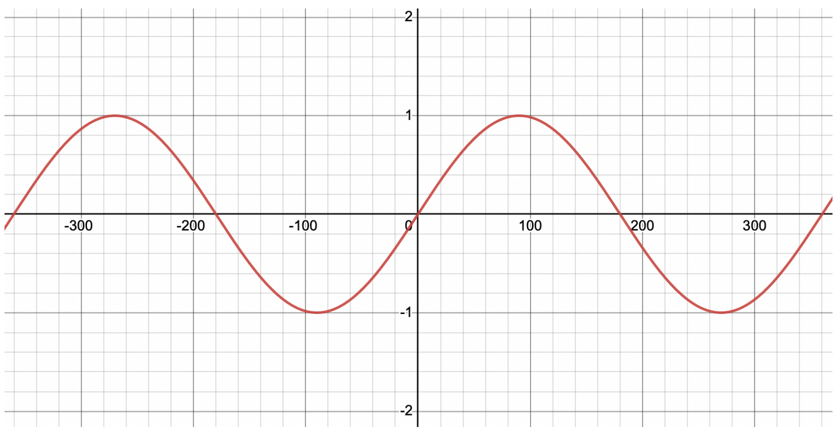
AQA AS-Level Mathematics Warmup - Paper 1 2022

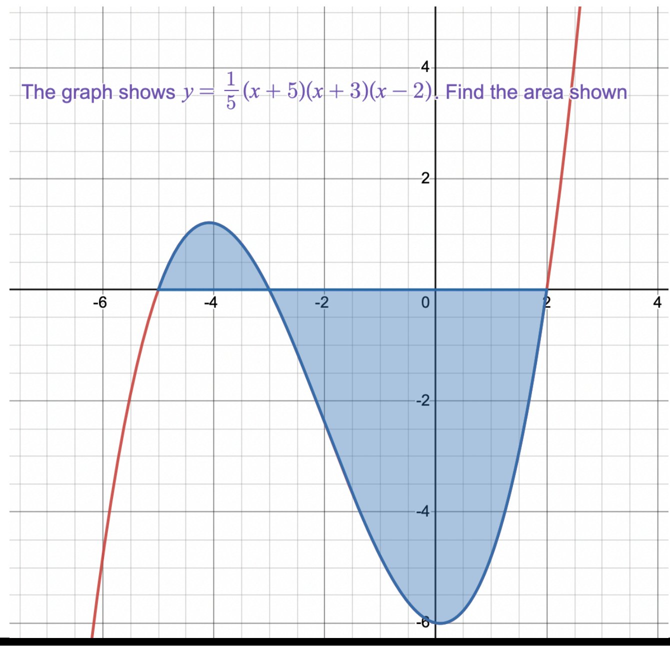
Find the centre and radius of the circle $x^2 + 6x + y^2 - 10y - 2 = 0$	What are the two main trigonometric identities?	Find $\frac{dy}{dx}$ for $y = \sqrt{x}\left(x^2 + 3x\right)$	Given that $v(t) = 2t(t+1)$, and $x(0) = 4$ find the displacement $x(t)$ and the acceleration $a(t)$.	Expand $(3 + 2x)^4$
Simplify $3\log_{10}\left(x^3y^2\right) - 2\log_{10}(xyz) + \log_{10}(z^4)$	Show that $(x - 5)$ is a factor of $p(x) = x^3 + x^2 - 22x - 40$	What impact does modelling a pulley as being smooth have?	Find the stationary points of the curve $y = 2x^3 - 3x^2 - 12x + 4$	What quantities can you find from a velocity-time graph?

The graph shows $y = \sin(x)$. Sketch $y = \sin(2x)$, $y = \sin(x) + 1$ and $y = \sin(x - 45°)$.



Find the equation of the tangent and normal to $y = (2x + 1)^2(x + 3)$ at $x = -1$

What are the small angle approximations?



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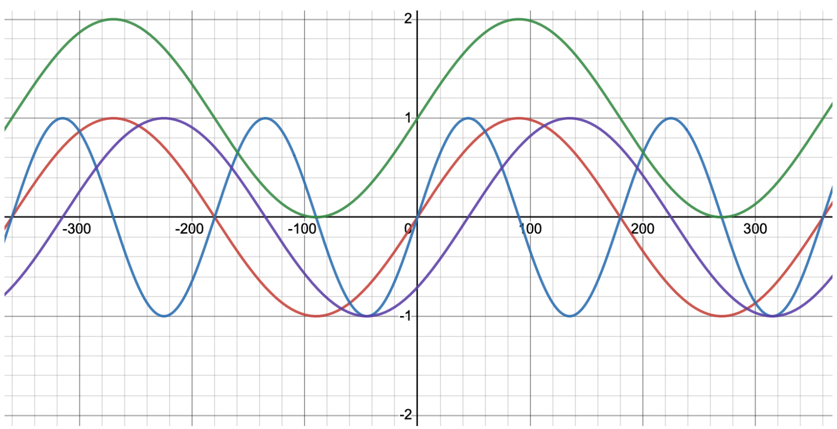
Radius = 6 Centre = $(-3,5)$	$\tan(\theta) = \dfrac{\sin(\theta)}{\cos(\theta)}$ $\sin^2(\theta) + \cos^2(\theta) = 1$	$\dfrac{\mathrm{d}y}{\mathrm{d}x} = \dfrac{1}{2}\sqrt{x}\,(5x+9)$	$x(t) = 2\left(\dfrac{t^3}{3} + \dfrac{t^2}{2}\right) + 4$ $a(t) = 4t + 2$	$81 + 216x + 216x^2 + 96x^3 + 16x^4$
$\log_{10}\left(x^7y^4z^2\right)$	$p(5) = 0$ so by the factor theorem$(x-5)$ is a factor of $p(x)$. $p(x) = (x-5)(x+2)(x+4)$	The tension in the string either side of the pulley will be the same.	$(-1,11)$ is a local maximum. $(-16,2)$ is a local minimum.	Displacement is the area undertake curve. The gradient is the acceleration.



tangent: $y = -7x - 5$

normal: $-x + 7y = 15$

$\sin(\theta) = \theta$

$\cos(\theta) = 1 - \dfrac{\theta^2}{2}$

$\tan(\theta) = \theta$

$\dfrac{407}{20}$