

MULTIPLICATION

Numbers have been used to pass on information for many thousands of years. Throughout history people have used numbers to combine information, and summarise it. Today, there are four ways of doing calculations. They are:

1. **Mental mathematics**, where all the calculations are done in your head. Only the answer is written down.
2. **Pen and paper methods**, where you break down the calculations you have to do on paper. This should make doing the calculation easier.
3. **Calculator methods**, where you use a calculator to solve your problem.
4. **Computer methods**, where you use computer software like Microsoft Excel to work out the calculations you need to do.

1. Mental/Paper and Pencil Mathematics

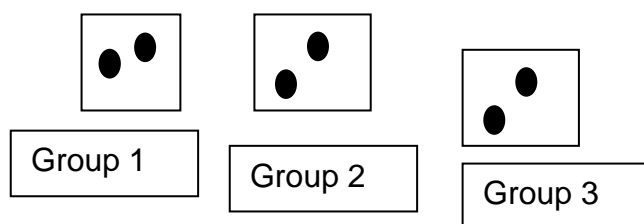
A useful way to improve your mental multiplication and division is to draw and count the number of groups. For example if you need to multiply 3 and 2, one way of doing this is to count the total of three groups of two.

Example 1

Work out 3×2

Solution

3×2 means three groups of two



In total there are 6 dots

So, $3 \times 2 = 6$

Exercise 1

Work out the following multiplications either in your head or by drawing groups of dots.

a. $3 \times 3 = \underline{\quad}$

b. $2 \times 4 = \underline{\quad}$

c. $3 \times 4 = \underline{\quad}$

d. $4 \times 4 = \underline{\quad}$

e. $5 \times 2 = \underline{\quad}$

Example 2

Work out $8 \div 4$

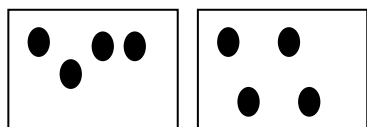
Solution

This problem is asking you to work out 8 divided by 4, or 8 shared by 4. You can do this with groups as well.

Draw 8 dots.



Try to form groups of 4.



There are 2 groups.

So, $8 \div 4 = 2$

You could do this in your head or on paper.

Exercise 2

Work out the following divisions in your head. They are the opposite of multiplication.

a. $6 \div 3 = \underline{\quad}$

b. $8 \div 2 = \underline{\quad}$

c. $9 \div 3 = \underline{\quad}$

d. $15 \div 5 = \underline{\quad}$

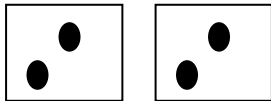
e. $20 \div 5 = \underline{\quad}$

Example 3

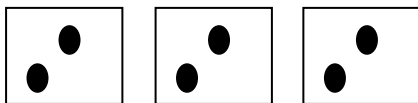
Using dots and groups work out the following.

