Day 336 **A Level Maths: A Tier 10-a-day**

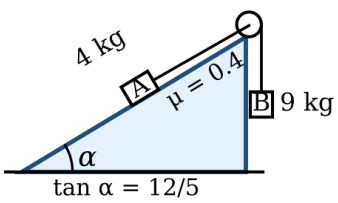
1 $|a| = 7$, $|b| = 5$ and the angle between a and b is 30°.
Find the exact values of $a \cdot b$ and $|a + b|$.

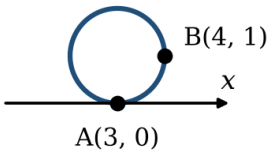
2 $P(A) = 0.1$ and $P(A \cup B) = 0.55$.
(a) Given that A and B are independent, find P(B).
(b) Given instead that A and B are mutually exclusive, find P(B).
(c) In the case in (a), find $P(A' \cap B)$.

3 Find the coefficient of x^3 in the expansion of $(1 + 2x)^9$.

4 A, B and C have position vectors $\begin{pmatrix} -3 \\ -1 \\ 3 \end{pmatrix}$, $\begin{pmatrix} -4 \\ -2 \\ 6 \end{pmatrix}$ and $\begin{pmatrix} -6 \\ k \\ 12 \end{pmatrix}$ relative to O, where k is a constant. Given that A, B and C are collinear, find k and the ratio AB : BC.

5 The system is released from rest and A moves up the rough plane. Find (a) the acceleration, (b) the tension in the light string. Take g = 9.8. Give answers to 3 s.f. if not exact.



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6 The diagram shows a circle that touches the x-axis at A(3, 0) and passes through B(4, 1). Find the equation of the circle.  	
7 A uniform plank AB (mass 15 kg, length 4 m) rests horizontally on supports at C and D, where AC = 1.5 m and DB = 0.5 m. A 5 kg particle is placed at E, AE = x m, and the plank is about to tilt about C. Find x.	
8 A curve has equation $3x^2 - xy + 2y^2 = 69$. Find the coordinates of the points where the tangent is parallel to the x-axis.	
9 Expand $(2 - x)^{-2}$ in ascending powers of x, up to and including x^2. State the range of x for which the expansion is valid.	
10 Faults occur as a Poisson process at a mean rate of 4 per roll of cloth. After a change, the number recorded in one roll of cloth is 1. Test at the 5% level whether the mean rate has decreased.	