Day 301	A Level Maths: A Tier 10-a-day
1 Find the quotient and the remainder when $2x^4 + x^3 + 6x^2 + 5$ is divided by $(x^2 + 1)$.	
2 For a sample of 9 pairs of values of age of a car and its price, $r = -0.732$. The critical value for a one-tailed test at the 5% level is 0.5822. Test, at this level, whether there is negative correlation between the two variables.	
3 The equation $2x^2 + (2k - 4)x + (2k + 2) = 0$ has no real roots. Find the set of possible values of k.	
4 A ball is thrown vertically upwards at 19.6 m s^{-1} from a point h m above horizontal ground, and hits the ground 5 s later. Find (a) h, (b) the greatest height above the ground. Take g = 9.8.	
5 A is acute and B is obtuse, with $\sin A = \frac{4}{5}$ and $\cos B = -\frac{15}{17}$. Find the exact values of sin(A+B) and cos(A−B).	

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6 25 values have $\Sigma x = 825$ and $\Sigma x^2 = 27850$. One value was recorded as 45 but should have been 28. Find the correct mean and standard deviation (3 s.f.).	
7 The region bounded by the curve $y = \sqrt{x}$, the x-axis, $x = 0$ and $x = 2$ is rotated through 360° about the x-axis. Find the exact volume of the solid formed.	
8 The circle $x^2 + y^2 + 2x - 8y - 8 = 0$ passes through P(3, 7). (a) Find the equation of the tangent at P, in the form $ax + by = c$. (b) Find the coordinates of the point where this tangent crosses the x-axis.	
9 A ball is projected from the ground at 28 m s^{-1} at angle α above the horizontal, $\tan\alpha = \frac{12}{5}$. At time T s, while in flight, it is moving perpendicular to its initial direction. Find (a) T, (b) the height of the ball then. Take $g = 9.8$. Give answers to 3 s.f. if not exact.	
10 $\lvert a\rvert = 8$, $\lvert b\rvert = 2$ and the angle between a and b is 120°. Find the exact values of $a \cdot b$ and $\lvert a + b\rvert$.	