Exercise walk-through

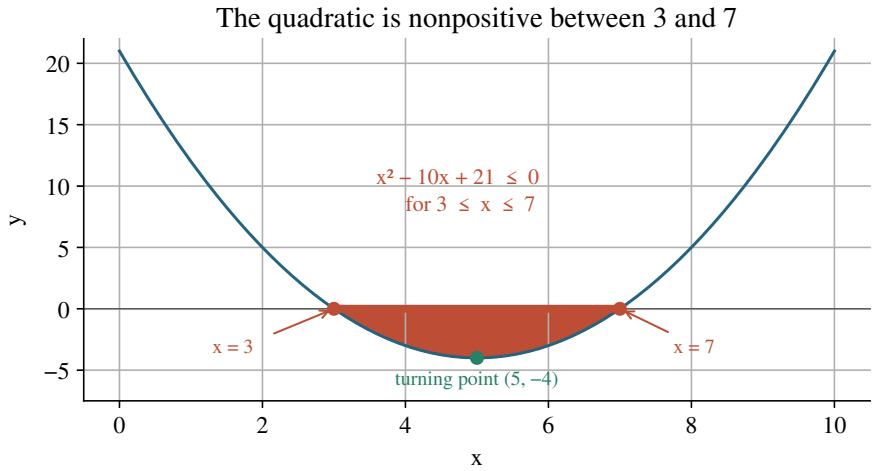
2.2 Quadratic

Pearson Edexcel · International GCSE · Mathematics A

Completing the square and solving quadratics (2)

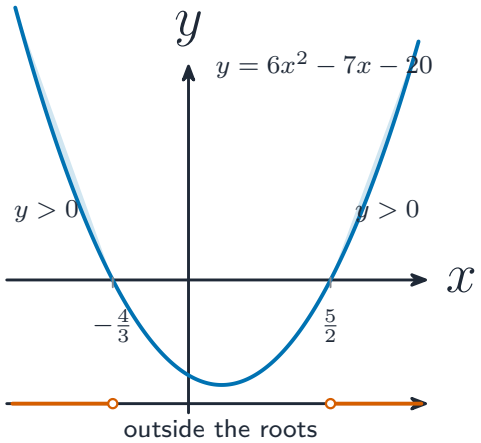
- factorise: $x^2 + x - 30 = 0$ gives $(x+6)(x-5) = 0$, so the **roots** are $x = -6$ and $x = 5$;
- use the **quadratic formula** $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ when it does not factorise;
- complete the square.
- $a = 2$, $b = 6$, $c = -1$: $x = \dfrac{-6 \pm \sqrt{36+8}}{4} = \dfrac{-6 \pm 2\sqrt{11}}{4} = \dfrac{-3 \pm \sqrt{11}}{2}$.

Figure: Completing the square and solving quadratics (2)



- $x^2 - 10x + 21 = (x - 3)(x - 7)$.
- It is ≤ 0 for $3 \leq x \leq 7$.

Figure: Inequalities and linear–quadratic pairs

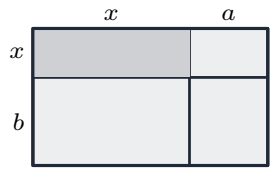


positive quadratic: $>$ holds
outside the critical values

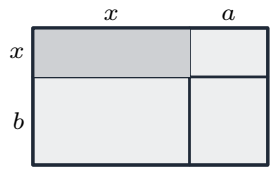
- Roots $-4/3$ and $5/2$.
- Positive outside the roots.

Exercises 2.1·2.2

2.1 Factorise $x^2 + x - 30$ [2]

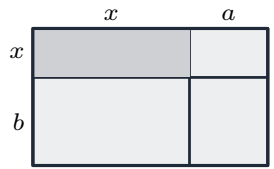


2.2 Factorise $6x^2 - 5x - 6$ [2]



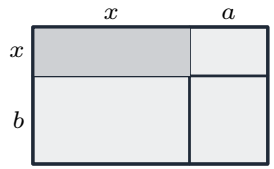
Exercises 2.1·2.2

2.1 Factorise $x^2 + x - 30$ [2]



2.1 $(x + 6)(x - 5)$.

