EXPLORATION 6

THE VINCULUM AND PARENTHESES

A snazzy symbol from the 1500s makes order of operations easy and obvious. Why don't we use it today?

TOPICS COVERED: Parentheses via the vinculum. Basic order of operations via the vinculum.

A. GETTING STARTED

Recall that the counting numbers count things! Maybe we count dots (book 1) or count piles or perhaps holes (book 5), or maybe we choose to count plum pips, or goats, or misuses of the word "circumspect."

And by combining objects we discover addition ($2+3=5$, for example), or by looking for groups of objects in piles we discover division ($276 \div 12 = 23$, for instance).

But what if we want to combine more than group at a time? For example:

What does $2+3+4$ mean?

This might seem like seem a silly question at first. (It means 9!) But the question is not about the answer but instead about the process of getting to the answer.

There are actually two ways to think about $2+3+4$:

- Add 2 and 3 first (to get 5), and then add 4

or

- Add 3 and 4 first, remember the answer, and then add that answer to 2.

Which do we prefer?

During the 15th – and 16th- centuries, European mathematicians used a horizontal bar, called a vinculum, to show "grouping together." If people wanted you to group the 2 and 3 together first to get 5, and then add 4, they would write:

$$\overline{2+3}+4$$

(So $\overline{2+3}+4=5+4=9$.) If they wanted you to group the 3 and 4 together and add the answer to 2, they would write:

$$2+\overline{3+4}$$

(So $2+\overline{3+4}=2+7=9$.)

Question 1: How would folk from Renaissance Europe wish you to compute each of the following?

a) $\overline{3+7}+3$

b) $\overline{3+9}-7$

c) $3+\overline{9-7}$

d) $\overline{4-1}-\overline{3-2}$

What do you think they might want you to do in the following expressions?

e) $\overline{2+\overline{5-1}+3}$

f) $\overline{6+18-3+\overline{7-1}+4}$

The vinculum is no longer used today – which is a little sad since it is fairly easy to see how entries are meant to be grouped together with it. Instead, we use *parentheses*. (Parentheses are also called *brackets*.)

For example:

$\overline{2+3}+4$ is written today as $(2+3)+4$

and

$2+\overline{3+4}$ is written today as $2+(3+4)$

Another comment: Why the change?

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