

# Chapter 1 – Algebraic expressions

## ? Example 1 – Simplifying expressions

Simplify these expressions:

a.  $x^2 \times x^5$    b.  $2r^2 \times 3r^3$    c.  $\frac{b^7}{b^4}$    d.  $6x^5 \div 3x^3$    e.  $(a^3)^2 \times 2a^2$    f.  $(3x^2)^3 \div x^4$

## ? Example 3 – Simplifying fractions

Solve the following equations:

a.  $\frac{x^7 + x^4}{x^4}$    b.  $\frac{3x^2 - 6x^5}{2x}$    c.  $\frac{20x^7 - 15x^3}{5x^2}$

## ? Example 4 – Expanding double brackets

Expand these expressions and simplify if possible:

a.  $(x + 5)(x + 2)$    b.  $(x - 2y)(x^2 + 1)$    c.  $(x - y)^2$    d.  $(x + y)(3x - 2y - 4)$

## ? Example 5 – Expanding Trinomials

Expand these expressions and simplify if possible:

a.  $x(2x + 3)(x - 7)$    b.  $x(5x - 3y)(2x - y + 4)$    c.  $(x - 4)(x + 3)(x + 1)$

## ? Example 7 – Factorising quadratics

Factorise:

a.  $x^2 - 5x - 6$    b.  $x^2 + 6x + 8$    c.  $6x^2 - 11x - 10$    d.  $x^2 - 25$    e.  $4x^2 - 9y^2$

## ? Example 9 – Simplifying indices

Simplify:

a.  $\frac{x^3}{x^{-3}}$    b.  $x^{\frac{1}{2}} \times x^{\frac{3}{2}}$    c.  $(x^3)^{\frac{2}{3}}$    d.  $2x^{1.5} \div 4x^{-0.25}$    e.  $\sqrt[3]{125x^6}$    f.  $\frac{2x^2 - x}{x^5}$

## ? Example 10 – Fractional indices

Evaluate:

a.  $9^{\frac{1}{2}}$    b.  $64^{\frac{1}{3}}$    c.  $49^{\frac{3}{2}}$    d.  $25^{-\frac{3}{2}}$

## ? Example 11 – Indices – problem solving

Given that  $y = \frac{1}{16}x^2$  express each of the following in the form  $kx^n$ , where  $k$  and  $n$  are constants.

a.  $y^{\frac{1}{2}}$    b.  $4y^{-1}$

## ? Example 12 – Simplifying surds

Simplify:

a.  $\sqrt{12}$    b.  $\frac{\sqrt{20}}{2}$    c.  $5\sqrt{6} - 2\sqrt{24} + \sqrt{294}$

## ? Example 13 – Expanding brackets and surds

Expand and simplify if possible:

a.  $\sqrt{2}(5 - \sqrt{3})$    b.  $(2 - \sqrt{3})(5 + \sqrt{3})$

## ? Example 14 – Rationalising the denominator

Rationalise the denominator of:

a.  $\frac{1}{\sqrt{3}}$    b.  $\frac{1}{3 + \sqrt{2}}$    c.  $\frac{\sqrt{5} + \sqrt{2}}{\sqrt{5} - \sqrt{2}}$    d.  $\frac{1}{(1 - \sqrt{3})^2}$

