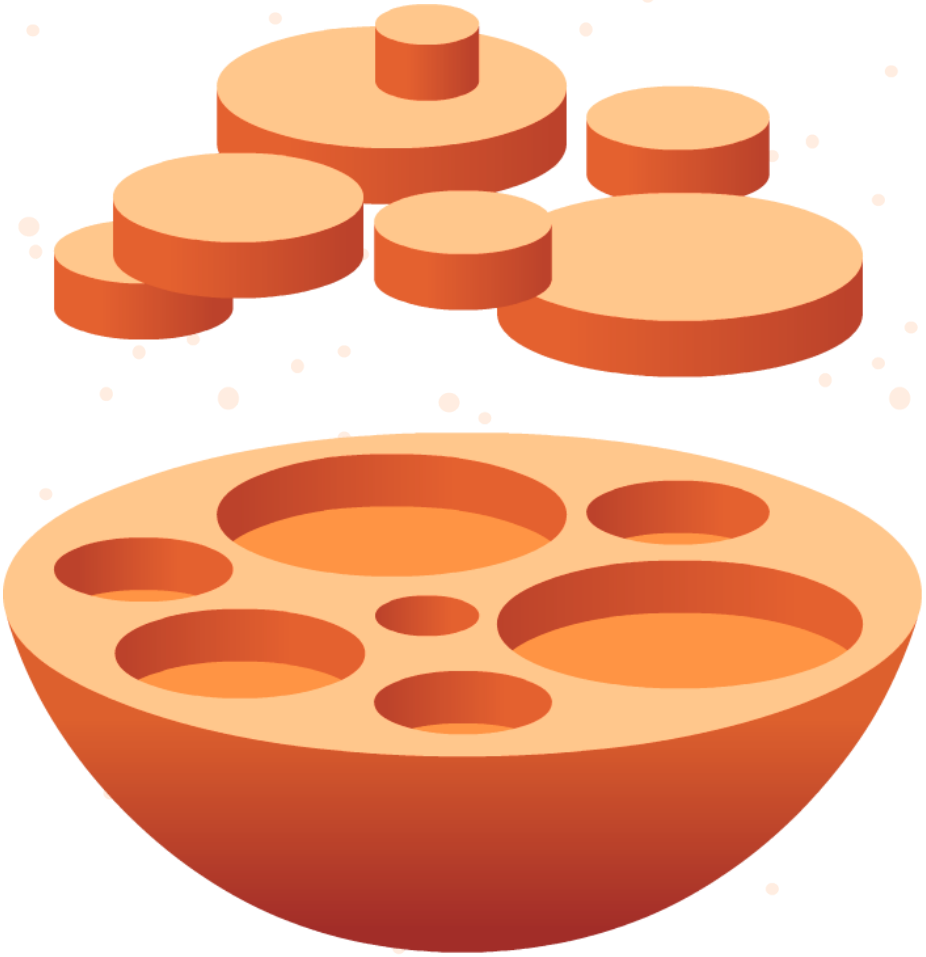
exploding dots

GLOBALMATHPROJECT

buzzmath



SUBTRACTION

STUDENT HANDOUTS

THE TEACHING GUIDE
Experience 4

Exploding Dots

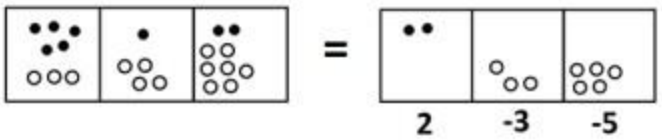
Experience 4: Subtraction

Access videos of all *Exploding Dots* lessons at: http://gdaymath.com/courses/exploding-dots/

Handout A: *Subtraction*

We can now perform subtraction in a 1 ← 10 machine simply by adding antidots. (Some people prefer to call them tods.)

5 1 2
-3 4 7
2|-3|-5



Unexplosions then show that this answer is the same as 165.

Here is a question for you to try, if you like.

Compute each of the following two ways: the dots-and-boxes way (and fixing the answer for society to read) and then with the traditional algorithm. The answers should be the same.

$$\begin{array}{r} 6328 \\ -\ 4469 \\ \hline \end{array} \qquad \begin{array}{r} 78390231 \\ -\ 32495846 \\ \hline \end{array}$$

Thinking question along the way: As you fix up your answers for society, does it seem easier to unexplode from left to right, or from right to left?

Additional question: Do you think you could become just as speedy the dots-and-boxes way as you currently are with the traditional approach?

Solutions to Handout A

$6328 - 4469 = 2 \mid -1 \mid -4 \mid -1 = 1 \mid 9 \mid -4 \mid -1 = 1 \mid 8 \mid 6 \mid -1 = 1 \mid 8 \mid 5 \mid 9 = 1859$

$$\begin{aligned} 78390231 - 32495846 &= 4 \mid 6 \mid -1 \mid 0 \mid -5 \mid -6 \mid -1 \mid -5 \\ &= 4 \mid 5 \mid 9 \mid 0 \mid -5 \mid -6 \mid -1 \mid -5 \\ &= 4 \mid 5 \mid 8 \mid 10 \mid -5 \mid -6 \mid -1 \mid -5 \\ &= 4 \mid 5 \mid 8 \mid 9 \mid 5 \mid -6 \mid -1 \mid -5 \\ &= 4 \mid 5 \mid 8 \mid 9 \mid 4 \mid 4 \mid -1 \mid -5 \\ &= 4 \mid 5 \mid 8 \mid 9 \mid 4 \mid 3 \mid 9 \mid -5 \\ &= 4 \mid 5 \mid 8 \mid 9 \mid 4 \mid 3 \mid 8 \mid 5 \qquad = 45894385 \end{aligned}$$

I personally find it much easier to do the unexplosions from left to right.

Exploding Dots

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Handout B: *WILD EXPLORATIONS*

Here are some "big question" investigations you might want to explore, or just think about. Have fun!

EXPLORATION 1: IS THERE ANOTHER WAY TO INTERPRET THE DOTS-AND-BOXES ANSWERS?

When Sunil saw,

$$\begin{array}{r} 5\,1\,2 \\ -3\,4\,7 \\ \hline 2\,|-3\,|-5 \end{array}$$

he wrote on his paper the following lines:

$$\begin{array}{r} 200 \\ -30 \\ -5 \end{array}$$

He then said that the answer has to be 165.

a) Can you explain what he is seeing and thinking?

b) What would Sunil likely write on the page for $7109 - 3384$?

EXPLORATION 2: WHAT ABOUT NEGATIVE ANSWERS?

How might you handle and interpret this subtraction problem?

$$\begin{array}{r} 148 \\ -\,677 \\ \hline \end{array}$$