Name:_____ Date:_____

Multi-digit Division Notesheet

Division gets more complicated when the numbers are big. In that case, long division is an algorithm we can use to divide any two numbers.

A New Symbol

When doing long division, just like multiplication, it helps to work vertically, which means we need a new symbol, the long division symbol.

$$divisor \overline{)\,dividend}\ quotient$$

$3\overline{)\,72}$ $5\overline{)\,850}$	1. Check how many of the divisors can divide into the leftmost digit of the dividend. 2. Write that quotient over the bar, above the leftmost digit. 3. Write the product of the divisor and that number below the leftmost digit. 4. Subtract that product from the leftmost digit to get the remainder. 5. Bring the next digit of the dividend down to form a new number with the remainder, and check how many of the divisors can divide into it. 6. Write that number over the bar, directly above the digit brought down and to the right of the digit already there. 7. Write the product of that number and the divisor below the lowest number, then subtract to get the remainder. 8. Repeat steps 5 - 7 until there are no more digits left. At that point, the number remaining at the bottom is the remainder, and the number above the top bar is the quotient. 9. To check your work, you can multiply the quotient by the divisor and then add the remainder, as division is the inverse (opposite) of multiplication.

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What happens if no divisors fit into the leftmost digit or the next number you need to divide by? Bring down another number.

Example:

$6\overline{)342}$	1. 6 doesn't fit into 3, but it does fit into 34. 2. Write the quotient of 34 ÷ 6 above the 4 instead of the 3. 3. Put the product of the quotient of 34 ÷ 6 underneath 34 as usual. 4. Subtract the product from 34 to get the remainder of 34 ÷ 6, and continue as usual.

Examples with the class:

$8\overline{)128}$ $3\overline{)723}$ $4\overline{)412}$

$5\overline{)137}$ $2\overline{)392}$ $6\overline{)543}$