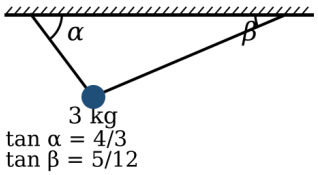
Day 251	A Level Maths: A Tier 10-a-day
1 The 3rd term of an arithmetic sequence is 21 and the 7th term is 25. Find the first term and common difference, and the sum of the first 20 terms.	
2 Solve $3^{2x} - 233^{x} + 126 = 0$. Give exact roots, or 3 s.f. where the answer is not exact.	
3 Simplify $\frac{x^2 - 4}{(3x - 4)} \div \frac{(x + 2)}{(3x + 2)}$.	
4 A 3 kg particle rests on a rough plane inclined at α, $\tan\alpha = \frac{8}{15}$, $\mu = 0.4$. A force of P N acts up a line of greatest slope and the particle stays at rest. Find the range of values of P. Take $g = 9.8$. Give answers to 3 s.f. if not exact.	
5 The equation $x^2 + (k - 2)x + (k + 1) = 0$ has real roots. Find the set of possible values of k.	

Day 251 **A Level Maths: A Tier 10-a-day**

6 A curve has parametric equations $x = \frac{1}{t}$, $y = t^2$.

Find $\frac{dy}{dx}$ in terms of t, and the equation of the normal at the point where t = 1, in the form ax + by + c = 0 (integers).

7 A 3 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.



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

8 The random variable X has pdf $f(x) = \frac{4}{625}x^3$ for $0 \leq x \leq 5$, and 0 otherwise.

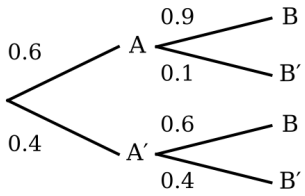
(a) Find the cumulative distribution function F(x) for $0 \leq x \leq 5$.

(b) Find $P(X > \frac{5}{2})$. (c) Find the median of X to 3 s.f.

9 The tree diagram shows probabilities for events A and B.

(a) Find P(B′).

(b) Find P(A′ | B′).



10 (a) Express $\frac{x}{(x+3)(x+2)}$ in partial fractions.

(b) Hence find $\int_0^5 \frac{x}{(x+3)(x+2)}\,dx$, giving the answer in the form ln k.