

*Subtopics: Index laws, expanding brackets, factorising, negative and fractional indices, surds, rationalising denominators*

1. **Expand** the brackets and **simplify** fully:

a)  $(11+x)(3-x)$                       b)  $(x+5)(x^2-8x+6)$                       c)  $(x-2)(x+3)(x-5)$                       [6]

2. **Factorise** fully:

a)  $36-9x-x^2$                       b)  $2y^2-y-21$                       c)  $2x^3-4x^2+2x$                       [6]

3. **Simplify** the following expressions:

a)  $\frac{7y^{11}}{35y^6}$                       b)  $5x^2 \div x^{-4}$                       c)  $(x^5)^{\frac{3}{5}}$                       [3]

4. **Simplify** as fully as possible:

a)  $\sqrt{75} + \sqrt{27}$                       b)  $\frac{\sqrt{60}}{\sqrt{3}}$                       c)  $\sqrt{2} \times 3\sqrt{8}$                       [7]

5. Write the following in the form  $x^n$ , where  $n$  is a constant:

a)  $\sqrt{x^4} \times \sqrt{x^7}$                       b)  $(\sqrt[3]{x})^5$                       c)  $(\sqrt{x})^{\frac{3}{2}}$                       [7]

6. Evaluate:

a)  $8^{\frac{1}{3}}$                       b)  $16^{\frac{3}{2}}$                       [3]

7. **Rationalise** the denominator of  $\frac{1}{-1+2\sqrt{2}}$                       [4]

8. **Simplify** as fully as possible:

a)  $7y^3 \times 4y^5 \times \frac{1}{2}y^2$                       b)  $(8x^6)^{-\frac{2}{3}}$                       c)  $\sqrt{45} - \sqrt{44} - \sqrt{20}$                       [8]

9. Factorise  $x^2 - 4y^2$  (*Hint:  $4y^2 = (2y)^2$* ).                      [2]

10. a) Expand and simplify  $(2 + \sqrt{5})(4 - \sqrt{5})$                       [2]

b) Hence write  $\frac{3}{(2 + \sqrt{5})(4 - \sqrt{5})}$  in the form  $a + b\sqrt{5}$  where  $a$  and  $b$  are **fractions**.                      [4]

11. Write the following in the form  $kx^n$ , where  $k$  and  $n$  are constants:

a)  $(9x^2)^{\frac{3}{2}}$                       b)  $\sqrt{x^7} \times \sqrt{25x^4}$                       [5]

12. Find the value of  $x$  such that  $27^x = 9$                       [3]

**TOTAL 60 MARKS**