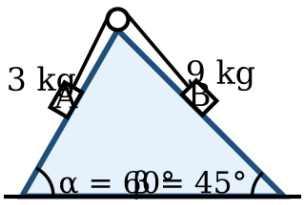
Day 70	A Level Maths: A Tier 10-a-day
1 The volume of a spherical balloon increases at a constant rate of 30 cm^3s^{-1}. Find the rates of increase of its radius and of its surface area when r = 5 cm.	
2 The probability that a seed germinates is 0.25. In 24 independent trials, find the probability that this happens (a) exactly 5 times (b) fewer than 5 times (c) at least 5 times.	
3 Solve $\cos 2\theta + 5\cos\theta = -4$ for $-180° \leq \theta \leq 180°$.	
4 Express $\frac{2+\sqrt{5}}{5-2\sqrt{5}}$ in the form $p + q\sqrt{5}$, where p and q are rational numbers.	
5 A particle P has constant acceleration $(-3\mathbf{i} + 2\mathbf{j})$ m s^{-2}. When t = 0, P is at $(8\mathbf{i} - 5\mathbf{j})$ m moving with velocity $(9\mathbf{i} + 4\mathbf{j})$ m s^{-1}. Find (a) when P moves parallel to $\mathbf{j}$, (b) its position vector then.	

Day 70	A Level Maths: A Tier 10-a-day
6 The line $y = 2x + 1$ meets the curve $y = x^2 + 3x - 5$ at A and B. (a) Find the coordinates of A and B. (b) Find the exact length AB.	
7 (a) Express $12\cos x + 9\sin x$ in the form $R\cos(x - \alpha)$, where $R > 0$ and $0° < \alpha < 90°$. Give α to 1 d.p. (b) Solve $12\cos x + 9\sin x = -4$ for $0° \leq x < 360°$, giving answers to 1 d.p.	
8 X has pdf $f(x) = \frac{2}{25}x$ for $0 \leq x \leq 5$, and 0 otherwise. Find E(X), Var(X) and the standard deviation of X (3 s.f.).	
9 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. 	
10 A circle has equation $x^2 + y^2 - 4x + 6y - 16 = 0$. (a) Find the centre and radius of the circle. (b) Determine whether P(2, −4) lies inside or outside the circle.	