AQA A-Level Mathematics Warmup - Paper 1 2019

What does the discriminant tell you about the roots of the quadratic equation $ax^2 + bx + c$?	Express in Cartesian form the curve given parametrically by $x = t - 1$ and $y = t^2 + 2$	Differentiate $y = \tan(3x^2 + 5x)$	Find the centre and radius of the circle $x^2 - 4x + y^2 + 6y + 4 = 0$	State the integration by parts formula.
A ball is projected upwards at a speed of 5 ms^{-1} at an angle of $25°$. Find the vertical and horizontal components of the velocity.	Find the turning point of $y = 5x^2 + 4x - 6$.	Sketch $f(x) = \|2x - 3\|$	Show, using the trigonometric addition formulae $\cos(15°) = \dfrac{1+\sqrt{3}}{2\sqrt{2}}$	$(x - 3)$ is a factor of $x^3 + ax^2 - 10x - 24$. Find the value of a.
Find $\int \ln(x)\ \mathrm{d}x$	What definition is used in differentiation from first principles?	Find $\dfrac{\mathrm{d}y}{\mathrm{d}x}$ for $3x^2y + y^2 = 5x^2 + 8x$.	Sove $3^{5x} = 4$	When is the expansion $(a + bx)^n$ where n is a fraction or a negative integer valid?
Find the inverse function of $y = 4x^2 + 3$ for $x > 0$ 4	Find, by substitution $\int \dfrac{\sec^2(x)}{\sqrt{\tan(x)}}\ \mathrm{d}x$	How do you determine a point of inflection for $f(x)$?	Find the area enclosed between the curve $y = x^3 - 3x^2 - 10x + 24$ and the $x-$axis.	For the arithmetic sequence $-2,3,8,13,\ldots$ find the sum of the first 20 terms.
Find the general solution of $\dfrac{\mathrm{d}y}{\mathrm{d}x} = xy$	Differentiate $y = x^2$ from first principles.	Expand $(1 + 3x)^{\frac{1}{2}}$	Let $f(x) = \sin(2x + 3)$ and $g(x) = x^2 + 2$. Find $fg(x)$.	State the three main logarithm laws.

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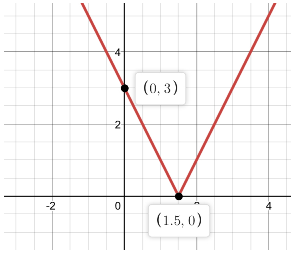
$b^2-4ac>0$, two real distinct roots. $b^2-4ac=0$, real repeated root. $b^2-4ac<0$, no real roots (two complex roots in conjugate pairs)	$y=(x+1)^2+2$ $=x^2+2x+3$	$\frac{\mathrm{d}y}{\mathrm{d}x}=(6x+5)\sec^2(3x^2+5x)$	By completing the square the centre is $(2,-3)$ and the radius is 3.	$\int u\,\mathrm{d}v=uv-\int v\,\mathrm{d}u$
Vertical: $5\sin(25)$ Horizontal: $5\cos(25)$	$\left(-\frac{2}{5},-\frac{34}{5}\right)$		$\cos(15^\circ)=\cos(60^\circ-45^\circ)$	$a=3$
$x\ln(x)-x$	$f'(x)=\lim_{x\to0}\frac{f(x+h)-f(x)}{h}$	$\frac{\mathrm{d}y}{\mathrm{d}x}=\frac{-6xy+10x+8}{3x^2+2y}$	$x=\frac{\ln(4)}{\ln(3^5)}$	Valid for $\left\|\frac{bx}{a}\right\|<1$ or equivalently $\|x\|<\left\|\frac{a}{b}\right\|$
$x=4y^2+3$ $\Rightarrow\quad x-3=4y^2$ $\Rightarrow\quad\sqrt{\frac{x-3}{4}}=y$ so $f^{-1}(x)=\sqrt{\frac{x-3}{4}}$	$2\sqrt{\tan(x)}+C$	For x to be a point of inflection, $f''(x)=0$. If in addition $f'(x)=0$ the point is a "stationary point of inflection", if not then it is a "non-stationary point of inflection".	101.75	910
$y=Ae^{\frac{x^2}{2}}+C$	$f'(x)=\lim_{h\to0}\frac{(x+h)^2-x^2}{h}$ $=\lim_{h\to0}\frac{x^2+2xh+h^2-x^2}{h}$ $=\lim_{h\to0}2x+h$ $=2x$	$1+\frac{3}{2}x-\frac{9}{8}x^2+\frac{27}{16}x^3$	$fg(x)=\sin(2x^2+7)$	$\log_a(mn)=\log_a(m)+\log_a(n)$ $\log_a\left(\frac{m}{n}\right)=\log_a(m)-\log_a(n)$ $\log_a(m^n)=n\log_a(m)$