A Level Induction Test

You may NOT use a calculator

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

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

2. Factorise
   (a) $x^2 - 7x$ **(2)** (b) $y^2 - 64$ **(2)** (c) $2x^2 + 5x - 3$ **(2)** (d) $6t^2 - 13t + 5$ **(2)**

3. Simplify
   (a) $\dfrac{4x^3y}{8x^2y^3}$ **(2)** (b) $\dfrac{3x+2}{3} + \dfrac{4x-1}{6}$ **(2)**

4. Solve the following equations
   (a) $\dfrac{h-1}{4} + \dfrac{3h}{5} = 4$ **(3)** (b) $x^2 - 8x = 0$ **(3)** (c) $p^2 + 4p = 12$ **(3)**

5. Write each of the following as single powers of x and / y
   (a) $\dfrac{1}{x^4}$ **(1)** (b) $(x^2y)^3$ **(1)** (c) $\dfrac{x^5}{x^{-2}}$ **(1)**

6. Work out the values of the following, giving your answers as fractions
   (a) 4^{-2} **(1)** (b) 10^0 **(1)** (c) $\left(\dfrac{8}{27}\right)^{\frac{1}{3}}$ **(2)**

7. Solve the simultaneous equations
   $3x - 5y = -11$
   $5x - 2y = 7$ **(3)**

8. Rearrange the following equations to make x the subject
   (a) $v^2 = u^2 + 2ax$ **(2)** (b) $V = \dfrac{1}{3}\pi x^2 h$ **(2)** (c) $y = \dfrac{x+2}{x+1}$ **(3)**

9. Solve $5x^2 - x - 1 = 0$ giving your solutions in surd form **(3)**