Partial-Products Multiplication

Study the algorithms below and answer the following questions:

1. How do they work?
2. How do these methods support student’s conceptual understanding of multiplication?
3. How can the teacher support students using these algorithm?
4. What difficulties might students have with these methods?
5. Compare the two different versions and discuss the pros and cons of each.

Southeast Asia

<table>
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<tr>
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<td>21</td>
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France

Solve the following multiplication problems using one of the Partial-Product methods.

14 x 16       23 x 13       126 x 34
Array Multiplication

Study the algorithms below and answer the following questions:
1. How do they work?
2. How do these methods support student’s conceptual understanding of multiplication?
3. How can the teacher support students using these algorithm?
4. What difficulties might students have with these methods?
5. Compare the two different versions and discuss the pros and cons of each.

Base-Ten Block
14 x 25

![Base-Ten Block Diagram]

Generic Rectangle
14 x 25

![Generic Rectangle Diagram]

Solve the following multiplication problems using one of the Array methods.

14 x 16
23 x 13
126 x 34
Lattice Multiplication

Study the algorithm below and answer the following questions:

1. How does it work?
2. How does this method support student’s conceptual understanding of multiplication?
3. How can the teacher support students using this algorithm?
4. What difficulties might students have with this method?

Fibonacci introduced the Lattice method for multiplication to Europe in 1202.

\[
\begin{array}{c}
53 \times 67 \\
\begin{array}{c|c}
5 & 3 \\
\hline
3 & 0 \\
5 & 1 \\
\end{array}
\end{array}
\]

\[
\begin{array}{c}
327 \times 94 \\
\begin{array}{c|c|c}
3 & 2 & 7 \\
\hline
2 & 1 & 6 \\
1 & 0 & 2 \\
7 & 3 & 8 \\
\end{array}
\end{array}
\]

Solve the following multiplication problems using the Lattice method.

14 \times 16 
23 \times 13 
126 \times 34
Egyptian Multiplication

Study the algorithm below and answer the following questions:

1. How does it work?
2. How does this method support student’s conceptual understanding of multiplication?
3. How can the teacher support students using this algorithm?
4. What difficulties might students have with this method?

Egyptians used this method over 4,000 years ago. This algorithm was widely used well into the Middle Ages, and a variation, called the Russian Peasant Method, is still used today in Russia, Ethiopia, the Arab world, and the Near East.

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<table>
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Solve the following multiplication problems using the Egyptian method.
Compensation Algorithm

Study the algorithm below and answer the following questions:

1. How does it work?
2. How does this method support student's conceptual understanding of multiplication?
3. How can the teacher support students using this algorithm?
4. What difficulties might students have with this method?

Phillipines

648 x 29

\[
\begin{array}{c}
648 \times 30 = 19,440 \\
- 648 \times 1 = 648 \\
\quad 18,792
\end{array}
\]

52 x 742

\[
\begin{array}{c}
742 \times 50 = 37,100 \\
+ 742 \times 2 = 1,484 \\
\quad 38,584
\end{array}
\]

Solve the following multiplication problems using the Compensation method.

21 x 168  
28 x 337  
34 x 526