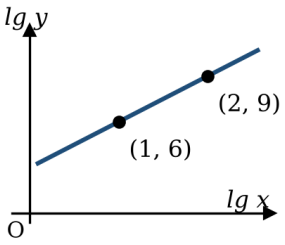
Day 62	A Level Maths: A Tier 10-a-day
1 A cyclist passes P with speed 7 m s^{-1} and accelerates uniformly. She travels 80 m in the next 10 s, reaching Q. Find (a) her acceleration, (b) her speed at Q, (c) her speed at the midpoint of PQ. Give answers to 3 s.f. if not exact.	
2 A curve has parametric equations $x = 2 + 3\cos\theta$, $y = 1 + 3\sin\theta$. Find its Cartesian equation and describe the curve.	
3 Flaws occur in a metre of cable at a mean rate of 3 per metre, as a Poisson process. Find the probability that in one such period there are (a) exactly 5 (b) at least 5 (c) fewer than 5 (3 s.f.).	
4 Show that $\frac{1}{\sqrt{5}-1} + \frac{5}{\sqrt{5}+1}$ can be written as $p + q\sqrt{5}$, and find p and q.	
5 By writing 165° as 120° + 45°, find the exact value of cos 165°, in the form $\frac{\sqrt{a} \pm \sqrt{b}}{c}$.	

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6 Express $\frac{x^2 + 5x - 10}{(x - 1)(x - 2)}$ in the form $1 + \frac{A}{(x - 1)} + \frac{B}{(x - 2)}$, where A and B are constants to be found.

7 A ball is projected horizontally at 12 m s^{-1} from a point 44.1 m above horizontal ground. Find
(a) the horizontal distance to the landing point,
(b) the speed and direction (angle below the horizontal, 1 d.p.) on landing. Take g = 9.8.
Give answers to 3 s.f. if not exact.

8 The diagram shows the graph of lg y against lg x for $y = A x^n$.
Find the value of n and the value of A.



9 A circular ripple has area A cm^2 increasing at a constant 8 $cm^2 s^{-1}$.
Find the rate at which the circumference is increasing when the radius is 10 cm.

10 The masses in grams of two groups: factory A has n = 10, mean 26, sd 4;
factory B has n = 10, mean 40, sd 2.
Find the mean and standard deviation of all 20 values (3 s.f. for the sd).