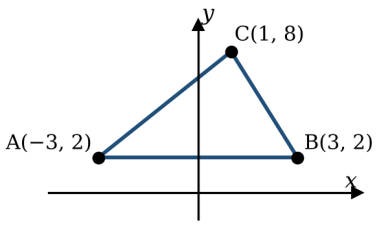
Day 53	A Level Maths: A Tier 10-a-day

1 Summary statistics for the daily total rainfall (mm) in the same month are:
Perth: mean 14.5, standard deviation 4.7;
Jacksonville: mean 8.5, standard deviation 2.4.
Make two comparisons.

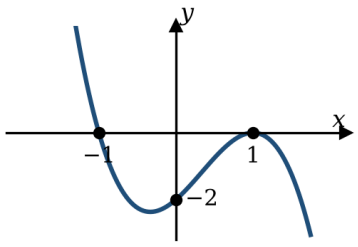
2 The diagram shows triangle ABC.
(a) Find the equation of the line through C perpendicular to AB.
(b) Hence find the coordinates of D, the foot of the perpendicular from C to AB, and the area of triangle ABC.



3 Find the exact value of

$$\int_0^{\frac{\pi}{12}} 5\sec^2 3x \, dx.$$

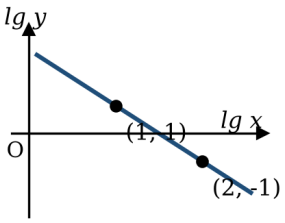
4 The diagram shows a sketch of the curve y = f(x), where f(x) is a cubic.
Find f(x), giving your answer in the form $k(x - p)(x - q)^2$.



5 X ~ Po(20). Use a suitable approximation to find P(X ≤ 24), to 3 significant figures.

Day 53 **A Level Maths: A Tier 10-a-day**

6 The diagram shows the graph of lg y against lg x for $y = A x^n$.
Find the value of n and the value of A.



7 A ball is projected from a point O on horizontal ground at 40 m s^{-1} at angle α above the horizontal, $\tan\alpha = \frac{5}{12}$, and lands at A. Find (a) the time of flight, (b) the greatest height, (c) OA. Take g = 9.8. Give answers to 3 s.f. if not exact.

8 A circle touches both coordinate axes and passes through the point (4, 2). Its centre lies in the first quadrant.
Find the equations of the two possible circles.

9 $l_1: \mathbf{r} = \begin{pmatrix} 6 \\ 1 \\ -2 \end{pmatrix} + \lambda \begin{pmatrix} 3 \\ -1 \\ -2 \end{pmatrix}$

$l_2: \mathbf{r} = \begin{pmatrix} 2 \\ 2 \\ -1 \end{pmatrix} + \mu \begin{pmatrix} -2 \\ 2 \\ 3 \end{pmatrix}$

Determine whether l_1 and l_2 intersect. If they do, find the point of intersection.

10 A uniform ladder AB (15 m, 25 kg) rests with A on rough ground, μ = 0.25, and B against a smooth wall, B being 12 m above the ground. A man of mass 50 kg climbs the ladder. How far along the ladder from A can he climb before it slips?