A Level Maths Day 1 – C3

Simplify $\frac{4x+8y}{2x+4y}$

A Level Maths Day 2 – C3

Find $f(3)$ and $f^{-1}(x)$ when $f(x) = 5x + 4$

A Level Maths Day 3 – C4

For the vectors $\boldsymbol{a} = \begin{pmatrix} \mathbf{2} \\ \mathbf{3} \\ \mathbf{1} \end{pmatrix}$ and $\boldsymbol{b} = \begin{pmatrix} \mathbf{4} \\ \mathbf{2} \\ \mathbf{1} \end{pmatrix}$ find the angle between $\boldsymbol{a}$ and $\boldsymbol{b}$**.** Give your answer exactly in it's simplest form.

A Level Maths Day 4 – C4

Find the following integral $\int \frac{2x+4}{x^2+4x+5}$

A Level Maths Day 5 – C3

Prove the following trigonometric identity $\sin(2x) = 2\sin(x)\cos(x)$

A Level Maths Day 6 – C3

Differentiate $y = 3x^2e^x$

A Level Maths Day 7 – C3

Show that for the equation $x^2 + 2x - 5 = 0$ a possible iterative formula can be given by

$$x_{n+1} = \frac{-x^2 + 5}{2}$$

Compute the first 6 iterations of this formula. What can you say about its suitability as an iterative formula to find a solution of the equation $x^2 + 2x - 5 = 0$.

A Level Maths Day 8 – C3

Sketch the graph of $y = |3x + 2|$.

A Level Maths Day 9 – C4

Find the Cartesian equation of the curve which is given by the parametric equations

$$x = t - 2$$
$$y = 3t^2 + 1$$

A Level Maths Day 10 – C3

Show that the equation $x^3 + 6x^2 - 4x - 6 = 0$ has roots in the intervals $[-7, -6]$, $[-1,0]$ and $[1,2]$.

A Level Maths Day 11 – C3

Find the derivative of $y = a^x$.

A Level Maths Day 12 – C3

Find $\frac{dy}{dx}$ for $x = 4\cos(2y)$.

A Level Maths Day 13 – C3

Solve $|4x - 3| = x$.

A Level Maths Day 14 – C4

Estimate the value of the integral of $y = 3^x$ between $x = 0$ and $x = 4$ using the Trapezium rule with 4 strips.

A Level Maths Day 15 – C4

Find the magnitude of $\boldsymbol{a} = 2\boldsymbol{i} + 3\boldsymbol{j} + 5\boldsymbol{k}$.

A Level Maths Day 16 – C4

Find

$$\int \frac{2}{(2x-1)^4}\, dx$$

A Level Maths Day 17 – C4

Express the following in partial fractions

$$\frac{2x^2 + x + 4}{2x^3 + 6x^2 + x + 3}$$

A Level Maths Day 18 – C3

Sketch the graphs of $y = e^x$ and $y = \ln(x)$. What do you notice?

A Level Maths Day 19 – C3

Differentiate $y = \frac{e^x}{x^2+1}$ by the quotient rule.

A Level Maths Day 20 – C4

Find the volume of revolution between $x = 1$ and $x = 3$ when $y = x^2$ is rotated about the x-axis.

A Level Maths Day 21 – C4

Find

$$\int \sin^3 x \ dx$$