

HOW TO COMPUTE THE DIVISION BETWEEN A 2-DIGIT NUMBER (ALGORITHM BASED ON NUMBERS – ABN):

This algorithm requires higher estimating procedures. The computations are complex since they require the ability of multiplying by 2-digit numbers, of adding zeros (if there are any), and mending the resulting number. This algorithm should be used once the multiplication by 2-digit numbers is totally controlled.

The estimation of the quotient is a required skill which is new for the pupils. Thus, it should be trained and it also requires creating the scale they are going to use along the computation process.

		:12	SCALE
8158			100↔1200
			500↔6000
			1000↔12000

If the pupil shares out **1** element to each one of the 12 groups, then he/she spends 12 elements. If he/she shares out **10**, then he/she spends 120; if he/she shares out

100, then he/she spends 1200; if he/she shares out **1000**, then he/she spends 12000. Then, the scale is established between 1200 and 12000 since 8158 is between them. Later, we also consider the half of 1000 (the highest multiple of 10 considered before), which is 500, and if we share out 500 elements, then we spend 6000 elements.

		:12	SCALE
8158	7200	600	100↔1200
958			500↔6000
			1000↔12000

The dividend is comprised between 6000 and 12000 and it is significantly closer to 6000 than to 12000. Therefore, we estimate that the partial quotient we

should obtain could be either 600 or 700 (a number between 500 and 1000 but closer to 500). It is convenient to be conservative (it is better to approximate the exact quotient from below instead of passing it). Then, we begin by sharing out 600. We put this number in the third column and we multiply it by 12 in order to obtain the spent quantity (which is 7200, and we can put it on the second column). Finally we can subtract 8158-7200 in order to obtain the new dividend 958.

		:12	SCALE
8158	7200	600	100↔1200
958	840	70	500↔6000
118			1000↔12000

Since the new dividend is “out” of the scale, we can “repair” it by eliminating a zero from all the numbers. Now the scale ranges from 10 to 100 and its “half” is 50.

In other words, we cannot share out hundreds but tens. As 958 is a number between 600 and 1200, we can choose a distribution of 70 elements. Thus, if we share out 70 elements then we spend $70 \times 12 = 840$ and there are $958 - 840 = 118$ remaining, which is the new dividend.

		:12	SCALE
8158	7200	600	100↔1200
958	840	70	500↔6000
118	108	9	1000↔12000
10			

Whenever we do a good estimate the scale must be “repaired”. Now the new dividend is between 12 and 120. Since it is very close to 120, it is clear that we need to

share out 9 per group. By following the same procedure the computation is finished. Therefore, we have shared out 679 elements (quotient) and we have 10 remaining (remainder).