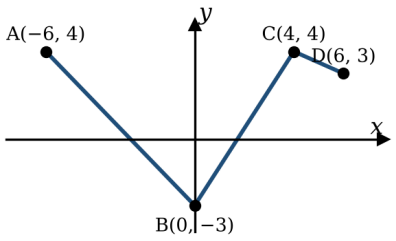
Day 351 **A Level Maths: S Tier 10-a-day**

1 The curve $y = ax^n$ passes through (9, 324) and (16, 768).
Find the values of a and n.

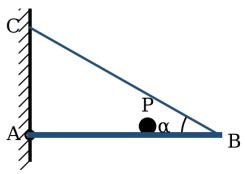
2 Data pairs (x, y) are coded by $u = x - 3$ and $v = \frac{y}{2}$. The regression line of v on u is $v = 10 + 1.1u$.
(a) Find the regression line of y on x in the form $y = a + bx$.
(b) Use it to estimate y when x = 9.

3 The diagram shows y = f(x), made of three straight line segments. Find the coordinates of the images of A, B, C and D on the graph of $y = -f(x - 1) - 1$.



4 Solve $6\text{cosec}^2\theta - 22\cot\theta + 6 = 0$
for $0 \leq \theta < 360°$, giving answers to 1 d.p.

5 A uniform rod AB (4 m, 40 N) is hinged at A to a vertical wall and held horizontal by a string BC, C on the wall above A, with $\tan\alpha = \frac{4}{3}$, where α is the angle between string and rod. A 40 N particle hangs at P, AP = 3 m.
Find (a) the tension, (b) the magnitude and direction of the hinge force (3 s.f. and 1 d.p.).



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6 A is acute and B is acute. $\sin A = \frac{7}{25}$ and $\sin B = \frac{12}{13}$. Find the exact values of $\tan(A - B)$ and $\cos(A + B)$.	
7 Each year Jo pays £400 into an account on 1 January. Interest of 5% is added each 31 December. Find the first year-end at which the balance exceeds £5,000.	
8 Find the term independent of x in the expansion of $(3x^3 + \frac{2}{x^2})^{10}$.	
9 A particle P moves on a line. Its displacement from a fixed point O at time t seconds is s metres, where $s = 8 \sin t + 15 \cos t$. Find (a) the greatest distance of P from O, (b) the greatest speed of P, (c) the first time P is at its greatest distance from O (3 s.f.).	
10 A test of H_0: $p = 0.1$ against H_1: $p > 0.1$ uses a sample of 50 at the 5% level. (a) Find the critical region for X, the number of successes. (b) Find the actual significance level. (c) Find P(Type II error) when in fact $p = 0.2$.	