Day 290	A Level Maths: S Tier 10-a-day
1 Show that $\frac{6+\sqrt{5}}{6-\sqrt{5}} - \frac{6-\sqrt{5}}{6+\sqrt{5}}$ can be written in the form $k\sqrt{5}$, and find k.	
2 A stone is thrown vertically upwards with speed 8 m s^{-1} from the top of a cliff. The top of the cliff is 82.5 m above the sea. Find (a) the time taken for the stone to reach the sea, (b) the total distance travelled by the stone, to 3 s.f. Take g = 9.8 m s^{-2}.	
3 Solve the simultaneous equations $\log_2 x + \log_2 y = 6$ $x - y = 12$	
4 A ball is projected from level ground with horizontal and vertical velocity components 49 and 53.9 m s^{-1}. Find (a) the two times at which it moves at 45° to the horizontal, (b) the horizontal distance between those two points. Take g = 9.8 m s^{-2}.	
5 $f(x) = \frac{5}{2x^2 - 16x + 38}$ for all real x. Find the greatest value of f(x), the value of x at which it occurs, and the range of f.	

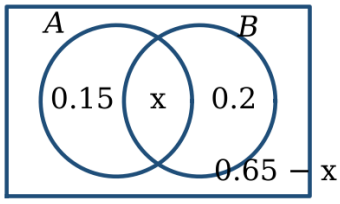
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6 A bag has 6 yellow counters and some white counters, n in total.
Two are taken without replacement. P(both yellow) = $\frac{15}{91}$. Find n.

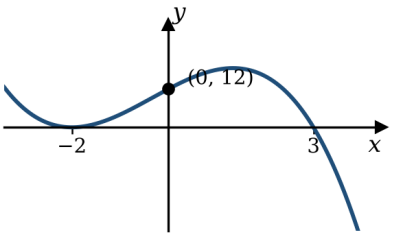
7 Use integration by parts to find the exact value of

$\int_1^3 x \ln x \, dx$

8 The Venn diagram shows probabilities; A and B are independent.
Find the possible values of x.



9 The diagram shows the cubic y = f(x), which touches the x-axis once. Find f(x), giving your answer in expanded form.



10 $\frac{dy}{dx}$ = 6xy, and y = 2 when x = 0.
Solve the differential equation and find y when x = 2.