

**A Level Induction Test (Non-calculator)
Example Test**

	Topic		Marks			Dr Frost Code
1	Expand and simplify 2 brackets		6	+	NS	299
2	Factorise quadratics		8	+	NS	362 / 364
3	Simplify Algebraic Fractions		4	+	NS	387 / 389
4 (a)	Solve equations involving fractions		3	+	NS	258
(b)(c)	Solve quadratics		6	+	NS	265
5	Indices rules		3	+	NS	394
6	Negative, zero and fractional indices		4	+	NS	158 / 298
7	Solve simultaneous equations		3	+	NS	276
8	Change the subject of a formula		7	+	NS	201 / 260 / 391
9	Solve a quadratic with exact values		3	+	NS	417
10	Simplify surds		5	+	NS	392 / 335 / 337
11	Sketch a trigonometric graph		2	+	NS	434
12	Sketch the graph:					
(a)	Linear in the form $y = mx + c$		3	+	NS	269
(b)	Linear in the form $ax + by = q$		3	+	NS	273e
(c)	Quadratic		3	+	NS	368

You may NOT use a calculator

If $ax^2 + bx + c = 0$ then $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

1. Expand and simplify

(a) $(2x - 3)(2x - 1)$ **(2)** (b) $(x - 2)^2$ **(2)** (c) $4x(x+3) - 2x(5x - 1)$ **(2)**

2. Factorise

(a) $14x^2 + 21x$ **(2)** (b) $9y^2 - 49$ **(2)** (c) $x^2 + 5x - 36$ **(2)** (d) $6t^2 + t - 2$ **(2)**

3. Simplify

(a) $\frac{18x^6y}{24x^5y^2}$ **(2)** (b) $\frac{3x-1}{3} - \frac{2x+1}{4}$ **(2)**

4. Solve the following equations

(a) $\frac{h+2}{2} + \frac{h-2}{2} = 7$ **(3)** (b) $4x^2 - 9x = 0$ **(3)** (c) $p^2 + p = 12$ **(3)**

5. Write each of the following as single powers of x and / y

(a) $\frac{1}{2x^3}$ **(1)** (b) $(3x^4)^3$ **(1)** (c) $\frac{x^{-2}}{x^5}$ **(1)**

6. Work out the values of the following, giving your answers as fractions

(a) 2^{-5} **(1)** (b) $\left(\frac{2}{3}\right)^0$ **(1)** (c) $\left(\frac{64}{27}\right)^{-\frac{2}{3}}$ **(2)**

7. Solve the simultaneous equations

$$\begin{aligned} 6x + 4y &= 10 \\ 5x + 6y &= 11 \end{aligned} \quad \mathbf{(3)}$$

8. Rearrange the following equations to make x the subject

(a) $s = u^2 + xt$ **(2)** (b) $V = \frac{2}{3}\pi x^2$ **(2)** (c) $y = \frac{2x+1}{x-4}$ **(3)**

9. Solve $5x^2 + 10x + 2 = 0$ giving your solutions in surd form **(3)**

10. Simplify

(a) $\frac{\sqrt{15}}{\sqrt{3}}$ **(1)**

(b) $\sqrt{15} \times \sqrt{15} \times \sqrt{3}$ **(2)**

(c) $(\sqrt{5} + \sqrt{3})^2$ **(2)**

11. Sketch the graph of $y = \sin x$ for $0 \leq x \leq 360^\circ$. **(2)**

12. Sketch (do not plot) these graphs showing any points of intersection with the x and y axes.

(a) $y = 3x + 4$ **(3)**

(b) $2x + 3y = 12$ **(3)**

(c) $y = x^2 + 5x + 4$ **(3)**