

# Year 9 Autumn 1

## KEYWORDS:

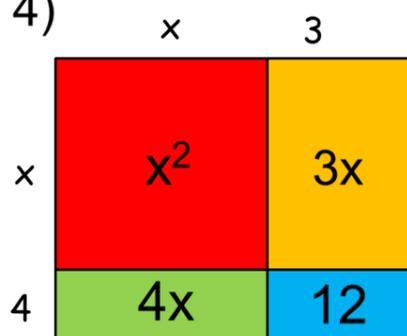
<b>Expand</b>	Multiply each term inside the bracket by the term in front of the bracket (to remove the brackets)	<b>Numerator</b>	The top of a fraction
<b>Factorise</b>	Finding factors of an expression and thus creating a bracketed expression (the reverse of expand)	<b>Denominator</b>	The bottom of a fraction
<b>Product</b>	The solution when two or more numbers are multiplied	<b>Sum</b>	The solution when two or more numbers are added

## Expanding brackets

### Expand

$$(x + 3)(x + 4)$$

One bracket partitioned down the side of your diagram



One bracket partitioned across the top of your diagram

Find the area of each section (length x width)

$$(x + 3)(x + 4) = x^2 + 3x + 4x + 12$$

Collect the like terms

$$= x^2 + 7x + 12$$

### Expand

$$(x + 3)(x + 1)(x - 2)$$

First, expand two of the brackets like we did above. I have chosen  $(x + 3)(x + 1) = x^2 + 4x + 3$

$$(x + 3)(x + 1) = x^2 + 4x + 3$$

Then use a bigger diagram to include the final bracket



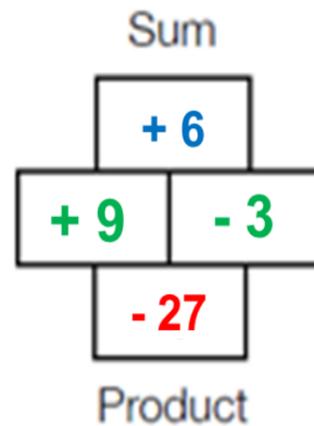
Again, find the areas of the sections and collect the like terms

$$x^3 + 2x^2 - 5x - 6$$

Videos 160—166

## Factorising double brackets

$$\text{Factorise } b^2 + 6b - 27$$



Find **two numbers** that **sum** to get the **coefficient of b** and whose **product** is the **constant** in your expression.

These will be the numbers in your new brackets:

$$(b + 9)(b - 3)$$

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## Simplifying algebraic fractions

**Always factorise** anything you can first.

Cancel any factors that are the same on the numerator and denominator

$$\frac{x^2 + 5x}{x} = \frac{\cancel{x}(x + 5)}{\cancel{x}} = x + 5$$

You can only

cancel a **whole bracket** all at once—you can never cancel just **one term** from inside a bracket!

$$\frac{x^2 + 6x + 5}{x^2 + 5x} = \frac{\cancel{(x+5)}(x+1)}{x\cancel{(x+5)}} = \frac{x+1}{x}$$

Video 229

## Algebraic Fraction Expressions

### Multiplication

Multiply numerators together and then multiply denominators together.

**Don't forget to cancel any factors you can before multiplying!**

$$\frac{7x}{2} \times \frac{3x}{5} = \frac{21x^2}{10}$$

### Division—KFC

Keep, Flip, Change (just the same as normal fraction division)

$$\frac{6t}{5} \div \frac{3}{4t} = \frac{6t}{5} \times \frac{4t}{\cancel{3}_1} = \frac{8t^2}{5}$$

### Addition and Subtraction

Always find a common denominator. Then add or subtract as you would with a "normal" fraction

$$\frac{f}{3} - \frac{f}{4} = \frac{4f}{12} - \frac{3f}{12} = \frac{f}{12}$$

Sometimes your common denominator will be algebraic.

**Don't forget, whatever you have done to the denominator, you must do the same to the numerator!**

$$\begin{aligned} \frac{2}{n+4} + \frac{5}{n} &= \frac{2n}{n(n+4)} + \frac{5(n+4)}{n(n+4)} \\ &= \frac{2n + 5n + 20}{n(n+4)} = \frac{7n + 20}{n(n+4)} \end{aligned}$$

Video 172

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