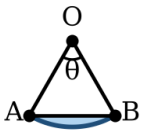
Day 90	A Level Maths: A Tier 10-a-day
1 A driver at constant speed sees a hazard 84 m ahead. After a reaction time of 0.5 s she brakes with deceleration 4 m s^{-2} and stops exactly at the hazard. Find (a) her initial speed, (b) the total time from seeing the hazard to stopping.	
2 A curve has parametric equations $x = 2t^2 - 1$, $y = t(t^2 - 16)$. Find the coordinates of the points where the curve meets the x-axis.	
3 A non-uniform rod AB (length 2 m, mass 10 kg) has its centre of mass at G, AG = 0.25 m. It hangs horizontally from vertical strings at A and B. A particle of mass m kg is fixed at P, AP = 1.5 m, making the tensions equal. Find (a) m, (b) the tension. Take g = 9.8.	
4 Given that $(x - 4)$ is a factor of $f(x) = x^3 - 4x^2 - 4x + 16$, solve $f(x) > 0$.	
5 The random variable X has $P(X = x) = k(7 - x)$ for $x = 1, 2, 3, 4$. (a) Show that $k = \frac{1}{18}$. (b) Find E(X) and Var(X). (c) Find $P(X \geq 3)$.	

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6 Solve $2^{2x} - 182^{x} + 56 = 0$.
Give exact roots, or 3 s.f. where the answer is not exact.

7 Solve $|x - 6| < |3x - 8|$.

8 The circle has centre O and radius 10 cm.
Angle AOB = $\frac{\pi}{3}$.
Find the exact area of the shaded segment.



9 The mean mass of a sack (kg) is normally distributed with standard deviation 10; it was previously 33.
A random sample of 9 has mean 41.4.
Test, at the 5% level, whether the mean has changed.

10 Use integration by parts to find the exact value of

$\int_0^1 xe^{2x}\,dx$.