Maths · Revision

Algebra Revision Notes

The core moves of GCSE algebra, each with a worked example. Cover the working and try each one yourself.

Simplifying and expanding

- **Collect like terms:** $3x + 2y + 5x - y = 8x + y$
- **Single bracket:** $4(2x - 3) = 8x - 12$
- **Double bracket:** $(x + 3)(x - 2) = x^2 - 2x + 3x - 6 = x^2 + x - 6$

Common slip: $3(x + 2)$ is $3x + 6$, not $3x + 2$. The number outside multiplies everything inside.

Factorising

- **Common factor:** $6x + 9 = 3(2x + 3)$
- **Quadratic:** $x^2 + 5x + 6 = (x + 2)(x + 3)$. Find two numbers that multiply to 6 and add to 5.
- **Difference of two squares:** $4x^2 - 9 = (2x + 3)(2x - 3)$

Expand your answer to check it. You should get back to where you started.

Solving linear equations: $5x - 3 = 2x + 9$

$3x - 3 = 9$
Take $2x$ from both sides.

$3x = 12$
Add 3 to both sides.

$x = 4$
Divide by 3. Check: $5(4) - 3 = 17$ and $2(4) + 9 = 17$.

Rearranging: make a the subject of $v = u + at$

$v - u = at$
Take u from both sides.

$a = (v - u) \div t$
Divide both sides by t.

This uses the same moves as solving an equation, with letters instead of numbers.

Quadratics by factorising: $x^2 + 5x + 6 = 0$

$(x + 2)(x + 3) = 0$
Factorise.

$x + 2 = 0$ or $x + 3 = 0$
If two things multiply to 0, one of them must be 0.

$x = -2$ or $x = -3$
There are two answers.

Common slip: rearrange so one side is 0 before you factorise.

Quadratic formula: $2x^2 + 3x - 2 = 0$

$a = 2, b = 3, c = -2$
Write these down first.

$x = (-3 \pm \sqrt{(9 + 16)}) \div 4$
$b^2 - 4ac = 9 - (4 \times 2 \times -2) = 25$.

$x = ½$ or $x = -2$
$(-3 + 5) \div 4$ and $(-3 - 5) \div 4$.

Simultaneous equations: $2x + y = 7$ and $x - y = 2$

$3x = 9$
Add the equations. The y terms cancel.

$x = 3$
Divide by 3.

$3 - y = 2$, so $y = 1$
Substitute back. Check: $2(3) + 1 = 7$.

Inequalities: $3x + 1 < 10$

$3x < 9$
Take 1 from both sides.

$x < 3$
Divide by 3.

Common slip: multiplying or dividing by a negative number flips the sign: $-2x < 6$ becomes $x > -3$.