Day 243	A Level Maths: B Tier 10-a-day
1 Find (a) $\int 2\sec^2 3x\,dx$, (b) the exact value of $\int_0^{\frac{\pi}{12}} 2\sec^2 3x\,dx$.	
2 A circle has equation $x^2 + y^2 + 2x + 10y + 17 = 0$. Find the coordinates of its centre and its radius.	
3 A sledge of mass 2 kg is pulled across smooth horizontal ice by a rope with tension 5 N, inclined at α above the horizontal, where $\tan\alpha = \frac{4}{3}$. Take $g = 9.8$ m s^{-2}. Find (a) the acceleration of the sledge, (b) the normal reaction of the ice.	
4 X ~ Po(3), modelling the number of flaws per metre of cloth. Find, to 3 significant figures, (a) P(X = 3) (b) P(X ≤ 3)	
5 A ball is projected horizontally at 117.6 m s^{-1} from a point high above the ground. Take $g = 9.8$ m s^{-2}. Find the speed and the direction of motion 16 s later, to 1 d.p. below the horizontal.	

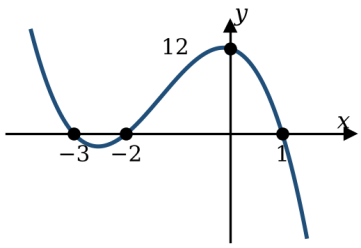
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6 Find the exact value of

$$\int_0^{\frac{\pi}{2}} \frac{4\cos x}{\sin x + 1}\,dx,$$

giving your answer in the form a ln b.

7 The diagram shows a sketch of the curve y = f(x), where f is a cubic. The curve meets the axes at the labelled points. Find f(x) in factorised form.



8 Solve $\log_3(x + 2) - \log_3(x - 2) = 1$.

9 A factory says a proportion 0.3 of its parts are defective. In a sample of 20 parts, 3 are defective.
Test, at the 5% significance level, whether the proportion is different from 0.3.

10 The points A, B and C are (−1, 2), (1, −2) and (5, 0).
(a) Show that angle ABC = 90°.
(b) Find the area of triangle ABC.