Multi-digit multiplication   name:_____

1. Draw a proportional and a non-proportional diagram for 12 × 4

2. With the standard algorithm for multiplication it matters what numbers you multiply first (work right to left). Does it matter for the expanded algorithm? Why or why not?

2. Answer these questions as if you were explaining the process and the reasons why to a student.

a. In the process of multiplying $\begin{array}{r} 5\ \ 6\ \ 4 \\ \times\ \ 3\ \ 8 \\ \hline \end{array}$ using the **standard algorithm**, we insert a 0 place holder in the ones place of

the second partial product. Explain where that 0 comes from and what it does.

b. In the process of multiplying $\begin{array}{r} 5\ \ 6\ \ 4 \\ \times\ \ 3\ \ 8 \\ \hline \end{array}$ using the **standard algorithm**, we multiply the tens digit of 38 by the ones

digit of 564: 3× 4 = 12.

   i.   What place value should the digit 2 go in (tens or ones)? Why should we write it there?

   ii.   Where should we write the digit 1 (tens or hundreds)? Why should we write it there?

4. On the back side of the page:

a. Sketch a by-hand (non-proportional) array diagram for the product. $\begin{array}{r} 6\ \ 3\ \ 8 \\ \times\ \ 4\ \ 7\ \ 3 \\ \hline \end{array}$	b. Write out the solution using the expanded algorithm. Show how the partial products in the expanded algorithm correspond to the parts of the diagram in part a	c. Write out the solution using the standard algorithm. Show (by color coding or labelling) how the numbers in the standard algorithm correspond to the representations in a and b.	d. Write out the solution using the lattice algorithm. Show how the parts of the lattice correspond to the other representations.