2.1 Expanding, factorising and algebraic fractions

Name: _____ Class: _____ Date: _____ **Total: 25 marks**

KEY WORDS quadratic equation

Expanding, factorising and algebraic fractions

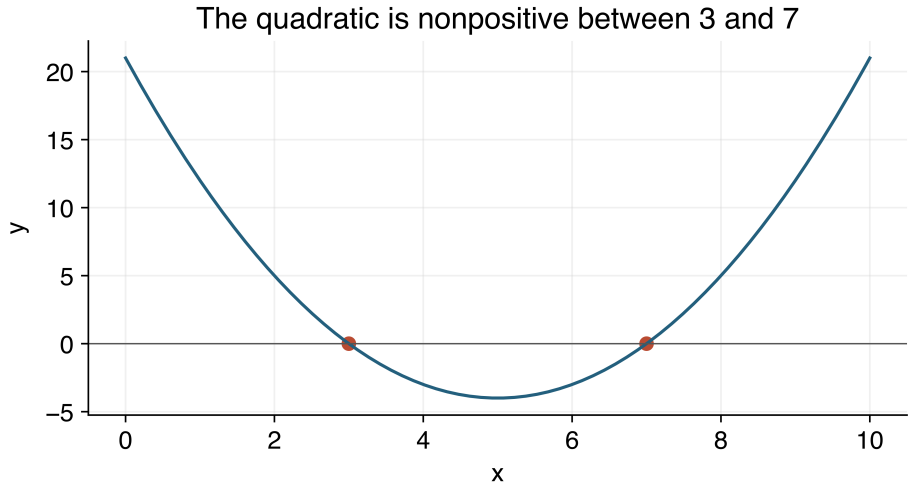
Objective

Expand products of two or three binomials, factorise all quadratics including the difference of two squares, and manipulate quadratic algebraic fractions (rows A4–A7 with the Extension additions).

1 Key knowledge and worked examples

Expanding and factorising. Three binomials: $(x+2)(x-3)(x+1) = (x^2 - x - 6)(x+1) = x^3 - 7x - 6$. Quadratic factorising: $2x^2 - 7x - 15 = (2x+3)(x-5)$; difference of two squares: $9x^2 - 25 = (3x-5)(3x+5)$.

Fractions. Factor, cancel whole factors, common denominators; the 2E specimen's answers $(11m-14)/(m^2-3m-4)$ and $(2x+3)/(x+4)$ come from this machinery. Simplify $\dfrac{x^2-9}{x^2+7x+12} = \dfrac{(x-3)(x+3)}{(x+3)(x+4)} = \dfrac{x-3}{x+4}$.



Original native-lesson illustration; labels belong to its worked example.

2 Practice

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

2.2 Factorise $2x^2 - 7x - 15$ [2]

2.3 Factorise $9x^2 - 25$ [2]

2.4 Simplify $\dfrac{x^2-9}{x^2+7x+12}$ [3]

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

3 Exam-style questions

3.1 *(Original, 2E fraction family.)* Simplify fully $\dfrac{2m^2 - 5m - 3}{m^2 - 3m - 4} \times \dfrac{m^2 - 2m - 8}{2m^2 + 5m + 2}$ [5]

3.2 *(Original.)* Make a the subject of $ax + 3 = 5xt - 2a$ (subject twice). [4]

3.3 *(Original, specification line not sampled: fractional powers.)* Simplify $\dfrac{8c^5}{3d^3} \div \dfrac{2c^2}{d}$, giving the answer in index form. [3]

Solutions

2.1 $(x^2 - x - 6)(x + 1) = x^3 - 7x - 6$.

2.2 $(2x + 3)(x - 5)$.

2.3 $(3x - 5)(3x + 5)$.

2.4 $\dfrac{(x-3)(x+3)}{(x+3)(x+4)} = \dfrac{x-3}{x+4}$.

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

3.1 Factor everything: $\dfrac{(2m+1)(m-3)}{(m-4)(m+1)} \times \dfrac{(m-4)(m+2)}{(2m+1)(m+2)} = \dfrac{m-3}{m+1}$.

3.2 $ax + 2a = 5xt - 3$, so $a(x + 2) = 5xt - 3$ and $a = \dfrac{5xt-3}{x+2}$.

3.3 $\dfrac{8c^5}{3d^3} \times \dfrac{d}{2c^2} = \dfrac{4c^3}{3d^2}$.

Local review guidance: every quadratic factored before cancelling; single simplest fractions; subject-twice answers collect before factorising. This is authored classroom guidance.