Athena

Sixth Form College

Mathematics Summer Transition

Expanding brackets and simplifying expressions

1 Expand $4(3x - 2)$

2 Expand and simplify $3(x + 5) - 4(2x + 3)$

3 Expand and simplify $(x + 3)(x + 2)$

4 Expand and simplify $(x - 5)(2x + 3)$

Surds and rationalising the denominator

1 Simplify $\sqrt{50}$

2 Simplify $\sqrt{147} - 2\sqrt{12}$

3 Simplify $\left(\sqrt{7} + \sqrt{2}\right)\left(\sqrt{7} - \sqrt{2}\right)$

4 Rationalise $\dfrac{1}{\sqrt{3}}$

5 Rationalise and simplify $\dfrac{\sqrt{2}}{\sqrt{12}}$

6 Rationalise and simplify $\dfrac{3}{2 + \sqrt{5}}$

Rules of indices

1 Evaluate 10^0

2 Evaluate $9^{\frac{1}{2}}$

3 Evaluate $27^{\frac{2}{3}}$

4 Evaluate 4^{-2}

5 Simplify $\frac{6x^5}{2x^2}$

6 Simplify $\frac{x^3 \times x^5}{x^4}$

7 Write $\frac{1}{3x}$ as a single power of x

8 Write $\frac{4}{\sqrt{x}}$ as a single power of x

Factorising quadratics

1 Factorise

a $2x^2 + x - 3$

b $6x^2 + 17x + 5$

c $2x^2 + 7x + 3$

d $9x^2 - 15x + 4$

e $10x^2 + 21x + 9$

f $12x^2 - 38x + 20$

Completing the square

1 Write the following quadratic expressions in the form $(x + p)^2 + q$

a $x^2 + 4x + 3$

b $x^2 - 10x - 3$

c $x^2 - 8x$

d $x^2 + 6x$

e $x^2 - 2x + 7$

f $x^2 + 3x - 2$

2 Write the following quadratic expressions in the form $p(x + q)^2 + r$

a $2x^2 - 8x - 16$

b $4x^2 - 8x - 16$

c $3x^2 + 12x - 9$

d $2x^2 + 6x - 8$

Sketching quadratic graphs

1 Sketch each graph, labelling where the curve crosses the axes.

a $y = x^2 - x - 6$

b $y = x^2 - 5x + 4$

c $y = x^2 - 4$

Simultaneous equations

1 $3x + 4y = 7$
$x - 4y = 5$

2 $2x + y = 11$
$x - 3y = 9$

3 $3x = y - 1$
$2y - 2x = 3$

4 $y = 2x + 1$

$x^2 + y^2 = 10$

5 $y - x = 2$

$x^2 + xy = 3$