Day 222	A Level Maths: B Tier 10-a-day
1 The radius of a circular oil slick increases at 0.2 cm per second. Find the rate at which its area is increasing when r = 12 cm, in terms of π.	
2 A curve has parametric equations $x = 5t$, $y = \frac{3}{t}$, $t \neq 0$. Find a Cartesian equation of the curve.	
3 A particle moves in a straight line. At time t seconds its velocity is $v = 4t^2 + 6t + 2$ m s^{-1}. Find the distance moved between t = 2 and t = 5. (The particle does not change direction.)	
4 Given that $15\cos\theta + 8\sin\theta \equiv 17\cos(\theta - 28.1°)$, solve $15\cos\theta + 8\sin\theta = -4$ for $0 \leq \theta \leq 360°$. (1 d.p.)	
5 (a) Expand $(1 + 5x)^{\frac{1}{2}}$ up to the x^2 term. (b) Use x = 0.03 to estimate $\sqrt{1.15}$ to 5 decimal places.	

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6 A crate of mass 10 kg is dragged at constant speed along rough horizontal ground by a rope inclined at angle α above the horizontal, where $\cos\alpha = \frac{12}{13}$. The coefficient of friction is 0.2. Take g = 9.8 m s^{-2}. Find the tension in the rope.	
7 Prove, by exhaustion, that a square number cannot be written in the form 8k + 3, where k is an integer.	
8 For 12 pairs of values, $\bar{x} = 8$, $\bar{y} = 40$, $S_{xx} = 100$ and $S_{xy} = 50$. (a) Find the regression line of y on x in the form y = a + bx. (b) Estimate y when x = 10.	
9 $f(x) = x^3 + 3x - 3$. Use the Newton-Raphson method with $x_0 = 1$ to find x_1 and x_2, to 4 d.p.	
10 A fair die is rolled 12 times and the number of sixes is X. This is done 2000 times. Estimate the number of times that X = 5.	