

# Vertically and Crosswise

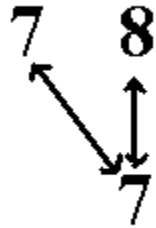
उर्ध्वतिर्यग्भ्याम्

URDHVATIRYAGBHYAM

**This sutra, or verse, is the short and simple algorithm for multiplying two numbers, as written in the Vedas. The Vedas are ancient Hindu texts passed down at first in an oral tradition, composed between the 16th century BC and the 5th century BC. They contained knowledge in many different areas, including mathematics, written in verse. We owe the numeral system we use to this tradition--the numerals we use and the concept of zero originated in India.**

**The Vedas contain 16 sutras, which are algorithms written in a line or two of Sanskrit verse.**

**Suppose you want to multiply  $7 \times 78$ . Here is how to do it "vertically and crosswise":**

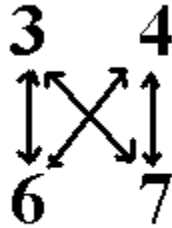


**Vertically is  $8 \times 7 = 56$ . Crosswise is  $70 \times 7 = 490$ . Add the 9 in the tens place to the 5 in the tens place.**

**49  
56**

**Your answer is 546.**

**Suppose you want to multiply  $34 \times 67$ .**



**First, vertically.  $3 \times 6$  is 18 (actually 1800)**

**Then crosswise.  $6 \times 4 + 3 \times 7 = 24 + 21 = 45$  (actually 450)**

**Then vertically.  $4 \times 7 = 28$ .**

18  
45  
28

**The answer is 2278. With practice you can do this in your head, even if the numbers you are multiplying are several digits long.**

