Day 50	A Level Maths: S Tier 10-a-day
1 Particles of mass 10 kg and 4 kg hang on a light string over a smooth fixed pulley. The 10 kg particle is 1.75 m above the ground; the 4 kg one is on the ground. Released from rest, find (a) the tension, (b) the greatest height reached by the 4 kg particle. Take g = 9.8 m s^{-2}.	
2 Solve $\|x + 4\| > -2x - 4$.	
3 A lift of mass M kg, carrying a passenger of mass 75 kg, hangs from a vertical cable. The tension in the cable is 4255 N and the floor exerts a force of 555 N on the passenger. Find (a) the acceleration of the lift, with its direction, (b) the value of M. Take g = 9.8 m s^{-2}.	
4 A cone with its vertex downwards and semi-vertical angle α, where $\tan\alpha = \frac{1}{2}$, is filled at 15π cm^3s^{-1}. Find the rate at which the depth h is rising when h = 2 cm. ($V = \frac{1}{3}\pi r^2h$)	
5 For 25 observations x, $\Sigma(x - 20) = 10$ and $\Sigma(x - 20)^2 = 104$. (a) Find the mean of x. (b) Find the standard deviation of x. (c) Find the value of Σx^2.	

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6 The curve C has equation $x^2 - xy + 2y^2 = 7$. Find the coordinates of the points on C where the tangent is parallel to the x-axis.	
7 Describe a sequence of two transformations that maps the curve $y = x^2$ onto the curve $y = -3x^2 + 6x - 9$.	
8 Find the sum of all the integers from 1 to 238 inclusive that are divisible by 2 or by 9, but not by both.	
9 The points A, B, C have coordinates (4, 2, 4), (−1, 0, 4), (1, 2, 3). Find angle ABC to 1 d.p., and the exact area of triangle ABC.	
10 $y = ab^x$. The graph of lg y against x is the straight line shown. Find a and b to 3 significant figures. 	