Maths Week/ Wiki Pāngarau 2025

Survivor Series/Kia Mōrehurehu

Day 1 Set D

For students

WHAT TO DO FOR STUDENTS

1 **You can work with one or two others. Teams can be different each day.**

2 **Do the tasks and write any working you did, along with your answers, in your maths book.**

3 **Your teacher will tell you how you can get the answers to the questions and/or have your work checked.**

4 **When you have finished each day, your teacher will give you a word or words from a proverb.**

5 **At the end of the week, put the words together in the right order and you will be able to find the complete proverb! Your teacher may ask you to explain what the proverb means.**

6 **Good luck.**

NUMBER QUEST

Task 1

The Russian Peasant method is a way of multiplying numbers which uses only doubling and halving, plus one final addition of numbers. It is not as quick as the methods we generally use today but it is fun to have a go at.

For example, to multiply 51 by 8,

Make a table with two columns and place one number at the top of each column.
Half the number in the left column repeatedly, ignore any remainders – so 51 divided by 2 = 25 (with a remainder of 1 which is ignored), write 25 immediately below 51. Continue by halving the number 25 and so on. Continue repeating the process until you reach 1.
Now double the number in the right-hand column repeatedly until you have an entry for every number in the left-hand column – so double 8 gives 16 which is placed immediately below 8, double 16 is 32, etc.
Next cross out each row which has an even number in the first column, in this example the lines with 12 and 6 in the first column are crossed out.

51	8
25	16
~~12~~	~~32~~
~~6~~	~~64~~
3	128
1	256
Total	408

Finally add together all the numbers remaining in the right-hand column, which will give the answer. [8 + 16 + 128 + 256 = 408]

Therefore 51 x 8 = 408

Try using the Russian Peasant method to solve the following:

a) 78 x 39
b) 56 x 59
c) 693 x 37
d) 819 x 62
e) 527 x 832
f) 935 x 715

Task 2

John Napier was a Scottish mathematician who invented a set of rods to make multiplication easier. The rods were called "Napier's Bones"

This multiplication method was used for more than 300 years until the invention of mechanical calculators. The reason the method was called Napier's Bones, was because they were invented by John Napier (1550 – 1617) and made from bones. Napier's method made multiplication easier for the people of his time.

Here is a copy of strips/rods of Napier's bones:

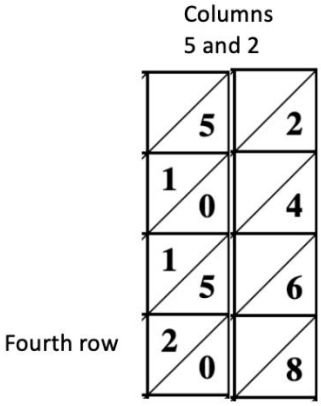
0	1	2	3	4	5	6	7	8	9
0	2	4	6	8	10	12	14	16	18
0	3	6	9	12	15	18	21	24	27
0	4	8	12	16	20	24	28	32	36
0	5	10	15	20	25	30	35	40	45
0	6	12	18	24	30	36	42	48	54
0	7	14	21	28	35	42	49	56	63
0	8	16	24	32	40	48	56	64	72
0	9	18	27	36	45	54	63	72	81

What do you notice about the numbers/patterns contained within the vertical strips/rods within Napier's bones?

Task 3

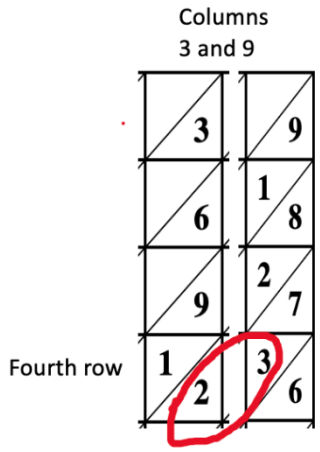
Napier's Bones can be used to find the answer to calculations involving the multiplication of larger numbers.

For example:



52 x 4 – you would need the strips/columns for the numbers 5 and 2 and you would need to look at the fourth line down:

So the answer is 208



39 x 4 – you would need the strips/columns for the numbers three and nine and would need to look at the fourth row down.

In this example, there are two numbers in the same diagonal on the fourth line and so these numbers in the middle diagonal need to be added (2 + 3 = 5); so the answer is 156

Use Napier's bones to find the answers to these:

a) 78 x 3
b) 53 x 9
c) 63 x 3
d) 81 x 6
e) 57 x 3
f) 95 x 7

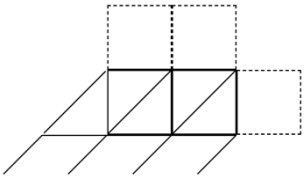
What do you notice about the numbers in the calculations and how do they link to any other methods you might know or use ordinarily for multiplications?

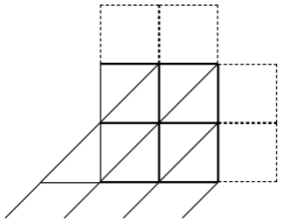
Task 4

The Napier's Bones method can also be used without the strips using your basic facts knowledge up to 9 times 9.

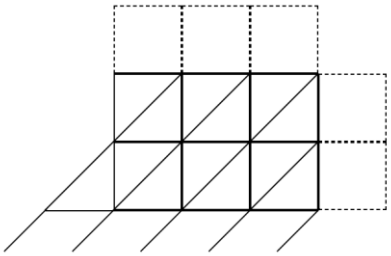
You start with a rectangular grid matching the number of digits in your question.

For example, if you are multiplying 43 x 3 you would need a grid which is two in one direction, for the two digits of 43, and one in the other, for the one digit of 3, as shown on the right.

