AQA A-Level Mathematics Warmup - Paper 1 2023

Sketch $y = \lvert x^2 + x - 12 \rvert$	Find the sum of the first 10 terms of the arithmetic series with first term 23 and common difference 6	$(x - 1)$ is a factor of $p(x) = x^3 + bx^2 + 2x - 8$. Find b and then fully factorise $p(x)$.	Show that $y = x^2 + 6x + 13$ is greater than zero for all x	Find $\int \sin^3(x)\ \mathrm{d}x$
Rationalise the denominator for $\dfrac{3}{4 + \sqrt{7}}$	Simplify $2\log_2(x^2) + \log_2(x + 3) - \log_2(x^3)$	Differentiate $y = \cos(x)$ from first principles.	Find the radius and centre of the circle $x^2 - 6x + y^2 + 8y = 0$	Find the values of k for which the quadratic $x^2 + (k + 1)x + 3k$ has a repeated root.
Sketch on the same axes: $y = \cos(x)$ $y = 2\cos(x)$ $y = \cos\left(2x - \dfrac{\pi}{2}\right)$	Find the normal to the curve $y = \tan(x)$ at $x = \dfrac{\pi}{3}$	What are the three Pythagorean trigonometric identities?	Find $\dfrac{\mathrm{d}y}{\mathrm{d}x}$ for $y = 2x^2 \sin(3x)$	Find the Cartesian form of the curve with parametric equations $x = 2 + 3\sin(\theta)$ and $y = -4 + 3\cos(\theta)$
Express $5\sin(x) - 5\sqrt{3}\cos(x)$ in the form $R\sin(x - \alpha)$	Solve the simultaneous equations $y = x^2 + 3x - 10$ and $y = -x + 2$	Find $\int 3x\sqrt{2x + 3}\ \mathrm{d}x$	Find an expression for the Newton-Raphson formula to find a root of the equation $\sin(x)\ln(x) = 0$	How many solutions has the equation $\cos(3\theta) = \dfrac{1}{2}$ got in the range $0° \leq \theta \leq 360°$

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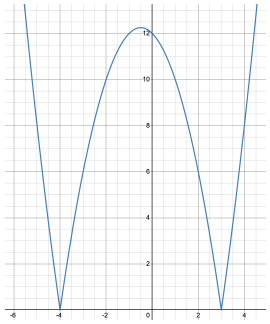
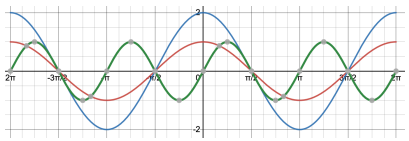
	$S_{10} = \frac{10}{2}\left[2 \times 23 + 9 \times 6\right]$ $= 500$	$b = 5$ $p(x) = (x-1)(x+2)(x+4)$	$x^2 + 6x + 13 = (x+3)^2 + 4$ $> 0 \quad \forall x$	$\frac{1}{12}\left(\cos(3x) - 9\cos(x)\right)$
$\frac{4-\sqrt{7}}{3}$	$\log_2\left(\frac{x^4(x+3)}{x^3}\right) = \log_2(x(x+3))$	$f'(x) = \lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ $= lim_{h\to 0}\frac{cos(x+h)-cos(x)}{h}$ $= \lim_{h\to 0}\frac{\cos(x)\cos(h) - sin(x)\sin(h) - cos(x)}{h}$ $= \lim_{h\to 0}\cos(x)\left(1\frac{h^2}{2}\right) - sin(x)h - cos(x)$ $= \lim_{h\to 0}\frac{h}{2}\cos(x) - \sin(x)$ $= -\sin(x)$	Centre: $(3, -4)$ Radius: 5	$5 - 2\sqrt{6}$ and $5 + 2\sqrt{6}$
	$y = -\frac{x}{4} + \frac{\pi}{12} + \sqrt{3}$	$\sin^2(x) + \cos^2(x) = 1$ $\sec^2(x) = 1 + \tan^2(x)$ $\text{cosec}^2(x) = 1 + \cot^2(x)$	$\frac{dy}{dx} = 2\left(3x^2\cos(x) + 2x\sin(3x)\right)$	$(x-2)^2 + (y+4)^2 = 9$
$10\sin\left(x - \frac{\pi}{3}\right)$	$(-6,8)$ and $(2,0)$	Integrate by substitution with $u = 2x + 3$ to get $\frac{3}{5}(x-1)(2x+3)^{\frac{3}{2}} + C$	$x_{n+1} = x_n - \frac{\sin(x_n)\ln(x_n)}{\frac{\sin(x_n)}{x_n} + \ln(x_n)\cos(x_n)}$	6 solutions.