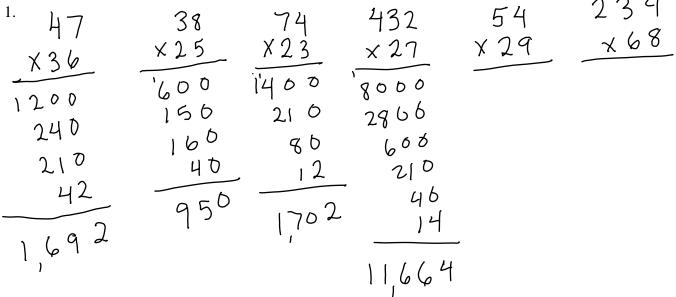Multiplication Error Patterns and Algorithms.

Below is the work of 3 fictional students. All of them are consistent in their work. Some of them (at least 1) 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 (at least 1) 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.

$$
\begin{array}{r}
47 \\
\times 36 \\
\hline
1200 \\
240 \\
210 \\
42 \\
\hline
1,692
\end{array}
\qquad
\begin{array}{r}
38 \\
\times 25 \\
\hline
600 \\
150 \\
160 \\
40 \\
\hline
950
\end{array}
\qquad
\begin{array}{r}
74 \\
\times 23 \\
\hline
1400 \\
210 \\
80 \\
12 \\
\hline
1,702
\end{array}
\qquad
\begin{array}{r}
432 \\
\times 27 \\
\hline
8000 \\
2866 \\
608 \\
210 \\
46 \\
14 \\
\hline
11,664
\end{array}
\qquad
\begin{array}{r}
54 \\
\times 29 \\
\hline
\end{array}
\qquad
\begin{array}{r}
234 \\
\times 68 \\
\hline
\end{array}
$$

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

2. $\overset{2}{6}4$ $\quad$ $\overset{4}{4}7$ $\quad$ $\overset{2}{8}3$ $\quad$ $\overset{3}{6}\overset{1}{4}2$ $\quad$ 42 $\quad$ 63
$\quad \times 27$ $\quad \times 36$ $\quad \times 37$ $\quad \times 29$ $\quad \times 36$ $\quad \times 29$
$\quad$ '44 8 $\quad$ 28 2 $\quad$ '58 1 $\quad$ '57 78
$\quad$ 14 8 0 $\quad$ 14 1 0 $\quad$ 26 9 0 $\quad$ 15 9 4 0
$\quad$ 1,9 28 $\quad$ 1,69 2 $\quad$ 3,271. $\quad$ 21,7 1 8
$\quad$ 1

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

3. $\overset{4}{4}6$ $\quad$ $\overset{4}{3}6$ $\quad$ $\overset{2}{1}\overset{2}{3}7$ $\quad$ $\overset{4}{}6$ $\quad$ 39
$\quad \times \ 8$ $\quad \times \ 7$ $\quad\quad \times 4$ $\quad \times \ 5$ $\quad \times 4$
$\quad$ 64 8 $\quad$ 49^2 $\quad$ 12 0 8

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