

## A Level Induction Test

**You may NOT use a calculator**

- Expand and simplify  
(a)  $(2x + 3)(2x - 1)$  (2)      (b)  $(a + 3)^2$  (2)      (c)  $4x(3x - 2) - x(2x + 5)$  (2)
- Factorise  
(a)  $x^2 - 7x$  (2)      (b)  $y^2 - 64$  (2)      (c)  $2x^2 + 5x - 3$  (2)
- Simplify  
(a)  $\frac{4x^3y}{8x^2y^3}$  (2)      (b)  $\frac{3x+2}{3} + \frac{4x-1}{6}$  (2)
- Solve the following equations  
(a)  $\frac{h-1}{4} + \frac{3h}{5} = 4$  (3)      (b)  $x^2 - 8x = 0$  (3)      (c)  $p^2 + 4p = 12$  (3)
- Write each of the following as single powers of  $x$  and /  $y$   
(a)  $\frac{1}{x^4}$  (1)      (b)  $(x^2y)^3$  (1)
- Work out the values of the following, giving your answers as fractions  
(a)  $4^{-2}$  (1)      (b)  $\left(\frac{8}{27}\right)^{\frac{1}{3}}$  (2)
- Solve the following pairs of simultaneous equations  
(a)  $\begin{cases} 3x - 5y = -11 \\ 5x - 2y = 7 \end{cases}$  (3)      (b)  $\begin{cases} y = x^2 \\ y = 2x^2 + 7x + 12 \end{cases}$  (3)
- Rearrange the following equations to make  $x$  the subject  
(a)  $v^2 = u^2 + 2ax$  (2)      (b)  $V = \frac{1}{3}\pi x^2h$  (2)      (c)  $y = \frac{x+2}{x+1}$  (3)
- Solve  $5x^2 - x - 1 = 0$  giving your solutions in surd form (3)
- a) Expand and simplify  $(7 + \sqrt{5})(3 - \sqrt{5})$  (2)  
b) Express  $\frac{7 + \sqrt{5}}{3 + \sqrt{5}}$  in the form  $a + b\sqrt{5}$ , where  $a$  and  $b$  are integers. (2)