This is a strategic question – because tens digits have more value than units digits, you’ll want to maximize the tens digits at 9 and 8, and then maximize the units digits at 7 and 6 (the next two highest digits). This means that you’re either adding 97 + 86 or 96 + 87. Either way, that gives you the answer 183.

4. 1. This problem is similar to the previous problem – strategically you want to minimize that difference between numbers. If you can get the tens digits adjacent (say, 2 and 1) and the units digits at 0 and 9 (think 20 and 19), you can make this difference 1, the smallest it will go.

5. A. This problem deals pretty closely with division definitions. Since b is the bigger number, when a is divided by b, it won’t divide evenly (think a = 5, b = 8. The answer would be 0, with 5 as the remainder) and so the entire numerator becomes the remainder.

6. 7. The rule for multiplying decimals is that you multiply the two numbers, then add up the decimal places and count that many places from the right-hand side of the product and place the decimal point where you leave off. Here, since there are 7 total decimal places between the two numbers being multiplied, you’ll have seven decimal places in the product.

7. 2. This problem teaches an important concept about GMAT multiplication and division – only do the math when you need to. Division is the same thing as multiplying by the reciprocal, so setting up this problem this way is a great first step: 9 * 8 * \(\frac{1}{10}\) * \(\frac{1}{2}\) is the same as \(\frac{9*8}{10*2}\). This factors nicely into \(\frac{1}{2} * 4 = 2\).

8. 750. Given that Rate = \(\frac{\text{Distance}}{\text{Time}}\) and that the rate here is constant, you can set up a ratio: \(\frac{450 \text{ feet}}{9 \text{ seconds}} = \frac{x \text{ feet}}{15 \text{ seconds}}\). Here you can either cross-multiply and use algebra, or think a bit more logically. The denominator increases by 2/3, so in order for the two to be equal the numerator should increase by 2/3. That means you’d add 300 (2/3 of 450) to end up at 750 feet.

9. 20. A quick way to think of Least Common Multiple is to list all the positive multiples of each number along the number line and then see where they first match. For 4, it’s 4, 8, 12, 16, 20...; for 10 it’s 10, 20... 20 is the first common multiple.

10. Infinite. Because every number times 0 is 0, 0 is divisible by all integers, giving it unlimited factors.

11. 2. This is an important definition. A prime number is “a positive integer with exactly two factors”. Because 1, the lowest positive integer, only has one factor (1), 2 is the lowest prime, divisible by 2 and 1.

12. A. 2 is the only even prime number. By definition, all other even numbers are divisible by 2, giving them an extra factor other than themselves and 1.

13. 1. 64 can be factored into \(2^6\), meaning that its only prime factor is 2.

14. 6. 18 can be factored into \(2*3*3\) and 24 can be factored into \(2*2*2*3\). The overlap between the two is \(2*3\), making 6 the greatest common factor.

15. It Cannot Be Determined. Remember that ratios give the proportion in which two (or more) groups appear together, but not the exact number. In this case, a ratio of 7:3 could mean that the actual numbers are 7 and 3, or 14 and 6, or 70 and 30. To convert to actual numbers, you’d
need the multiplier – the actual numbers are 7x and 3x, and since we don’t know x we can’t tell what the new ratio of (7x – 6) : (3x) would be.

16. A. 3:2. This question is subtly but significantly different from the previous question. In this case, we know that the actual numbers are 3x and 4x. And since we know that the first category doubles, then its new total is 2(3x) = 6x. That means that the new ratio of 6x : 4x can be reduced. The x terms on either side cancel, and the 6 and 4 reduce to 3:2.

17. 20. The percent change formula is \( \frac{\text{New} - \text{Original}}{\text{Original}} \times 100\% \), all multiplied by 100. Here that gives you \( \frac{240 - 200}{200} \times 100\% \), which amounts to 20%.

18. 150. Using the language of mathematics, you can set up the formula: 18 is what percent of 12 \( \Rightarrow 18 = \frac{x}{100}(12) \). Then solve for x. First, multiply both sides by 100 to get: 1800 = 12x. Then divide both sides by 12. This can be broken in to chunks so that the equation is 18(100) = 12x. That lets you divide 18 by 12 (which equals 1.5) and then multiply by 100 to get 150.

19. B. 71 is a prime number. 51 is divisible by 3 (note the rule: because the digits sum to a multiple of 3 (5 + 1 = 6), 51 must be divisible by 3. This “divisible by 3” rule is extremely useful on the GMAT). 91 is divisible by 7, which you can see by breaking 91 into 70 + 21. 70 is 7(10) and 21 is 7(3), so 91 equals 7(13).

20. E. All three numbers are divisible by 6. The rule for divisibility by 6 is a combination of the rule for an even number (ends in an even units digit) and the rule for divisibility by 3 (the digits sum to a multiple of 3). Because all three numbers fit both characteristics, all are divisible by 6.