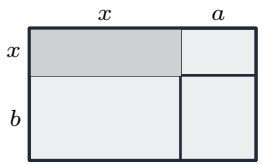
2.2 Factorise $6x^2 - 5x - 6$ [2]



2.2 $(3x + 2)(2x - 3)$.

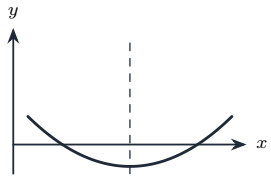
Setup for exercise 2.3

2.3 Factorise fully $4x^2 - 9$ [2]



Exercise 2.3

2.4 Simplify $\dfrac{x^2 - 4}{x^2 + 5x + 6}$ [3]

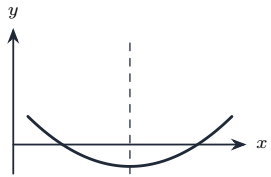


2.5 Express $\dfrac{3}{x+1} + \dfrac{2}{x-2}$ as a single fraction [3]



Exercise 2.3

2.4 Simplify $\dfrac{x^2 - 4}{x^2 + 5x + 6}$ [3]



2.5 Express $\dfrac{3}{x+1} + \dfrac{2}{x-2}$ as a single fraction [3]



2.3 $(2x - 3)(2x + 3)$.

2.4 $\dfrac{(x-2)(x+2)}{(x+2)(x+3)} = \dfrac{x-2}{x+3}$ (for $x \neq -2, -3$).

2.5 $\dfrac{3(x-2) + 2(x+1)}{(x+1)(x-2)} = \dfrac{5x - 4}{(x+1)(x-2)}$.

Exercise 3.1

3.1 *(Edexcel 4MA1 2HR June 2024 Q26, adapted.)* Write $4-(3x-5)\div\dfrac{3x^2+x-10}{4x-1}$ as a single fraction in its simplest form. [4]



Exercise 3.1

3.1 *(Edexcel 4MA1 2HR June 2024 Q26, adapted.)* Write $4-(3x-5)\div\dfrac{3x^2+x-10}{4x-1}$ as a single fraction in its simplest form. [4]



3.1 Factor: $3x^2+x-10=(3x-5)(x+2)$. Dividing inverts: $4-\dfrac{(3x-5)(4x-1)}{(3x-5)(x+2)}=4-\dfrac{4x-1}{x+2}=\dfrac{4(x+2)-(4x-1)}{x+2}=\dfrac{9}{x+2}$.

Exercise 3.2

3.2 *(Edexcel 4MA1 2HR June 2024 Q18, adapted.)* Using algebra, convert the recurring decimal $0.306306\ldots$ to a fraction in its simplest form. [2]



3.3 *(Original.)* Prove that $(2n+1)^2 - (2n-1)^2$ is a multiple of 8 for every integer n. [3]



Exercise 3.2

3.2 *(Edexcel 4MA1 2HR June 2024 Q18, adapted.)* Using algebra, convert the recurring decimal $0.306306\ldots$ to a fraction in its simplest form. [2]



3.3 *(Original.)* Prove that $(2n+1)^2-(2n-1)^2$ is a multiple of 8 for every integer n. [3]



3.2 Let $x = 0.306306\ldots$ Then $1000x = 306.306\ldots$, and subtracting, $999x = 306$, so $x = \frac{306}{999} = \frac{34}{111}$.

3.3 $(2n+1)^2-(2n-1)^2 = (4n^2+4n+1)-(4n^2-4n+1) = 8n$, which is a multiple of 8 for every integer n.

Local review guidance: factor before cancelling, and cancel only whole factors; simplest-form single fraction; proofs are algebraic – a numeric example is not a proof. This is authored classroom guidance.