Exercise walk-through

2.1

Notation, expressions, substitution, expanding and factorising (A1–A4)

AQA · GCSE · Mathematics

Solving equations

- **Linear equations.** Collect the letters on one side and the numbers on the other. **Worked example 8.** $7x - 22 = 4x + 29$.
- Subtract $4x$: $3x - 22 = 29$.
- Add 22: $3x = 51$, so $x = 17$.
- **Quadratic equations by factorising.** Make one side zero and factorise.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Inequalities

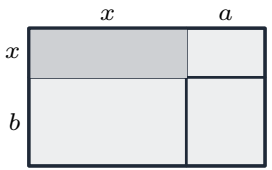
- Solve a linear inequality like an equation, but if you multiply or divide by a negative number, turn the sign round: from $-2x < 6$ you get $x > -3$.
- On a number line, an open circle means the end value is not included ($<$ or $>$) and a filled circle means it is ($\leq$ or $\geq$).
- **Worked example 15.** Find the integers n with $-3 < 2n + 1 \leq 9$.
- Subtract 1: $-4 < 2n \leq 8$.

Sequences

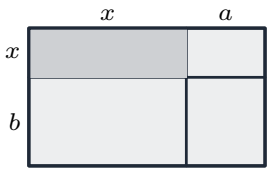
- A sequence is a list of numbers that follows a rule.
- A term-to-term rule says how to get the next term; a position-to-term rule, the **nth term** , gives any term from its position n.
- You should know the square numbers (1, 4, 9, 16, ...), cube numbers (1, 8, 27, ...), triangular numbers (1, 3, 6, 10, ...) and Fibonacci-type sequences, where each term is the sum of the two before.
- **Arithmetic sequences.** An **arithmetic progression** adds the same number each time.

Exercises 2.1·2.2

2.1 Expand and simplify $3(2x - 5) + 4(x + 1)$ [2]

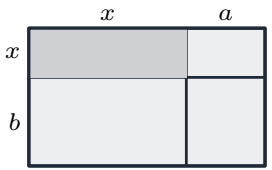


2.2 Expand and simplify $(x + 5)(x - 3)$ [2]



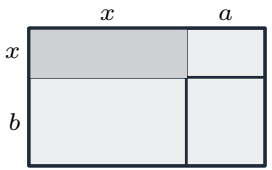
Exercises 2.1·2.2

2.1 Expand and simplify $3(2x - 5) + 4(x + 1)$ [2]



2.1 $6x - 15 + 4x + 4 = 10x - 11$.

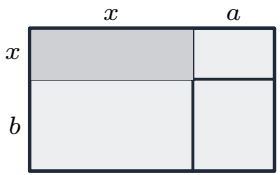
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2.2 $x^2 + 2x - 15$.

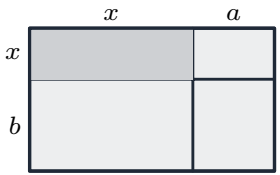
Exercise 2.3

2.3 Factorise $x^2 - 2x - 24$ [2]



Exercise 2.3

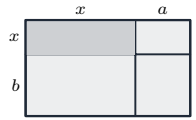
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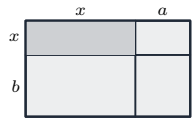
2.3 $(x - 6)(x + 4)$.

Exercise 2.4

2.4 Factorise $6x^2 - 7x - 3$ [2]



2.5 Expand and simplify $(3 + \sqrt{2})(1 - 2\sqrt{2})$ [3]

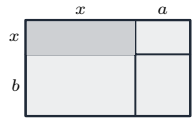


2.6 Make t the subject of $v = u + at$ [2]

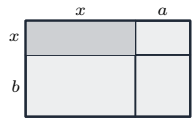


Exercise 2.4

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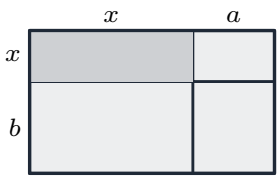
2.4 $(3x + 1)(2x - 3)$.

2.5 $3 - 6\sqrt{2} + \sqrt{2} - 4 = -1 - 5\sqrt{2}$.

2.6 $at = v - u$, so $t = \dfrac{v - u}{a}$.

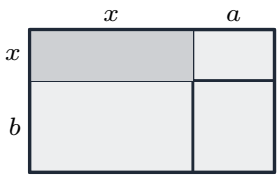
Exercise 3.1

3.1 *(Original, 3H June 2024 Q4 family.)* Show that $(2x+3)^2-(2x+1)(2x+5)\equiv 4$. [3]



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3.1 LHS $=(4x^2+12x+9)-(4x^2+12x+5)=4=$ RHS for all x: an identity. ✓

Exercise 3.2

3.2 *(Original, 1H June 2024 Q17 family.)* Make x the subject of $y = \dfrac{3x + 7}{x}$. [4]

assume → deduce → conclude

3.3 *(Original, 1H June 2024 Q9 family.)* Simplify fully $\dfrac{26}{16.4}$, giving your answer as a fraction in its lowest terms. [3]



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3.3 *(Original, 1H June 2024 Q9 family.)* Simplify fully $\dfrac{26}{16.4}$, giving your answer as a fraction in its lowest terms. [3]

3.2 Multiply by x: $xy = 3x+7$, so $xy - 3x = 7$, factorise $x(y-3) = 7$, giving $x = \dfrac{7}{y-3}$.

3.3 $\dfrac{26}{16.4} = \dfrac{260}{164} = \dfrac{65}{41}$.

Local review guidance: factor before cancelling; simplest forms; identity proofs end with the “all values” statement. This is authored classroom guidance.