Day 322	A Level Maths: B Tier 10-a-day
1 In the binomial expansion of $(1 + kx)^n$, where n is a positive integer, the coefficient of x is 32 and the coefficient of x^2 is 448. Find the values of n and k.	
2 X ~ Po(1.5), modelling the number of flaws per metre of cloth. Find, to 3 significant figures, (a) P(X = 1) (b) P(X ≤ 1)	
3 Solve $\|x - 2\| = \|2x + 6\|$.	
4 Given that $\sin A = \frac{40}{41}$ and $\sin B = \frac{3}{5}$, where A is obtuse and B is acute, find the exact value of $\cos(A - B)$.	
5 A particle of mass 4 kg slides from rest down a smooth curved slope, starting 2.5 m above the bottom. Take $g = 9.8$ m s^{-2}. Use energy to find its speed at the bottom of the slope.	

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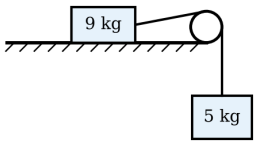
6 The length X cm of a metal rod is normal with mean 75.
Given P(X < 86.8) = 0.975, find the standard deviation (3 s.f.).

7 Given that $20\cos\theta + 21\sin\theta \equiv 29\cos(\theta - 46.4°)$,
solve $20\cos\theta + 21\sin\theta = -6$ for $0 \leq \theta \leq 360°$. (1 d.p.)

8 (a) Expand $(1 + 3x)^{-2}$ up to the x^2 term.

(b) Use x = 0.04 to estimate $\frac{1}{1.12^2}$ to 5 decimal places.

9 A block of mass 9 kg lies on a rough horizontal table (coefficient of friction 0.3). It is joined by a light string over a smooth pulley to a particle of mass 5 kg hanging freely.
Take g = 9.8 m s^{-2}.
The system is released. Find the acceleration and the tension in the string.



10 Use the substitution $u = x^2 + 2$ to find the exact value of

$$\int_0^3 \frac{2x}{x^2 + 2}\,dx.$$