Year 10 · Algebra: Equations, Lines & Quadratics

Name: _____ Date: _____

Kia ora! This sheet pulls together the algebra you've been learning: tidying up expressions, solving equations and inequalities, working with straight lines, and getting started on quadratics. Take your time and show every step.

Warm-up

1. Collect like terms: $5a + 3b - 2a + 7b$.

2. Expand: $4(2x - 5)$.

3. Solve: $3x + 7 = 22$.

4. Factorise using a common factor: $6y + 15$.

Practice

5. Expand and simplify: $(x + 4)(x - 3)$.

6. Factorise the quadratic: $x^2 + 7x + 12$.

7. Solve the inequality and show the solution on a number line: $-2x + 5 \leq 11$.

8. Mia hires a kayak at Lake Pupuke. It costs a $12 booking fee plus $8 per hour. If she pays $52 in total, form and solve an equation to find how many hours she hired the kayak.

9. A water tank at a farm near Kumeū starts with 20 litres and is filled at a steady 15 litres per minute. Write the equation for the volume V (litres) after t minutes in the form $V = mt + c$, then find the volume after 6 minutes.

10. Solve the quadratic equation $(x - 2)(x + 5) = 0$, and state where the related graph $y = (x - 2)(x + 5)$ crosses the x-axis.

Challenge

11. A straight line passes through the points $(1, 5)$ and $(4, 14)$. Find its gradient, then find the equation of the line in the form $y = mx + c$.

12. Factorise $x^2 + 2x - 8$ by grouping, then describe how the graph of $y = x^2 + 3$ differs from the graph of $y = x^2$.