

Factorising Quadratics ($a \neq 1$)

Starter

1. (Review of last lesson)

Factorise: (a) $x^2 - 8x - 20$

(b) $3y^2 - 12y - 36$

2. (Review of a previous lesson)

Factorise: (a) $8x^2 + 10x + 12x + 15$

(b) $18x^2 - 3x - 12x + 2$

Notes

Factorising quadratics becomes more difficult when the coefficient of x^2 is not 1. That is, for the quadratic $ax^2 + bx + c$ the value of a is not 1 ($a \neq 1$).

However, precisely the same method is used as when the coefficient is 1.

Success criteria - factorising quadratics

1. **Multiply** the coefficient of x^2 by the constant term
2. **Find two numbers** that **multiply** to get the number from step 1. and **add** to get the coefficient of x
3. **Separate into two terms** the x term using the 2 numbers you found in step 2.
4. **Factorise** the expression **by grouping**

N.B. After the first step of factorising by grouping, the **brackets must be the same**

E.g. 1 Factorise $3x^2 + 19x + 6$.

Working: $3 \times 6 = 18 \Rightarrow$ Multiply: $18 = 18 \times 1$
Add: $19 = 18 + 1$

Split $19x$ into $18x + x$: $3x^2 + 19x + 6 = 3x^2 + 18x + x + 6$

N.B. The 6 remains the same.

Factorise by grouping: $3x^2 + 19x + 6 = 3x(x + 6) + 1(x + 6)$
 $= (x + 6)(3x + 1)$

N.B. $19x$ could also be split into $x + 18x$.

E.g. 2 Factorise $2x^2 + 5x - 12$.

Working: $2 \times -12 = -24 \Rightarrow$ Multiply: $-24 = 8 \times -3$
Add: $5 = 8 + -3$

Split $5x$ into $8x - 3x$: $2x^2 + 5x - 12 = 2x^2 + 8x - 3x - 12$

N.B. The -12 remains the same.

Factorise by grouping: $2x^2 + 5x - 12 = 2x(x + 4) - 3(x + 4)$
 $= (x + 4)(2x - 3)$

N.B. $5x$ could also be split into $-3x + 8x$.

E.g. 3 Factorise $3x^2 - 5x + 2$.

E.g. 4 Factorise $3x^2 - 14x - 5$.

Video: [Factorising quadratics \(a > 1\)](#)

[Solutions to Starter and E.g.s](#)

Exercise

9-1 class textbook: p113 E4.3 Qu 1-23
A*-G class textbook: p102 E4.3 Qu 1-23
9-1 homework book: p41 E4.3 Qu 1-16
A*-G homework book: p30 E4.3 Qu 1-14

Summary

Factorising quadratics

1. **Multiply** the coefficient of x^2 by the constant term
2. **Find two numbers** that **multiply** to get the number from 1. and **add** to get the coefficient of x
3. **Separate into two terms** the x term using the 2 numbers you found in 2.
4. **Factorise** the expression **by grouping** (make sure the **brackets are the same**)

[Homework book answers \(only available during a lockdown\)](#)