EXPLORATION 4

DIVISION

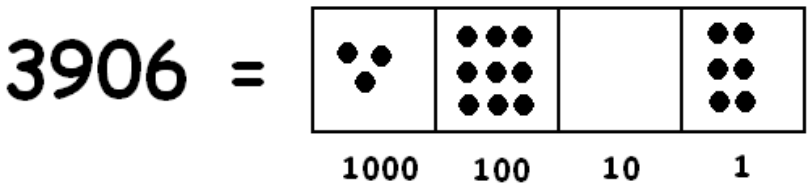
The mysterious long-division algorithm is finally explained. It makes sense!

TOPICS COVERED: Long division via dots and boxes.
Extension to polynomial division.

A. GETTING STARTED

Let's keep playing with the $1 \leftarrow 10$ system of dots and boxes. (After all, it represents the way human beings like to write their numbers!)

Here is the number 3906 in the $1 \leftarrow 10$ system:



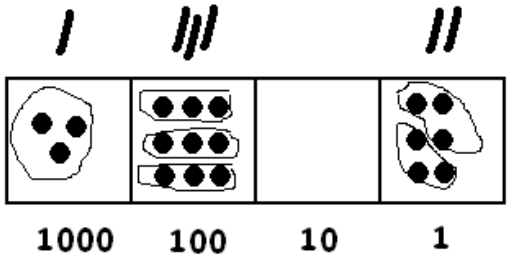
Let's divide this number by three. This means that we are asking:

How many groups of 3 fit into 3906?

Now, three dots looks like ●●● so we are really asking:

How many groups of ●●● can we see in the picture?

There is certainly one group of 3 at the 1000s level, and three at the 100s level, none at the tens level, and two at the 1s level.



This shows that 3 goes into 3906 one thousand, three hundreds and two ones times. That is,

$$3906 \div 3 = 1302$$

WEIRD LANGUAGE: The division sign ÷ has an unusual name. It is called an obelus. Not many people know this.

1. Draw a dots and boxes picture of 20486. Use your picture to show why $20486 \div 2$ equals 10243.

Let's try a harder one! Consider:

$$402 \div 3$$

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