Exploding Dots™
HANDOUTS

Experience 5:
Division

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Handout A: Division and Remainders

This picture shows that $276 \div 12$ equals 23.

![Diagram]

Here are some practice questions you might, or might not, want to try.

1. Compute $2783 \div 23$ by the dots-and-boxes approach by hand.
2. Compute $3900 \div 12$.
3. Compute $46632 \div 201$.
4. Show that $31533 \div 101$ equals 312 with a remainder of 21.
5. Compute $2789 \div 11$.
6. Compute $4366 \div 14$.
7. Compute $5481 \div 131$.
8. Compute $61230 \div 5$. 
Solutions to Handout A

1. $2783 \div 23 = 121$

2. $3900 \div 12 = 325$. We need some unexplosions along the way. (And can you see how I am getting efficient with my loop drawing?)

3. $46632 \div 201 = 232$. 
4. \(31533 \div 101 = 312\) with a remainder of 21. That is, \(31533 \div 101 = 312 + \frac{21}{101}\)

\[
\begin{array}{c}
31533 = \\
101 = \\
\end{array}
\]

5. We have \(2789 \div 11 = 253\) with a remainder of 6. That is, \(2789 \div 11 = 253 + \frac{6}{11}\)

\[
\begin{array}{c}
2789 = \\
11 = \\
\end{array}
\]

6. \(4366 \div 14 = 311 + \frac{12}{14}\).

\[
\begin{array}{c}
4366 = \\
14 = \\
\end{array}
\]

7. \(5481 \div 131 = 41 + \frac{110}{131}\).

\[
\begin{array}{c}
5481 = \\
131 = \\
\end{array}
\]
8. We certainly see one group of five right away.

\[
61230 = \begin{array}{cccc}
\text{ } & \text{ } & \text{ } & \text{ } \\
\text{ } & \text{ } & \text{ } & \text{ } \\
\text{ } & \text{ } & \text{ } & \text{ } \\
\text{ } & \text{ } & \text{ } & \text{ } \\
\text{ } & \text{ } & \text{ } & \text{ } \\
\end{array}
\]

Let’s perform some unexplosions. (And let’s write numbers rather than draw lots of dots. Drawing dots gets tedious!)

\[
61230 = \begin{array}{cccc}
\text{ } & \text{ } & \text{ } & \text{ } \\
\text{ } & \text{ } & \text{ } & \text{ } \\
\text{ } & \text{ } & \text{ } & \text{ } \\
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\end{array}
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61230 = \begin{array}{cccc}
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\end{array}
\]

\[
61230 = \begin{array}{cccc}
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\text{ } & \text{ } & \text{ } & \text{ } \\
\end{array}
\]

We see \(61230 \div 5 = 12246\).
**Exploding Dots**  
Experience 5: Division


**Handout B: WILD EXPLORATIONS**
Here is a “big question” investigation you might want to explore, or just think about. Have fun!

**EXPLORATION: LEFT TO RIGHT? RIGHT TO LEFT? ANY ORDER?**
When asked to compute $2552 \div 12$, Kaleb drew this picture, which he got from identifying groups of twelve working right to left.

Kaleb said the answer to $2552 \div 12$ is $121$ with a remainder of $1100$.

Mabel, on the other hand, identified groups of twelve from left to right in her diagram for the problem.

She concluded that $2552 \div 12$ is $211$ with a remainder of $20$. Both Kaleb and Mabel are mathematically correct, but their teacher pointed out that most people would expect an answer with smaller remainders: both $1100$ and $20$ would likely be considered strange remainders for a problem about division by twelve. She also showed Kaleb and Mabel the answer to the problem that is printed in the textbook.

$$2552 \div 12 = 212 \text{ R } 8$$

How could Kaleb and Mabel each continue work on their diagrams to have this textbook answer appear?