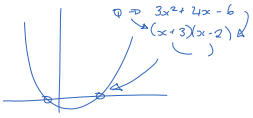
Factorising



The work which will need to be done once teaching has taken place is:

Factorisation of DOPS and trinomials	MM Ex. 3B	2aefi 3bc 4aei 5beii 6bcf 7bef 8cdfi 9bce

What does it mean to factorise?

When you factorise, you take outside a set of brackets, terms which are common. "Most"
You effectively, divide each term by the highest factor and move it outside of a set of brackets

E.g.1 $x^2 + x = x(x+1)$

$x^2 \div x = x$

E.g.2 $3x + 9x^2 = 3x(1 + 3x)$

E.g.3. $abc + ab^2c = abc(a + b)$

Grouping of terms

This is the early part of factorising quadratics.
When we factorise we are generally looking at taking outside of brackets what's common to **TWO** terms.
When you have three terms ... we need to employ some clever Mathematics ...
But we're rushing!

E.g. 4 $x^3 + 4x^2 - 3x - 12$

$x^2(x+4) - 3(x+4)$

$(x+4)(x^2 - 3)$

$(x-3)(x+3)$

Quadratics

E.g. 5 $x^2y^2 - x^2 - y^2 + 1$

$x^2(y^2 - 1) - 1(y^2 - 1)$

$(y^2 - 1)(x^2 - 1)$

Factorised

Difference of two squares

We know, how to use FOIL to multiply out two brackets which are multiplied together.

$(a+b)(a-b)$ $a^2 - b^2$

$a^2 - b^2$

$2 \times 9 = 6$
$3 \times 2 = 6$

$a^2 - b^2 = (a+b)(a-b)$

That is an important result!

$(a+b)(a-b) = a^2 - b^2$

$a^2 - b^2 = (a+b)(a-b)$

E.g. 6 $x^2 - 9$

$x^2 - (3)^2$

$a^2 - b^2$

$(a+b)(a-b)$

$(x+3)(x-3)$

$x^2 + 9$

1 4 9 16 25 36 ...

1^2 2^2 3^2 4^2 5^2

E.g. 7 $9a^2 - 25b^2$

$(3a)^2 - (5b)^2$

$(3a + 5b)(3a - 5b)$

$a^2 - b^2$

$a = 3a$

$b = 5b$

$(5b)^2 = 25b^2$

$5b \times 5b$

$5 \times 5 \times b \times b = 25b^2$

E.g. 8 $3a^2 - 27b^2$

$3[a^2 - 9b^2]$

$3[(a)^2 - (3b)^2]$

$3[(a - 3b)(a + 3b)]$

$3(a-3b)(a+3b)$

When 3 becomes 4

Earlier we said that we can factories even numbers of terms. Generally we have two terms which we factorise. We have seen tha t, with 4 terms, we can factorise in pairs. Which might allow us to factorise again.

This is the process we use in Factorisation of Quadratics.

We turn 3 into 4.

The T-Method

Factorise the following: $x^2 - 2x - 8$

ax^2+bx+c Product ac

-8

$-1 + 8$

$-2 + 4$ ×

$-4 + 2$

$-8 + 1$

(Factors!)

$x^2 - 2x - 8$

3 into 4 : $x^2 - 4x + 2x - 8$

$x(x-4) + 2(x-4)$

$(x-4)(x+2)$

$x^2 - 2x - 8$ ✓

$x^2 - 2x + 4x - 8$ ✗

Factorise the following

$2x^2 - 5x + 6x - 15$

$2x^2 + 3x + 1x$

3 into 4 $2x^2 - 5x + 6x - 15$

$x(2x-5) + 3(2x-5)$

$(2x-5)(x+3)$

-30

$-1 \mid 30$

$-2 \mid 15$

$-3 \mid 10$

$-5 \mid 6$

$6 ; 5$

$10 \quad 3$

Methods 3 and 4 advance: $(x+1)^2 - 2(x+1) - 3$

$a^2 - 2a - 3$

B.F.T. $(x+1) = a$

$a^2 + a - 3a - 3$

$a(a+1) - 3(a+1)$

$(a+1)(a-3)$ ∞

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

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

$(x+2)(x-2)$

-3

$1 \mid -3$