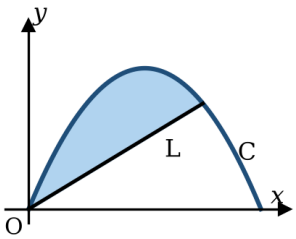
Day 80	A Level Maths: A Tier 10-a-day

1 A 1200 kg car has engine power 60 kW and constant resistance 500 N. Find (a) its greatest steady speed on a horizontal road, (b) its acceleration at 24 m s^{-1} up a hill where $\sin\alpha = \frac{1}{20}$. Take g = 10. Give answers to 3 s.f. if not exact.

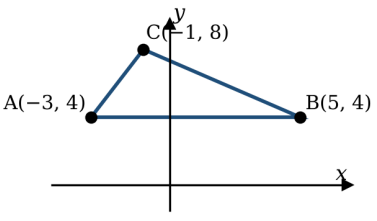
2 $f(x) = \frac{2x-2}{2x-1}$, $x \in \mathbb{R}$, $x \neq \frac{1}{2}$.
Find $f^{-1}(x)$ and state its domain.

3 Summary statistics for the daily mean temperature (°C) in the same month are:
Perth: mean 27.5, standard deviation 5.4;
Jacksonville: mean 10.5, standard deviation 3.4.
Make two comparisons.

4 The diagram shows the curve C: $y = x(4-x)$ and the line L: $y = 1x$.
Find the area of the shaded region between C and L.



5 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.



Day 80	A Level Maths: A Tier 10-a-day
6 A 6 kg block is released from rest on a rough plane inclined at α, $\tan\alpha = \frac{3}{4}$, $\mu = 0.5$, and slides 4 m down a line of greatest slope. Use work and energy to find (a) the work done against friction, (b) its speed after 4 m. Take $g = 10$.	
7 The line $3x + 4y = 25$ meets the circle $(x + 1)^2 + (y - 3)^2 = 36$ at the points A and B. Find the exact length of AB.	
8 Solve the differential equation $\frac{dy}{dx} = 4xy^2$, given that $y = 1$ when $x = 0$. Give y in terms of x.	
9 $X \sim Po(18)$. Use a suitable approximation to find $P(X \leq 24)$, to 3 significant figures.	
10 A sector of a circle has area 14.4 cm^2 and angle 1.8 radians. Find the radius, the arc length and the perimeter of the sector.	