2×2 , 2×3 , 2×4 , 2×5 , 2×6 , 2×7 , 2×8 , 2×9 , 2×10


Solution



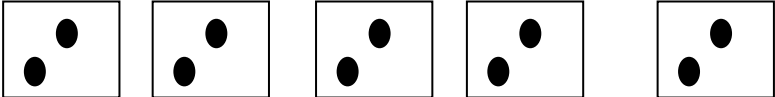
$2 \times 2 = 4$



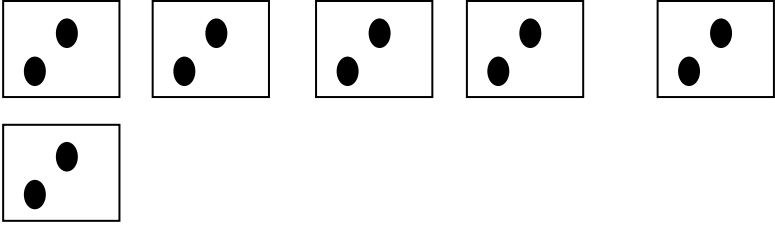
$2 \times 3 = 6$



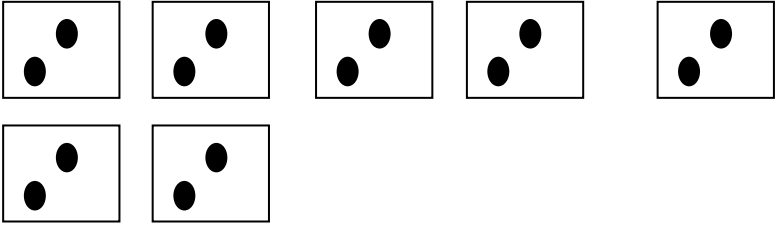
$2 \times 4 = 8$



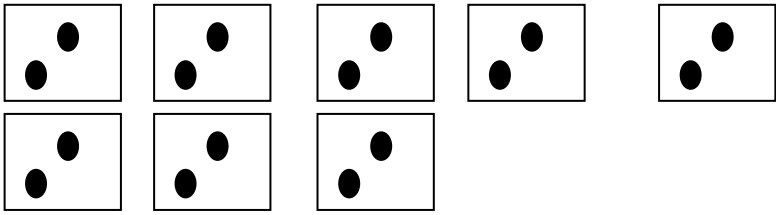
$2 \times 5 = 10$



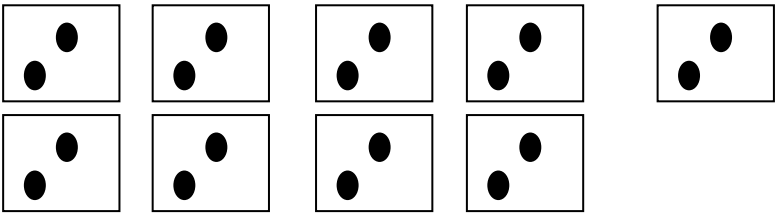
$2 \times 6 = 12$



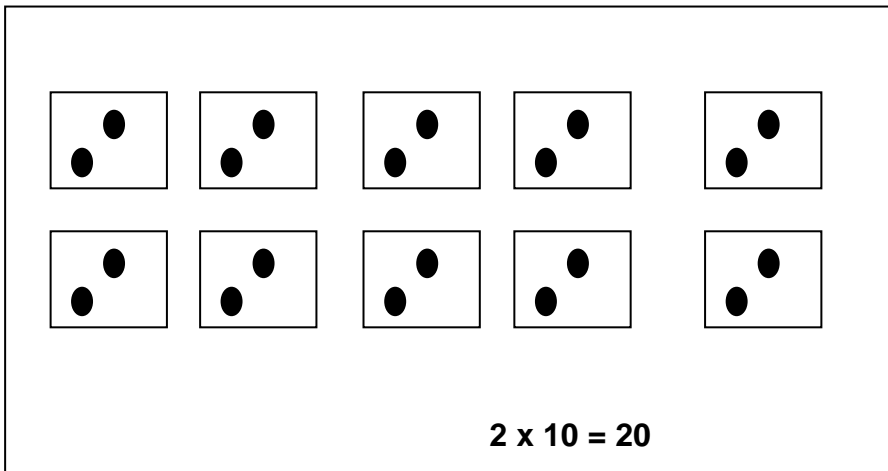
$2 \times 7 = 14$



$2 \times 8 = 16$



$2 \times 9 = 18$



Exercise 3

Using dots and groups work out the following.

3×2 , 3×3 , 3×4 , 3×5 , 3×6 , 3×7 , 3×8 , 3×9 , 3×10

Exercise 4

Using dots and groups work out the following.

4×2 , 4×3 , 4×4 , 4×5 , 4×6 , 4×4 , 4×8 , 4×9 , 4×10

Exercise 5

Using dots and groups work out the following.

5×2 , 5×3 , 5×4 , 5×5 , 5×6 , 5×4 , 5×8 , 5×9 , 5×10

Exercise 6

Put your answers in the table below

x	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2									
3	3									
4	4									
5	5									

This is a multiplication table.

2. Paper and Pencil Methods

There are many times in real life when you may need to do a calculation without a calculator. It is useful, then, to write the problem out.

Example 1

Work out 31×2 using paper and pencil.

Solution

There are several steps to work out the total. First of all, arrange the numbers one under the other. This makes it easier to multiply them.

$$\begin{array}{r} 31 \times \\ 2 \\ \hline \\ \hline \end{array}$$

Start on the right hand side and multiply the 2 and the 1 together. $2 \times 1 = 2$

$$\begin{array}{r} 31 \times \\ 2 \\ \hline 2 \\ \hline \end{array}$$

Move to the next column and multiply the numbers together. $2 \times 3 = 6$

$$\begin{array}{r} 31 \times \\ 2 \\ \hline 62 \\ \hline \end{array}$$

Answer: 62

Exercise 1

Work out the following additions in the space provided.

a. 42×3

b. 34×2

c. 54×2

d. 64×2

e. 43×3

Example 2

Work out 32×23 using paper and pencil.

Solution

There are several steps to work out the total. First of all, arrange the numbers one under the other. This makes it easier to multiply them. For this multiplication you need two rows.

$$\begin{array}{r} 32 \times \\ 23 \\ \hline \\ \hline \\ \hline \end{array}$$

Start on the right hand side and times the 2 and the 3 together. $2 \times 3 = 6$. This is 6 unit and 0 ten.

$$\begin{array}{r} 32 \times \\ 23 \\ \hline 6 \\ \hline \\ \hline \end{array}$$

Move to the next column and times the 3 by the 3. $3 \times 3 = 9$. This is 9 units and 0 tens.

$$\begin{array}{r} 32 \times \\ 23 \\ \hline 96 \\ \hline \\ \hline \end{array}$$

Move to the next row and put a 0 in the right most space the 4, the 3 and the 1 together. $4 \times 3 + 1 = 8$.

$$\begin{array}{r} 32 \times \\ 23 \\ \hline 96 \\ 0 \\ \hline \end{array}$$

Move to the next column and times the 2 by the 2 and put 4 in the right most space. Then multiply the 3 and the 2 together. $3 \times 2 = 6$. Put the 6 in the left most column.

$$\begin{array}{r} 32 \times \\ 23 \\ \hline 96 \\ 640 \\ \hline \\ \hline \end{array}$$

Now add together the numbers in the two rows to get the answer.

$$\begin{array}{r} 32 \times \\ 23 \\ \hline 96 \\ 640 \\ \hline 736 \\ \hline \end{array}$$

Answer: 736

Exercise 2

Work out the following additions on paper.

a. 24×21

b. 32×14

c. 23×12

d. 41×24

e. 12×32

Useful You Tube Links

<https://www.youtube.com/watch?v=v1lh3-mDPUk>

https://www.khanacademy.org/math/arithmetic/multiplication-division/multiplication_fun/v/basic-multiplication

<https://www.youtube.com/watch?v=0jhf1ldvP-o>

Useful Web Page Links

http://www.ehow.com/list_7598356_techniques-adults-memorize-multiplication.html