Day 246 **A Level Maths: B Tier 10-a-day**

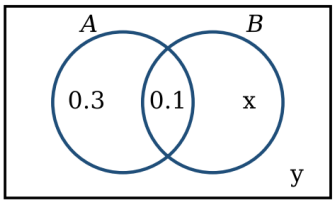
1 Simplify $\frac{36}{\sqrt{6}} - \sqrt{54}$, giving your answer in the form $k\sqrt{6}$.

2 A curve has parametric equations
$x = t^2$, $y = t^3$.
Find the gradient at $t = -1$ and the equation of the normal there.

3 The points A and B have coordinates (3, 2) and (5, −1).
(a) Find the midpoint of AB.
(b) Find the line AB as $ax + by + c = 0$, with integer a, b, c.

4 A has position vector $\begin{pmatrix} 0 \\ -1 \end{pmatrix}$ and B has position vector $\begin{pmatrix} 4 \\ -9 \end{pmatrix}$.
The point P lies on AB with AP : PB = 3 : 1.
Find the position vector of P.

5 The Venn diagram shows probabilities for events A and B, which are independent.
Find the values of x and y.



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6 A is the point (8, 6) and B is the point (−3, −1). Find the perpendicular bisector of AB as ax + by + c = 0, with integer a, b, c.	
7 Particles A (3 kg) and B (7 kg) are joined by a light string over a smooth pulley. Both are held with the string taut, B is 0.25 m above the ground, then released. Take g = 9.8 m s^{-2}. Find the speed with which B hits the ground.	
8 A journey takes X minutes, normal with mean 500. Given P(X < 505.9) = 0.975, find the standard deviation (3 s.f.).	
9 A particle moves in a straight line. At time t seconds its velocity is $v = 3t^2 - 5t$ m s^{-1}. Find the distance moved between t = 2 and t = 4. (The particle does not change direction.)	
10 Find the coordinates of the stationary points of the curve $y = x^2e^{-x}$, and determine their nature.	