Day 143	A Level Maths: A Tier 10-a-day
1 30 values have $\Sigma x = 630$ and $\Sigma x^2 = 14310$. One value was recorded as 6 but should have been 22. Find the correct mean and standard deviation (3 s.f.).	
2 A sector of a circle has area 2.7 cm^2 and angle 0.6 radians. Find the radius, the arc length and the perimeter of the sector.	
3 A crate of mass 20 kg is pushed at constant speed along rough horizontal ground, $\mu = 0.2$, by a force of P N at angle θ below the horizontal, $\tan\theta = \frac{12}{5}$. Find P and the normal reaction. Take g = 9.8. Give answers to 3 s.f. if not exact.	
4 A is acute and B is obtuse, with $\sin A = \frac{15}{17}$ and $\cos B = -\frac{5}{13}$. Find the exact values of $\tan(A+B)$ and $\sin(A-B)$.	
5 n = 10 pairs of (x, y): $\Sigma x = 151$, $\Sigma y = 248$, $\Sigma x^2 = 2841$, $\Sigma xy = 4318$. (a) Find the equation of the regression line of y on x (3 s.f.). (b) Estimate y when x = 19.	

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6 Find the coefficient of x^8 in the expansion of $(x^3 - \frac{2}{x^2})^6$.	
7 A 1500 kg car tows a 500 kg trailer by a light tow-bar on a horizontal road. Driving force 1800 N; resistances 400 N (car), 200 N (trailer). Find (a) the acceleration and the tow-bar tension. At 8 m s^{-1} the tow-bar breaks. (b) How far does the trailer then travel?	
8 $u_1 = 40$ and $u_{n+1} = \frac{1}{4} u_n + 15$. (a) Find the limit L of the sequence as $n \to \infty$. (b) Find the least n for which $\lvert u_n - L \rvert < 0.01$.	
9 Express $\frac{-2x^2 + x - 9}{(x + 1)(x - 1)^2}$ in the form $\frac{A}{(x + 1)} + \frac{B}{(x - 1)} + \frac{C}{(x - 1)^2}$, and find A, B and C.	
10 θ is obtuse and $\sin \theta = \frac{20}{29}$. Find the exact values of $\sin 2\theta$, $\cos 2\theta$ and $\tan 2\theta$.	