ALGEBRA (Q 1 & 2, PAPER 1)

LESSON NO. 1: SOME BASICS

2006

1 (a) Find the real number a such that for all $x \neq 9$, $\dfrac{x-9}{\sqrt{x}-3} = \sqrt{x} + a$.

2005

1 (b) (i) Express $2^{\frac{1}{4}} + 2^{\frac{1}{4}} + 2^{\frac{1}{4}} + 2^{\frac{1}{4}}$ in the form $2^{\frac{p}{q}}$, where $p, q \in \mathbf{Z}$.

(ii) Let $f(x) = ax^3 + bx^2 + cx + d$. Show that $(x-t)$ is a factor of $f(x) - f(t)$.

2004

1 (a) Express $\dfrac{1-\sqrt{3}}{1+\sqrt{3}}$ in the form $a\sqrt{3} - b$, where a and $b \in \mathbf{N}$.

1 (b) (ii) Show that $\dfrac{3}{1+x^p} + \dfrac{3}{1+x^{-p}}$ simplifies to a constant.

1 (c) (i) Show that $p^3 + q^3 - (p+q)^3 = -3pq(p+q)$.

(ii) Hence, or otherwise, find, in terms of a and b, the three values of x for which $(a-x)^3 + (b-x)^3 - (a+b-2x)^3 = 0$.

2003

1 (a) Express the following as a single fraction in its simplest form: $\dfrac{6y}{x(x+4y)} - \dfrac{3}{2x}$.

2001

2 (b) (ii) Simplify $\left(x^2 + \sqrt{2} + \dfrac{1}{x^2}\right)\left(x^2 - \sqrt{2} + \dfrac{1}{x^2}\right)$ and express your answer in the form $x^n + \dfrac{1}{x^n}$ where n is a whole number.

ANSWERS

2006 1 (a) $a = 3$

2005 1 (b) (i) $2^{\frac{9}{4}}$

2004 1 (a) $\sqrt{3}-2$ 1 (b) (ii) 3 (c) (ii) a, b, $\frac{1}{2}(a+b)$

2003 1 (a) $-\dfrac{3}{2(x+4y)}$

2001 2 (b) (ii) $x^4+\dfrac{1}{x^4}$