Exercise walk-through

2.1 Algebra

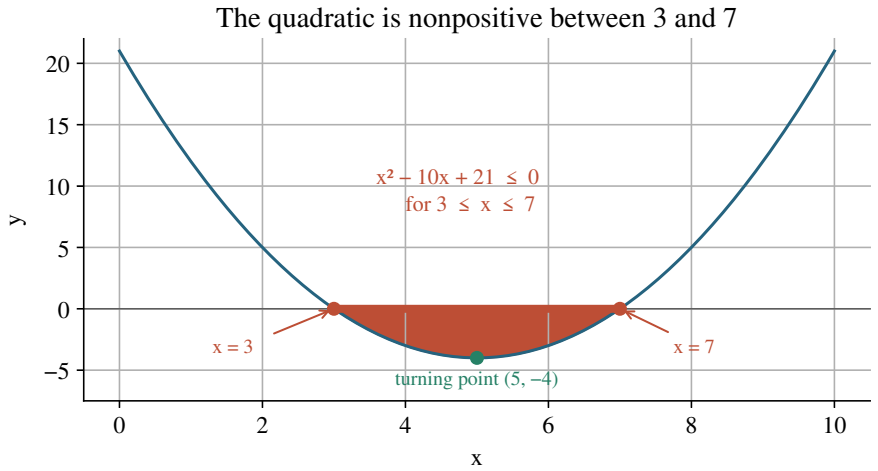
Pearson Edexcel · International GCSE · Mathematics A

Quadratic algebra

- To factorise $x^2 + bx + c$, find two numbers that multiply to c and add to b: $x^2 + 10x + 24 = (x+6)(x+4)$.
- (Higher) To factorise $ax^2 + bx + c$, find two numbers that multiply to ac and add to b, then split the middle term: $6x^2 - 5x - 6 = 6x^2 - 9x + 4x - 6 = 3x(2x-3) + 2(2x-3) = (3x+2)(2x-3)$.
- The **difference of two squares** : $x^2 - a^2 = (x-a)(x+a)$, so $4x^2 - 9 = (2x-3)(2x+3)$.

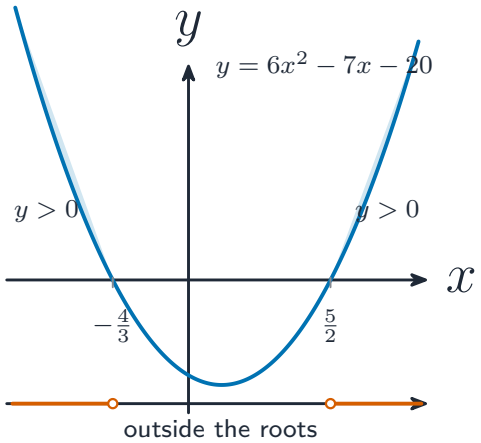
$$\frac{x^2-4}{x^2+5x+6} = \frac{(x-2)(x+2)}{(x+2)(x+3)} = \frac{x-2}{x+3}$$

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

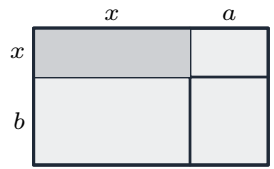


positive quadratic: $>$ holds
outside the critical values

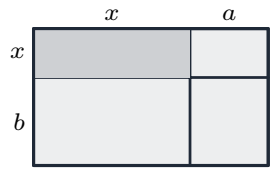
- Roots $-4/3$ and $5/2$.
- Positive outside the roots.

Exercises 2.1·2.2

2.1 Simplify $x^5 \times x^{-2} \div x^0$, giving your answer as a single power. [2]

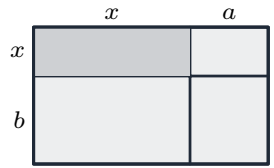


2.2 Evaluate $27^{1/3} \times 4^{1/2}$ [2]



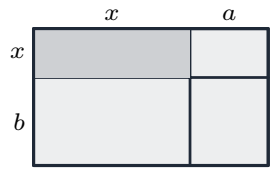
Exercises 2.1·2.2

2.1 Simplify $x^5 \times x^{-2} \div x^0$, giving your answer as a single power. [2]



2.1 $x^{5+(-2)-0} = x^3$ (dividing by $x^0 = 1$ changes nothing).

