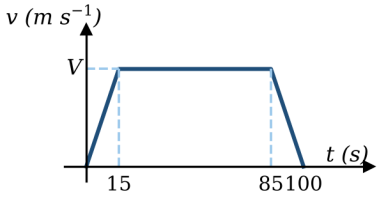
Day 65	A Level Maths: A Tier 10-a-day

1 The circle $x^2 + y^2 + 6x - 6y - 82 = 0$ passes through P(−11, 9).
(a) Find the equation of the tangent at P, in the form ax + by = c.
(b) Find the coordinates of the point where this tangent crosses the x-axis.

2 P(A) = 0.45, P(B) = 0.65 and P(A ∩ B) = 0.15. Find
(a) P(A ∪ B)
(b) P(A | B′)
(c) P(A′ ∩ B′)

3 The diagram shows the speed-time graph for a train journey of 2040 m. Find (a) V, (b) the deceleration in the final stage.



4 P(B) = 0.7, P(A) = 0.3 and P(A | B) = 0.4.
(a) Find P(A ∩ B) and P(A ∪ B).
(b) Find P(B | A).
(c) Determine whether A and B are independent.

5 Solve $x(\sqrt{2} - 2) = -5 - 3\sqrt{2}$, writing x in the form $p + q\sqrt{2}$.

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6 A is acute and B is obtuse, with $\sin A = \frac{8}{17}$ and $\cos B = -\frac{7}{25}$.
Find the exact values of cos(A−B) and cos(A+B).

7 Show by counter-example that the statement "$2^n - 1$ is prime for all integers $n \geq 2$" is false.

8 $g(\theta) = \frac{1}{24 + 8\sin\theta + 15\cos\theta}$
(a) Write $8\sin\theta + 15\cos\theta$ in the form $R\sin(\theta + \alpha)$, with α acute.
(b) Find the greatest and least values of $g(\theta)$ and the smallest positive θ at which the greatest value occurs (1 d.p.).

9 The line through the origin is a tangent to the curve $y = x^2 + 6$.
Find the gradients of the two possible tangents and the points of contact.

10 The system is released from rest and A moves up the rough plane. Find (a) the acceleration, (b) the tension in the light string. Take g = 9.8. Give answers to 3 s.f. if not exact.