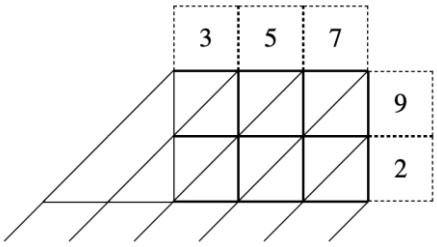




If you were multiplying 39 x 42 you would need a grid which is two in both directions, as shown on the left.

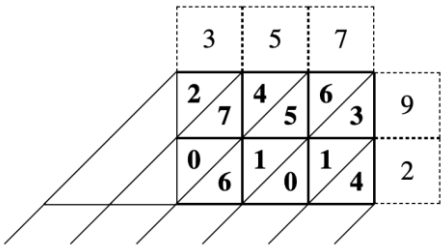


And if you were multiplying 357 x 92 you would need a grid which is three in one direction and two in the other, as shown on the right.

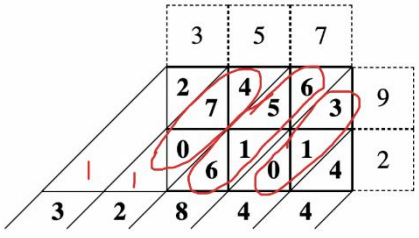


Then you would need to place the numbers 3, 5 and 7 (representing 357) in the top three boxes and the numbers 9 and 2 in the right hand side boxes (representing 92), as shown on the left.

Each box with the diagonal going through it is completed by multiplying the number at the top of the column by the number on the far right of the row. If the answer has two digits, the tens digit is written to the left of the diagonal line and the ones digit to the right of the diagonal line; if the answer only has a ones digit it is written to the right of the diagonal line, just like the numbers on each row within Napier's Bones, as shown on the right.

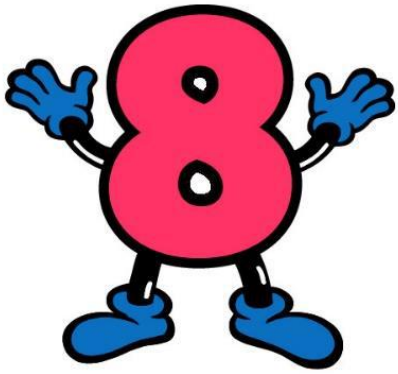


Now the numbers in each diagonal are summed and the answer written at the bottom of the diagonal to give the answer. The diagonal on the far right only has a four, so the answer ends with a four. The next diagonal has the numbers zero, one and three which when summed also gives an answer of four. The third diagonal from the left has the numbers six, one, five and six which when summed give an answer of eighteen. In this case eight is written into the answer space and a one is carried forward to the next column to the left, and so on. Thus 357 x 92 = 32844.



Try this method to solve the following:

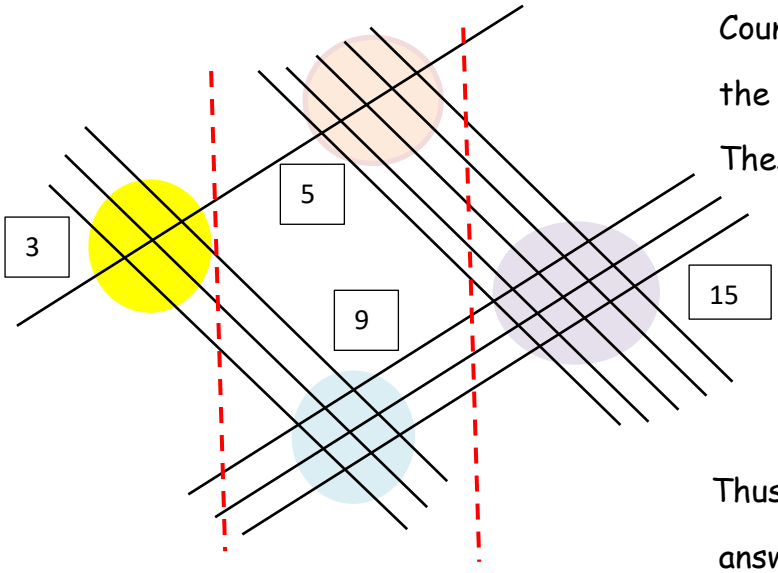
A. 71 x 23
B. 59 x 63
C. 73 x 38
D. 587 x 27
E. 831 x 725
F. 918 x 823



Task 5

There are many other techniques people used for multiplication, other than the Russian Peasant method, Napier's Bones or the use of logarithms before the invention of electronic calculators and computers. Another method is the "lines" method, or Japanese multiplication method. This is a visual method of multiplying numbers by drawing lines. Each number is represented by a set of parallel lines, and the answer is found by counting intersections of these lines which are drawn at different angles. The first number is represented by lines sloping down and the second number by lines sloping up.

For example, to multiply 35 by 13, first to represent the thirty draw the group of three lines sloping down and after a gap then draw the group of 5 lines sloping down to represent the five. Then repeat with the one line, representing the ten, and three lines, representing the three, (to represent 13) sloping up.



Count the intersections at the four points, highlighted. These will lead to the answer.

Add the answers in each of the three red columns.

If the answer is greater than nine, carry the tens into the columns to the left.

Thus, the units digit of the answer is 5 and the one of the fifteen is carried into the column with the five and nine, 1 + 5 + 9 = 15, so the tens digit is also 5 and one is carried into the next column, 1 + 3 = 4, so the hundred digit is 4 giving an answer of 455.

Experiment using this method for some of the questions from task 1, 3 or 5.

What do you notice about the numbers in the calculations and how do they link to any other methods you might know or use ordinarily for multiplication?