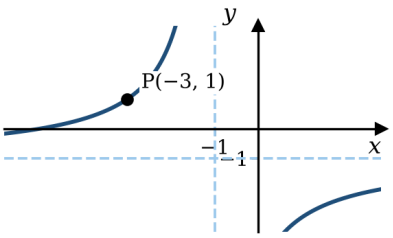
Day 205	A Level Maths: S Tier 10-a-day
1 Solve $\tan(2\theta + 20°) = -1$ for $0° \leq \theta \leq 360°$.	
2 A car of mass 1000 kg tows a trailer of mass 600 kg along a horizontal road, with driving force 1360 N. Resistances are 400 N on the car and 480 N on the trailer. (a) Find the tension in the tow bar. At 6.4 m s^{-1} the tow bar breaks. (b) Find the distance between car and trailer when the trailer stops.	
3 Describe a sequence of two transformations that maps the curve $y = x^2$ onto the curve $y = 4x^2 - 16x + 21$.	
4 A chord AB of a circle, centre O and radius 8 cm, subtends an angle of $\frac{\pi}{3}$ at O. Find the exact area and the exact perimeter of the minor segment cut off by AB.	
5 For 20 observations x, $\Sigma(x - 30) = 40$ and $\Sigma(x - 30)^2 = 380$. (a) Find the mean of x. (b) Find the standard deviation of x. (c) Find the value of Σx^2.	

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6 A particle P moves with constant acceleration. At t = 0 seconds P is at $(-5\mathbf{i} + \mathbf{j})$ m with velocity $(14\mathbf{i} + 11\mathbf{j})$ m s^{-1}. At t = 8, P has velocity $(-18\mathbf{i} - 13\mathbf{j})$ m s^{-1}.
Find (a) the acceleration of P, (b) the time at which P moves parallel to $(\mathbf{i} + \mathbf{j})$, (c) the position vector of P at that time.

7 The curve $y = 2x^3\sqrt{7 - x}$, for $0 < x < 7$, has one stationary point. Find its exact coordinates and determine its nature.

8 The diagram shows the curve C, its asymptotes (dashed) and a point P. C has equation $y = \frac{a}{x + p} + q$. Find a, p and q.



9 For 10 pairs of values, $S_{xx} = 324$, $S_{yy} = 169$ and $S_{xy} = 179$.
(a) Calculate the product moment correlation coefficient r.
(b) The critical value for a two-tailed test at the 5% level with n = 10 is 0.6319. Carry out the test of H_0: $\rho = 0$ against H_1: $\rho \neq 0$.

10 Solve simultaneously, giving integer x and y:
$8^x \times 16^y = 128$
$27^x \div 9^y = 3$