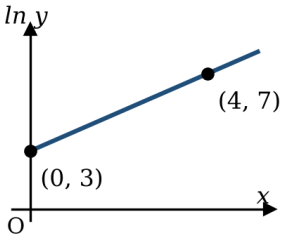
Day 294	A Level Maths: A Tier 10-a-day
1 Forces $F_1 = (-\mathbf{i} + 7\mathbf{j})$ N, $F_2 = (6\mathbf{i} - 8\mathbf{j})$ N and $F_3 = (a\mathbf{i} + b\mathbf{j})$ N keep a 3 kg particle in equilibrium. Find (a) a and b. F_2 is then removed; (b) find the magnitude of the acceleration. Give answers to 3 s.f. if not exact.	
2 The line $12x + 5y = k$ is a tangent to the circle $(x + 3)^2 + (y - 4)^2 = 4$. Find the two possible values of k.	
3 $y = 5^{2x}$. Find the exact gradient of the curve at $x = 0$ and the equation of the tangent there.	
4 Solve $x(\sqrt{6} - 2) = -4 - 4\sqrt{6}$, writing x in the form $p + q\sqrt{6}$.	
5 Use the trapezium rule with 4 strips to estimate $\int_1^5 2(\sqrt{x})\,dx$, giving your answer to 3 s.f. State, with a reason, whether your estimate is an overestimate or an underestimate.	

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6 A claim is that the probability p that a seed germinates is 0.3. In a sample of 20, the number of successes is 5.
Test at the 1% level whether p has decreased.

7 The diagram shows the graph of ln y against x for $y = A e^{kx}$.
Find the exact values of A and k.



8 3% of people have a disease. The screening test is positive for 80% of those who have it and for 1% of those who do not.
(a) Find the probability that a person tests positive.
(b) Given a positive test, find the probability that the person has the disease (3 s.f.).

9 A particle moves on the x-axis. At time t s its acceleration is $(12t - 12)$ m s^{-2}. When t = 0 it is at O with velocity -2 m s^{-1}. Find (a) its velocity when the acceleration is zero, (b) its displacement from O then.

10 Find the set of values of k for which the line $y = -4x + k$ does not meet the curve $y = x^2 + 2x - 3$.