Expanding brackets (Extending)

Sunday, 20 October 2019 12:59 pm

★ By the end of the lesson I would hope that you have an understanding of the concepts below:

- Know how to expand brackets using the distributive law.

RECAP

We have learnt much about terms, constants, pronumerals, variables and much more recently. We are now going to start putting it to practical use. We need to ensure that we remember that between a number and letter is a kissy-kissy! We need to remember that $1 \times 2 \times 3$ is the same as $3 \times 2 \times 1$ etc.

Basic Multiplication

We have been multiplying numbers together for years!
Nothing is going to be hard for us when multiplying numbers together.

Example:
Multiply 3 and 4 together

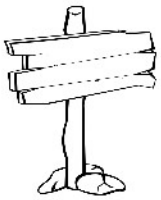
$3 \times 4 = 12$

$4 \times 3 = 12$

What about multiplying 23 and 5 together?

There are lots of ways of doing this ...

Way 1:

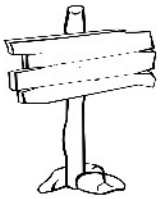


23×5

$$\begin{array}{r} 23 \\ \times\ 5 \\ \hline 115 \\ \hline 1 \end{array}$$

5×3
5×20 +

Another way ...



23×5

5×23

$5 \times (20 + 3)$

$= 5 \times 20 + 5 \times 3$

$= 5 \times 20 + 5 \times 3$

$= 100 + 15$

$= 115$

Knowing this second way ... can help us with Algebra

Let's think of the idea now that **anything inside of the bracket should be multiplied by what is outside of the brackets.** We know that a number and a letter are connected by a times and can be written in a simpler form. We can combine this to do complicated examples!

Let's look at some simple examples first:

Example 1:
Example the following brackets

$3(x + 2)$

$3 \times (x + 2)$

$= 3 \times x + 3 \times 2$

$= 3x + 6$

$5(4 - k)$

$5 \times (4 - k)$

$= 5 \times 4 - 5 \times k$

$= 20 - 5k$

$7(b + g)$

$7 \times (b + g)$

$= 7 \times b + 7 \times g$

$= 7b - 7g$

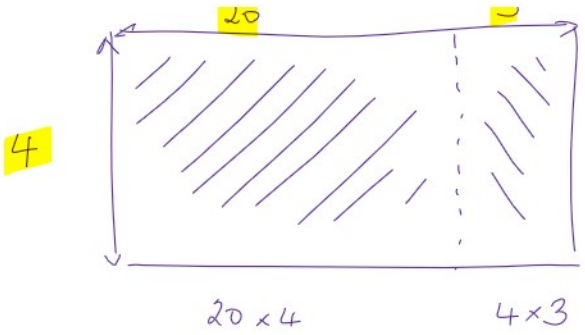
Thinking about areas of rectangles

Multiplying can also be thought of using areas of rectangles.
If we go back to the idea of 23 × 4
We could think of it in the following way:

$23 \times 4 = 4 \times 23$

$= 4 \times (20 + 3)$



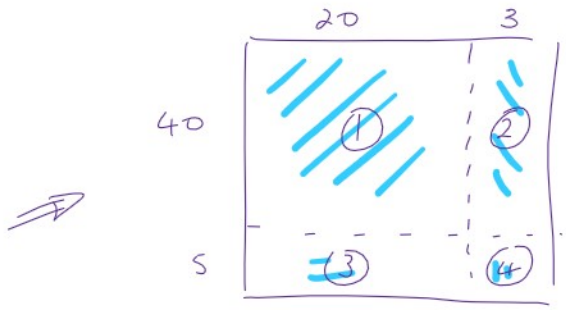


$= 20 \times 4 + 4 \times 3$

$= 80 + 12$

$= 92$

Another example could be 23×45



$23 = 20 + 3$

$45 = 40 + 5$

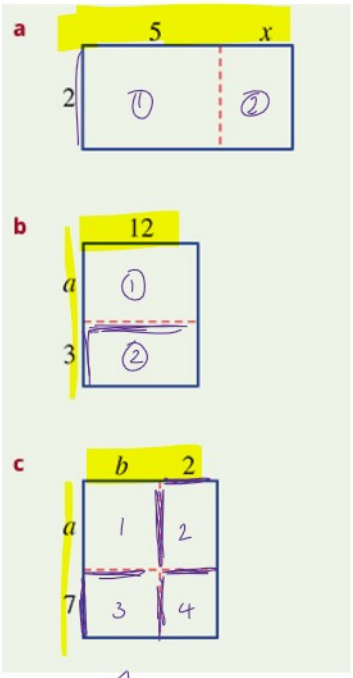
$40 \times 20 + 40 \times 3 + 5 \times 20 + 3 \times 5$

$= 800 + 120 + 100 + 15$

$= 1035$

What if we don't know both numbers and one of them is a letter?
The same idea applies!
For example, think about the following examples which have been provided by the Cambridge Essentials Textbook series for Year 7.

Example 1:
Write two equivalent expressions for the area of each rectangle shown, only one of which includes brackets.



① $= 2 \times 5$

② $= 2 \times x$

$+ = 10 + 2x$

$2 \times (5 + x)$

$= 2(5 + x)$

$= 2(x + 5)$

$12(a + 3)$

① $= 12a$

② $= 3 \times 12$

$+ = 12a + 36$

$(b + 2)(a + 7)$

① $= ab$

② $= 2a$

③ $= 7b$

④ $= 2 \times 7 = 14$

$ab + 2a + 7b + 14$

Example 2:
Expand the following expressions.

$5(x + 3)$

$5 \times (x + 3)$

$= 5 \times x + 5 \times 3$

$= 5x + 15$

$8(a - 4)$

$8 \times (a - 4)$

$= 8 \times a - 8 \times 4$

$= 8a - 32$

$3(a + 2b)$

$3 \times (a + 2b)$

$= 3 \times a + 3 \times 2b$

$= 3a + 6b$

$3 \times 2 \times b$

$6 \times b$

$6b$

$5a(3p - 7q)$

$5a \times (3p - 7q)$

$= 5a \times 3p - 5a \times 7q$

$= 3 \times 5 \times a \times p - 5 \times 7 \times a \times q$

$= 15ap - 35aq$