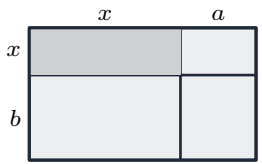
2.2 Evaluate $27^{1/3} \times 4^{1/2}$ [2]



2.2 $\sqrt[3]{27} \times \sqrt{4} = 3 \times 2 = 6$.

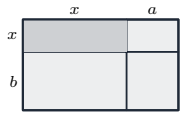
Setup for exercise 2.3

2.3 Expand and simplify $(x+8)(x-5)$ [2]



Exercise 2.3

2.4 Factorise fully $x^2 + 10x + 24$ [2]



2.5 Make t the subject of $v = u + at$ [2]

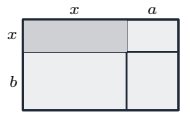


2.6 Expand and simplify $(x + 2)(x + 3)(x - 1)$ [3]



Exercise 2.3

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2.3 $x^2 + 3x - 40$.

2.4 $(x + 6)(x + 4)$.

Full solution on next slide

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Full solution 2.3

2.3 $x^2 + 3x - 40$.

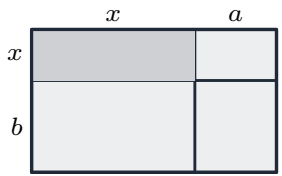
2.4 $(x + 6)(x + 4)$.

2.5 $at = v - u$, so $t = \dfrac{v - u}{a}$.

2.6 $(x^2 + 5x + 6)(x - 1) = x^3 + 4x^2 + x - 6$.

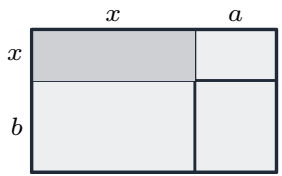
Exercise 3.1

3.1 *(Edexcel 4MA1 2HR June 2024 Q7, adapted.)* Given that $\dfrac{3^{n-2} \times 3^{n+5}}{3^{3n+10}} = 1$, find the value of n. [2]



Exercise 3.1

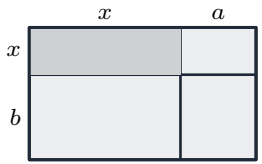
3.1 *(Edexcel 4MA1 2HR June 2024 Q7, adapted.)* Given that $\dfrac{3^{n-2} \times 3^{n+5}}{3^{3n+10}} = 1$, find the value of n. [2]



3.1 One base, so indices combine: $(n-2)+(n+5)-(3n+10)=0$, giving $-n-7=0$ and $n=-7$.

Setup for exercise 3.2

3.2 *(Original.)* Make r the subject of $V = \frac{4}{3}\pi r^3$ [3]

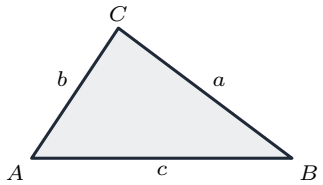


3.3 *(Original.)* Make l the subject of $T = 2\pi\sqrt{\frac{l}{g}}$ [3]



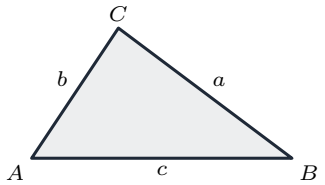
Exercise 3.2

3.4 *(Original.)* The three angles of a triangle are $a°$, $(a+10)°$ and $(a+20)°$. Set up and solve an equation to find a. [3]



Exercise 3.2

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3.2 Multiply by 3: $3V = 4\pi r^3$; divide by 4π: $r^3 = \frac{3V}{4\pi}$; cube root: $r = \sqrt[3]{\frac{3V}{4\pi}}$.

3.3 Square both sides: $T^2 = \frac{4\pi^2 l}{g}$, so $l = \dfrac{gT^2}{4\pi^2}$.

3.4 Angles sum to 180°: $3a + 30 = 180$, so $a = 50$ (angles 50°, 60°, 70° – check: sum 180° ✓).

Local review guidance: index arithmetic on the exponents only, never on the bases; subjects isolated with correct power handling; checks by substitution into the original form. This is authored classroom guidance.