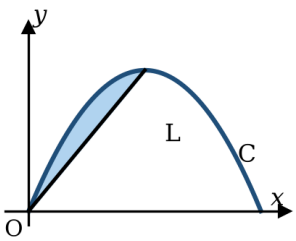
Day 311 **A Level Maths: A Tier 10-a-day**

1 Express $\frac{1}{(x-2)} - \frac{5}{(x+1)}$ as a single fraction in its simplest form.

2 The diagram shows the curve C: $y = x(4 - x)$ and the line L: $y = 2x$.
Find the area of the shaded region between C and L.



3 For 20 values of x, $\Sigma(x - 50) = 40$ and $\Sigma(x - 50)^2 = 85$.
Find the mean and standard deviation of x.

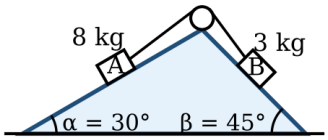
4 £20000 is invested at 8% compound interest per year.
Find the smallest whole number of years for the value to exceed £40000.

5 The curve $y = f(x)$ has a minimum point at $(-1, 6)$.
Find the coordinates of the corresponding point on:
(a) $y = f(x - 1)$
(b) $y = f(-x)$
(c) $y = f(\frac{x}{2})$

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6 The probability that a seed germinates is 0.02 on each independent trial.
Find the least number of trials needed so that the probability of this happening at least once is greater than 0.995.

7 The system is released from rest. Find (a) the magnitude of the acceleration and which particle moves down, (b) the tension. Take g = 9.8. Give answers to 3 s.f. if not exact.



8 Solve $x(\sqrt{6} - 3) = -5 - 3\sqrt{6}$, writing x in the form $p + q\sqrt{6}$.

9 At t = 0, P and Q have position vectors $(-12\mathbf{i} - \mathbf{j})$ m and $(-5\mathbf{i} - 2\mathbf{j})$ m and velocities $(4\mathbf{i})$ m s^{-1} and $(-3\mathbf{j})$ m s^{-1}. Find (a) the time when they are closest, (b) the least distance between them.

10 Use integration by parts to find the exact value of

$$\int_0^3 x\, e^{-3x}\, dx.$$