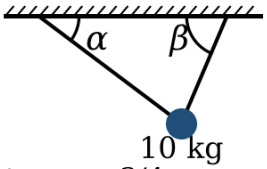
Day 44	A Level Maths: A Tier 10-a-day
1 A particle of mass 4 kg is acted on by forces $F_1 = (-12\mathbf{i} + 19\mathbf{j})$ N and F_2. Its acceleration is $(3\mathbf{i} + 3\mathbf{j})$ m s^{-2}. Find (a) F_2, (b) the angle between F_2 and $\mathbf{i}$, to 1 d.p.	
2 Summary statistics for the daily mean visibility (Dm) in the same month are: Camborne: mean 23.5, standard deviation 4.1; Leeming: mean 16.5, standard deviation 1.6. Make two comparisons.	
3 A is $(-4, -5)$ and B is $(-6, 5)$. (a) Find the equation of the perpendicular bisector of AB, in the form $ax + by = c$. (b) The perpendicular bisector meets the x-axis at P. Find the area of triangle ABP.	
4 Solve $\log_{10}(x + 2) + \log_{10}(x - 7) = 1$.	
5 The line l has equation $x + y = -6$. (a) Find the coordinates of the foot of the perpendicular from P$(6, -4)$ to l. (b) Hence find the shortest distance from P to l, in exact form.	

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6 A 10 kg particle hangs in equilibrium from two light strings, as shown. Find the tension in each string (T_1 in the string at angle α). Take g = 9.8. Give answers to 3 s.f. if not exact.



$\tan \alpha = 3/4$
$\tan \beta = 12/5$

7 X ~ B(100, 0.3). Use a normal approximation to estimate P(X ≥ 35) to 3 significant figures.

8 A is acute and B is obtuse, with $\sin A = \frac{12}{13}$ and $\cos B = -\frac{5}{13}$.
Find the exact values of tan(A+B) and tan(A−B).

9 A drink at 88°C is left in a room at 18°C. Its temperature θ °C satisfies $\frac{d\theta}{dt} = -k(\theta - 18)$.
After 15 minutes the temperature is 58°C. Find k, then the time for it to reach 28°C, to 3 s.f.

10 Express $\frac{-x^2 + 25x - 9}{(x + 4)(x - 1)^2}$ in the form $\frac{A}{(x + 4)} + \frac{B}{(x - 1)} + \frac{C}{(x - 1)^2}$, and find A, B and C.