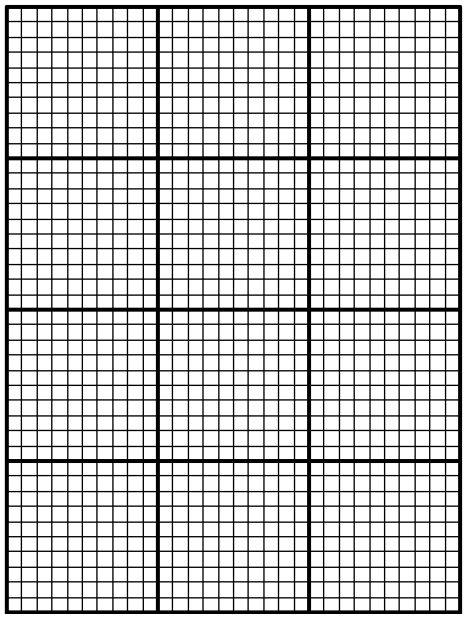
1. For the product: $\begin{array}{r} 2\ 7 \\ \times\ 3\ 8 \\ \hline \end{array}$ name:_____

a. Make a proportional array diagram for the product using this grid.



b. Write out the solution using the expanded algorithm. Indicate (by color coding or labeling) how the partial products in the expanded algorithm correspond to the parts of the diagram in a.

c. Write out the solution using the standard algorithm. Indicate (by color coding or labelling) how the numbers in the standard algorithm correspond to the representations in a and b.

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?

3. For the product:

$$\begin{array}{r} 6\ 3\ 8 \\ \times\ 4\ 7\ 3 \\ \hline \end{array}$$

a. Sketch a by-hand (non-proportional) array diagram for the product.

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 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.

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4. Show how to add using the Expanded Algorithm for addition: 439 + 586

5. Show how to subtract using the Expanded Algorithm for subtraction: a. 532 – 178 b. 703 - 329