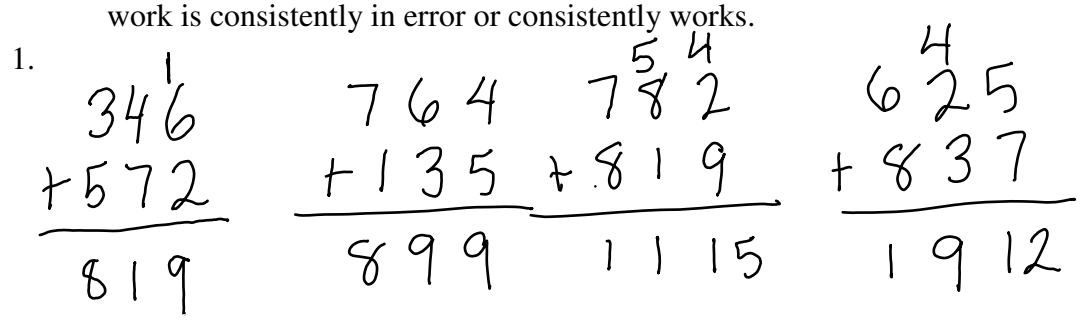
Addition Error Patterns and Algorithms.

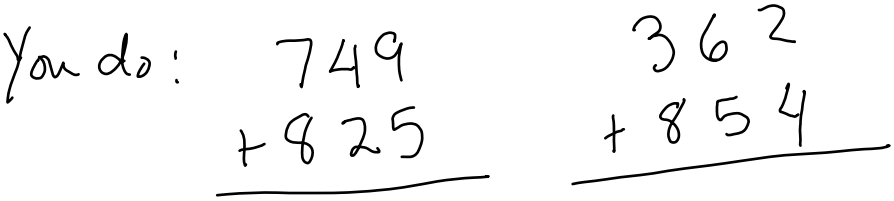
Below is the work of 6 fictional students. All of them are consistent in their work. Some of them are making consistent errors. That means, if there is the opportunity in the problem for them to make their ideosyncratic error, they will make it. Some of them have alternate algorithms that they are using (that yield the correct result in a reasonable way that is different from the standard algorithm). Try to get inside the head of each student and see if you can figure out what they are doing and why.

- Your task is to figure out what each student is doing and to do the same thing they would on the last two problems in each set.
- You then need to explain what they did in words: *what are they doing* and why: *is it an error or an alternate algorithm*? Try to use place value language to *describe why* their work is consistently in error or consistently works.

1.



You do:



Explain the pattern, and why it works or doesn't work.

2. $467 + 395$ → 767 → 857 → 862

$743 + 191$ → 843 → 933 → 934

$621 + 145$ → 721 → 761 → 766

$943 + 172$ → 1043 → 1113 → 1115

$781 + 465$

$932 + 189$

Explain the pattern, and why it works or doesn't work.

3. $74 + 13 = 87$

$65 + 49 = 1014$

$38 + 16 = 414$

$276 + 193 = 3169$

$29 + 35$

$74 + 68$

Explain the pattern, and why it works or doesn't work.

4.

$$\begin{array}{r} 24 \\ +30 \\ \hline 54 \end{array} \qquad \begin{array}{r} 28 \\ +9 \\ \hline 19 \end{array} \qquad \begin{array}{r} 4 \\ +18 \\ \hline 13 \end{array} \qquad \begin{array}{r} 37 \\ +4 \\ \hline 14 \end{array} \qquad \begin{array}{r} 15 \\ +23 \\ \hline 38 \end{array}$$

$$\begin{array}{r} 46 \\ +12 \\ \hline \end{array} \qquad \begin{array}{r} 38 \\ +5 \\ \hline \end{array}$$

Explain the pattern, and why it works or doesn't work.

5.

$$\begin{array}{r} 523 \\ +678 \\ \hline 1291 \end{array} \qquad \begin{array}{r} 658 \\ +391 \\ \hline 1049 \end{array} \qquad \begin{array}{r} 792 \\ +186 \\ \hline 978 \end{array} \qquad \begin{array}{r} 459 \\ +183 \\ \hline 642 \end{array}$$

$$\begin{array}{r} 648 \\ +237 \\ \hline \end{array} \qquad \begin{array}{r} 486 \\ +297 \\ \hline \end{array}$$

Explain the pattern, and why it works or doesn't work.

6.

$$\begin{array}{r} {\scriptstyle 1}\,65 \\ +\ 8 \\ \hline 153 \end{array} \qquad \begin{array}{r} {\scriptstyle 1}\,28 \\ +\ 7 \\ \hline 105 \end{array} \qquad \begin{array}{r} {\scriptstyle 1}\,36 \\ +\ 5 \\ \hline 91 \end{array} \qquad \begin{array}{r} {\scriptstyle 1}\,75 \\ +\ 9 \\ \hline 174 \end{array}$$

$$\begin{array}{r} 34 \\ +\ 8 \\ \hline \end{array} \qquad \begin{array}{r} 49 \\ +\ 7 \\ \hline \end{array}$$

Explain the pattern, and why it works or doesn't work.

More Alternate algorithms

7. Do each of these problems using A. the expanded algorithm and B. The lattice algorithm

i. 487 + 259

ii. 398 + 479

8. Mental math addition: Do each of these in your head, using something other than the standard algorithm, and explain how you did it:

a. 25+76

b. 198 + 557

c. 543+507

d. 29 + 36