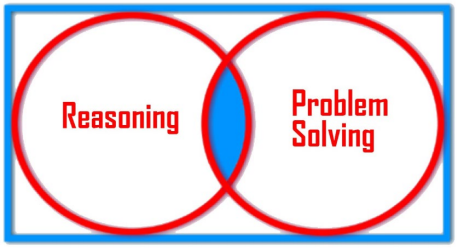
Year 1 – AS

Differentiation (AS)
(Sample Questions)

The Marks shown are for guidance purposes only



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Round all decimals to 3 significant figures where applicable

<u>Differentiation from First Principles:</u>

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

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1	Evaluate $\lim_{x \to 7} \frac{x^2-49}{2x^2-11x-21}$ **[4Marks]**

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2	Two functions are defined on a set of real numbers as $g(x) = ax + 7$ and $h(x) = 5x - a$ where a is a constant a) Given that $f'[gh(x)] = 25$, find the value of a **[3Marks]** b) Hence, evaluate $hg(-2)$ **[2Marks]**

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3	You are given the following information about the equation of a certain curve, $\frac{d^2y}{dx^2} = -12$, $\left.\frac{dy}{dx}\right\|_{x=-2} = 27$ and the coordinate $(-1, 15)$ lies on the graph of the curve. a) Find the equation of the curve **[6Marks]** b) Hence, find y when $x = \frac{1}{3}$ **[1Mark]**

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4	The function $f(x) = 1 - Ax - x^2 + x^3$ has a tangent at the point $(-1, 1)$. The tangent passes through the point $(-3, -5)$ a) Find the value of A **[4Marks]** b) Hence, find the equation of a normal to $f(x)$ at $(2, 1)$ **[3Marks]**

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5	A function is given as $f(x) = x^3 + ax^2 + bx + c$ When f(x) is divided by $(x - 2)$ and $(x + 1)$ remainders of 8 and 9 are obtained respectively. Given that $f'(-2) = 39$, calculate the values of a, b and c **[6Marks]**

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