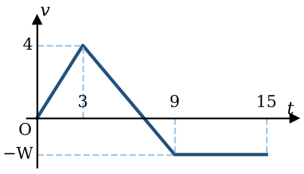
Day 34	A Level Maths: S Tier 10-a-day

1 A cone with its vertex downwards and semi-vertical angle α, where $\tan\alpha = \frac{1}{2}$, is filled at 3π cm^{3}s^{-1}. Find the rate at which the depth h is rising when h = 5 cm. ($V = \frac{1}{3}\pi r^2 h$)

2 25 recorded masses (grams) have mean 47 and standard deviation 8.
One value was recorded as 67 but should have been 79.
Find the correct mean and the correct standard deviation.

3 The diagram shows the velocity-time graph of a particle P moving on a straight line (velocity in m s^{-1}, time in s). At time 15 s, P is back at its starting point.
Find (a) the value of W, (b) the greatest distance of P from its starting point.



4 A chord AB of a circle, centre O and radius 10 cm, subtends an angle of $\frac{2\pi}{3}$ at O.
Find the exact area and the exact perimeter of the minor segment cut off by AB.

5 Describe a sequence of two transformations that maps the curve $y = x^2$ onto the curve $y = 3x^2 - 24x + 52$.

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6 X ~ B(100, 0.015). (a) Explain why a Poisson approximation is suitable and state its distribution. (b) Use it to estimate P(X > 2), to 4 s.f. (c) Find the exact value of P(X > 2), to 4 s.f.	
7 A particle P moves on a straight line. At time t seconds, where $t \geq 0$, its velocity is v m s^{-1}, where $v = 4\sqrt{t} - 1t$. Find (a) the greatest speed of P, (b) the greatest displacement of P from its starting point.	
8 Solve $2x^{\frac{2}{3}} - 2x^{\frac{1}{3}} - 24 = 0$.	
9 Find the exact coordinates of the point of inflection of $y = (x + 2)e^{-2x}$, justifying that it is a point of inflection.	
10 The line $4y = 3x + k$ is a tangent to the circle $(x - 1)^2 + (y + 3)^2 = 1$. Find the two possible values of k.	