ACHIEVEMENT QUESTIONS ON A TYPICAL NCEA PAPER. (A)

ALGEBRA

Question ONE

(a) Simplify $(a^4)^3(5a)^2$	(b) Simplify $(27b^6)^{-\frac{1}{3}}$
$= a^{12} \times 25a^2$ $= 25a^{14}$	$= \left(\frac{1}{27b^6}\right)^{\frac{1}{3}} = \frac{1}{3b^2}$

Question TWO

(a) Factorise $4x^2 + 4x - 15$	(b) Solve $4x^2 + 4x - 15 = 0$
$(2x - 3)(2x + 5)$	$(2x-3)(2x+5) = 0$ So $x = \frac{3}{2}$ and $-\frac{5}{2}$

Question THREE

(a) Solve for x: $\log x = 3 \log 4$	(b) Solve for x: $\log_4 x = 2$
$\log x = \log 4^3$ $x = 4^3 = 64$	$4^2 = x$ $x = 16$

CALCULUS

Question ONE

(a) If $f(x) = 3x^2 + 4x - 5$ find the gradient when $x = 2$	(b) The gradient function $f'(x) = 3 - 4x = y'$ The graph passes through $(2, 7)$, find the equation for $f(x)$
grad $f' = 6x + 4$ Sub $x = 2$ $f' = 12 + 4 = 16$	$y = 3x - 2x^2 + c$ $7 = 6 - 8 + c$ $9 = c$ $y = f(x) = 3x - 2x^2 + 9$

Question TWO

(a) Find the x coordinate of the point on the graph $y = x^2 - 3x + 7$ where the gradient is equal to 8	(b) Find the x coordinate of the points on the graph $y = \frac{x^3}{3} - x^2 - 15$ where the gradient is equal to 0
grad $y' = 2x - 3 = 8$ $2x = 11$ $x = \frac{11}{2}$	grad $y' = x^2 - 2x = 0$ $x(x - 2) = 0$ $x = 0$ and 2

Question THREE

(a) The curve $y = f(x)$ goes through $(0, 0)$ and $f'(x) = 3x^2 - 2x$. Find the y value if $x = 4$	(b) The temperature T in an experiment at t seconds is $T = 4t^2 + 2t$. Find the rate of increase of the temperature at $t = 5$ seconds.
$y = f(x) = x^3 - x^2 + c$ Sub $(0,0)$ $c = 0$ $y = x^3 - x^2$ Sub $x = 4$ $y = 64 - 16 = 48$	Rate $= \frac{dT}{dt} = 8t + 2$ Sub $t = 5$, Rate $= 42$