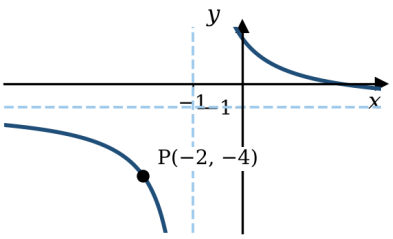
Day 235	A Level Maths: S Tier 10-a-day
1 Solve $\cos 2\theta - 5\cos\theta + 3 = 0$ for $0 \leq \theta < 360°$.	
2 A lift of mass M kg, carrying a passenger of mass 80 kg, hangs from a vertical cable. The tension in the cable is 5280 N and the floor exerts a force of 880 N on the passenger. Find (a) the acceleration of the lift, with its direction, (b) the value of M. Take g = 9.8 m s^{-2}.	
3 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. 	
4 A cone with its vertex downwards and semi-vertical angle α, where $\tan\alpha = \frac{1}{2}$, is filled at 15π cm^3s^{-1}. Find the rate at which the depth h is rising when h = 5 cm. ($V = \frac{1}{3}\pi r^2 h$)	
5 Find the set of values of x for which both $x^2 + 6x + 5 < 0$ and $-x + 3 \leq 7$.	

Day 235	A Level Maths: S Tier 10-a-day
6 $X \sim B(30, \frac{1}{3})$. (a) Show that $P(X = r + 1) \div P(X = r) = \frac{30 - r}{r + 1} \times \frac{1}{2}$. (b) Find the most likely value of X and its probability (3 s.f.).	
7 Solve $x - 9\sqrt{x} + 18 = 0$.	
8 Data satisfy $y = ax^n$. The line of best fit for lg y against lg x is lg y = 0.65 + 2 lg x. (a) Find a and n, giving a to 3 significant figures. (b) Estimate y when x = 20, to 3 significant figures.	
9 Two boats P and Q move so that, t hours after noon, their position vectors in km are $r_P = \begin{pmatrix}1\\5\end{pmatrix} + t\begin{pmatrix}-2\\1\end{pmatrix}$ and $r_Q = \begin{pmatrix}6\\10\end{pmatrix} + t\begin{pmatrix}-3\\-2\end{pmatrix}$. Find the time at which they are closest and the exact minimum distance between them.	
10 A non-uniform rod AB of length 5 m and mass 5 kg rests on supports at C and D, where AC = 2 m and AD = 4 m, with R_C = 3 R_D. Find (a) the distance of the centre of mass from A. A particle of mass m kg at B puts the rod on the point of tilting about D. (b) Find m.	