

TY Hons Maths - Problem Set 1

1. Simplify the following

$$(i) \frac{x^2 + 2xy + y^2}{x^2 - y^2} \times \frac{3x - 3y}{4x + 4y} \quad (ii) \sqrt{\frac{x^3 + 6x^2 + 9x}{x}} \quad (iii) \frac{x^{-\frac{1}{2}} + x^{\frac{1}{2}}}{x^{-\frac{1}{2}} - x^{\frac{3}{2}}}$$

2. Simplify (i) $(a-b)^2 - (a+b)^2$ (ii) Hence simplify $(\sqrt{x} - \sqrt{y})^2 - (\sqrt{x} + \sqrt{y})^2$

3. Factorise fully each of the following

$$(i) 5x^2 + 18x - 8 \quad (ii) x^2y - y^3 + x^3 - xy^2 \quad (iii) a^2 - 2ab + b^2 + 4c^2 \quad (iv) x^2 + 3px - 4p^2$$

4. Use factorisation to solve the following equations:

$$(i) x^2 + 3x + 2 = 0 \quad (ii) 6x^2 - 5x - 4 = 0 \quad (iii) x^2 - 4x = 0$$

5. Use the formula to solve the following equations to 2 decimal places.

$$(i) x^2 + 7x + 9 = 0 \quad (ii) 4x^2 - x - 7 = 0$$

6. Show that $(a+b)^2 - 2ab = a^2 + b^2$

7. *Solve, without using a calculator, the following simultaneous equations

$$x + 2y + 4z = 7$$

$$x + 3y + 2z = 1$$

$$-y + 3z = 8$$

$$[x = 3, y = -2, z = 2]$$

8. Show using multiplication that $(x+y)(x^2 - xy + y^2) = x^3 + y^3$