

The Trachtenberg method: the rules for multiplying by 2 to 12, with the worked example 423

Work from the right. 'Neighbour' is the digit to the right of the one you are on; the first digit has neighbour 0; imagine a 0 in front of the number for the last step. 'Half' means the whole-number half (half of 3 is 1).

By	The rule	423 × it, from the right	Why
11	Add the neighbour	3; $2+3 = 5$; $4+2 = 6$; $0+4 = 4 \rightarrow 4653$	$11 = 10 + 1$
12	Double the digit, add the neighbour	6; $4+3 = 7$; $8+2 = 10 \rightarrow 0$ carry 1; $0+4+1 = 5 \rightarrow 5076$	$12 = 10 + 2$
6	Add half the neighbour; add 5 if the digit is odd	3 odd: $3+0+5 = 8$; $2+1 = 3$; $4+1 = 5$; $0+2 = 2 \rightarrow 2538$	$6 = 5 + 1$
7	Double the digit, add half the neighbour; add 5 if odd	$6+0+5 = 11 \rightarrow 1$ c1; $4+1+1 = 6$; $8+1 = 9$; $0+2 = 2 \rightarrow 2961$	$7 = 5 + 2$
5	Half the neighbour; add 5 if odd	$0+5 = 5$; 1; 1; 2 $\rightarrow 2115$	5 is half of 10
9	First: $10 - \text{digit}$. Middle: $9 - \text{digit} + \text{neighbour}$. Last: leading digit $- 1$	$10-3 = 7$; $9-2+3 = 10 \rightarrow 0$ c1; $9-4+2+1 = 8$; $4-1 = 3 \rightarrow 3807$	$9 = 10 - 1$
8	First: $(10 - \text{digit}) \times 2$. Middle: $(9 - \text{digit}) \times 2 + \text{neighbour}$. Last: leading $- 2$	$14 \rightarrow 4$ c1; $14+3+1 = 18 \rightarrow 8$ c1; $10+2+1 = 13 \rightarrow 3$ c1; $4-2+1 = 3 \rightarrow 3384$	$8 = 10 - 2$
4	First: $10 - \text{digit} (+5 \text{ if odd})$. Middle: $9 - \text{digit} + \text{half neighbour} (+5 \text{ if odd})$. Last: half leading $- 1$	$10-3+5 = 12 \rightarrow 2$ c1; $9-2+1+1 = 9$; $9-4+1 = 6$; $2-1 = 1 \rightarrow 1692$	$4 = 5 - 1$
3	First: $(10 - \text{digit}) \times 2 (+5 \text{ if odd})$. Middle: $(9 - \text{digit}) \times 2 + \text{half neighbour} (+5 \text{ if odd})$. Last: half leading $- 2$	$14+5 = 19 \rightarrow 9$ c1; $14+1+1 = 16 \rightarrow 6$ c1; $10+1+1 = 12 \rightarrow 2$ c1; $2-2+1 = 1 \rightarrow 1269$	$3 = 5 - 2$
2	Double each digit	846	
10	Add a zero	4230	

Practice, and the two-week plan

Thirty questions

By 11: a) 234 b) 517 c) 689 d) 2345

By 12: a) 234 b) 517 c) 689 d) 1234

By 6: a) 234 b) 517 c) 689

By 7: a) 234 b) 517 c) 689

By 5: a) 234 b) 517 c) 689

By 9: a) 234 b) 517 c) 689

By 8: a) 234 b) 517 c) 689

By 4: a) 234 b) 517 c) 689

By 3: a) 234 b) 517 c) 689

Check any three with the school method.

Answers

11: 2574, 5687, 7579, 25795. 12: 2808, 6204, 8268, 14808. 6: 1404, 3102, 4134. 7: 1638, 3619, 4823. 5: 1170, 2585, 3445. 9: 2106, 4653, 6201. 8: 1872, 4136, 5512. 4: 936, 2068, 2756. 3: 702, 1551, 2067.

The two-week plan

Days	Learn
1 to 2	By 11 and 12: the two easiest rules, an immediate win; ten numbers a day each
3 to 5	By 6, 7 and 5: the 'half the neighbour' family; the odd-digit +5 is the thing to drill
6 to 8	By 9 and 8: the 'subtract from 10 or 9' family; the last step (leading digit minus 1 or 2) is where errors live
9 to 11	By 4 and 3: the combined rules; slowest to learn, so last
12 to 14	Mixed practice; time it; check three answers a day with the school method or digit sums

Who it suits: a child of about 9 or more with secure place value and tables who likes a routine. Who it does not: a child whose tables are not yet automatic, or who needs the written school method for an exam this year.

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