Name: _____ 5-a-day Further Maths

17th September

Corbettmaths

The first 5 terms of a quadratic sequence are

27 30 29 24 15

Find an expression for the nth term

$t(n) = -2n^2 + 9n + 20$

$t(n) = an^2 + bn + c$

27 30 29 24 15

3 −1 −5 −9

−4 −4 −4

$a+b+c = 27 \quad c = 20$

$3a+b = 3 \quad b = 9$

$2a = -4 \Rightarrow a = -2$

Prove that when two consecutive integers are squared, that the difference is equal to the sum of the two consecutive integers.

$n, n+1 \quad (n \geq 0)$

$(n+1)^2 - n^2 = n^2 + 2n + 1 - n^2$

$= 2n + 1$

$= n + (n+1)$

Use factor theorem to show $(x+3)$ is a factor of $x^3 - x^2 - 44x - 96 = f(x)$

$f(-3) = -27 - 9 + 132 - 96 = 0$

$\Rightarrow x+3$ factor.

Solve $x^3 - x^2 - 44x - 96 = 0$

$(x+3)(x^2 - 4x - 32) = 0$

$(x+3)(x+4)(x-8) = 0$

$x = -3, -4, 8$

$y = 4x^3 - 5x^2 + 8x - 1$

Work out the value of $\frac{d^2y}{dx^2}$ when $x = 2$

$\frac{dy}{dx} = 12x^2 - 10x + 8$

$\frac{d^2y}{dx^2} = 24x - 10$

$x = 2 \Rightarrow \frac{d^2y}{dx^2} = 38.$