GCSE 7+ Session 3
Independent Practice
Fluency with quadratic expressions

KING'S MATHS SCHOOL

Revise, refresh, recall *the core knowledge and skills:*

1 Expand a) $(2x+1)(2x-3)$ b) $(2x+1)(2x-3)(x-2)$

2 Expand a) $(3x-4y)^2$ b) $(3x+4y)(3x-4y)$

3 Factorise a) $x^2+3x-10$ b) $5x^2-x-6$

4 Factorise fully a) x^2-25 b) $2x^3-50x$

5 Simplify fully a) $\dfrac{x}{x^2-9x}$ b) $\dfrac{3x-9}{x^2-9}$ c) $\dfrac{x^2+3x}{x^2-9}$

6 Solve

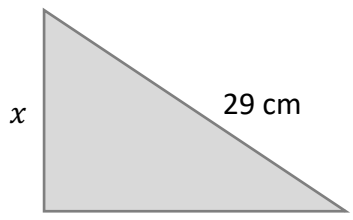
- by factorising: a) $x=1+\frac{56}{x}$
  b) $(3x-1)(2x+1)=20x+19$
- by the quadratic formula, giving x as **exact** fractions: $48x^2+22x-15=0$
- by completing the square, giving x as surds: $x^2+4x-4=0$

Practice makes permanent: *these questions will help you embed and make secure your factual knowledge, procedural fluency and conceptual understanding:*

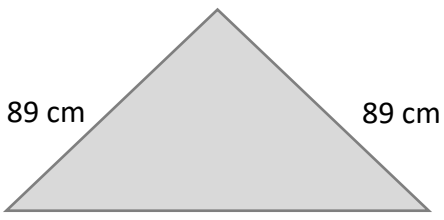
7 Solve a) $\dfrac{7}{x}-\dfrac{6}{x^2}=2$ b) $\dfrac{5}{x-2}-\dfrac{8}{x-1}=1$

8 Work out (no calculators):

a)



b) The area of



9 Use the quadratic formula to solve the following, giving the values of x as **exact surds**

a) $x^2 - 3\sqrt{2}x + 4 = 0$ b) $3x^2 + \sqrt{15}x - 10 = 0$

10 Expand and simplify fully:

a) $(3 + x)(3 - x)$ b) $\left(3 + \sqrt{x}\right)\left(3 - \sqrt{x}\right)$ c) $(3^x + 2^x)(3^x - 2^x)$

11 Factorise fully

a) $81 - x^2$ b) $81 - 16x^4$ c) $81x^2 - 16x^4$

12 Factorise fully

a) $x^2 + x - 20$ b) $12x^2 + x - 20$ c) $12x^2 + 43xy - 20y^2$

13 Simplify

a) $\dfrac{x^2 + x}{x}$ b) $\dfrac{x^2 + x}{x^3 - x}$ c) $\dfrac{x^2 + x - 2}{x^2 - 1}$

14 Complete the square in a) $x^2 - 6x + 1$ b) $4^x - 6 \times 2^x + 1$

Productive struggle: *these harder questions require deeper thinking.*

15 Expand and simplify fully:

a) $\left(2 + \sqrt{x + 4}\right)\left(2 - \sqrt{x + 4}\right)$ b) $\left(\sqrt{x + 5} + \sqrt{x + 4}\right)\left(\sqrt{x + 5} - \sqrt{x + 4}\right)$

16 Factorise fully

a) $4x^4 - 15x^3 - 4x^2$ b) $4x^4 - 15x^2 - 4$ c) $4x^4 - 25x^2y^2 + 36y^4$

d) $(2x)^{-2} - x^{-1} - 3$ e) $(2x)^{-2} - (4x)^{-1} - 3$

f) $81(x + y)^2 - 16(x - y)^2$ g) $(3x - 2y + 1)^2 - (2x - 3y - 1)^2$

17 Simplify fully a) $\dfrac{x^4 - 1}{4x^3 - 4x}$ b) $\dfrac{x^4 - 10x^2 + 9}{x^2 - 2x - 3}$

18 **Without using a calculator**, work out the exact values of

a) $\dfrac{101^2 - 1}{102}$ b) $\dfrac{101^2 - 1}{25}$ c) $\dfrac{101^4 - 101^2}{101^3 - 101^2}$

19 Solve $(x^2 - 4x + 4)^{(x^2 - 4)} = 1$