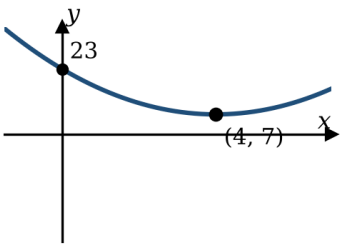
Day 249	A Level Maths: A Tier 10-a-day

1 10 values have $\Sigma x = 350$ and $\Sigma x^2 = 12500$.
One value was recorded as 48 but should have been 38.
Find the correct mean and standard deviation (3 s.f.).

2 By writing 75° as 45° + 30°, show that
$\tan 75° = \sqrt{3} + 2$.

3 Particles A (8 kg) and B (5 kg) move in the same direction on a smooth horizontal line at 5 m s^{-1} and 5 m s^{-1}. They collide and coalesce.
Find (a) the speed of the combined particle, (b) the kinetic energy lost in the collision.

4 The diagram shows the curve with equation y = f(x), where f is a quadratic.
The turning point is marked, and the curve crosses the y-axis as shown.
Find f(x), giving it in the form $ax^2 + bx + c$.



5 A is acute and B is obtuse, with $\sin A = \frac{3}{5}$ and $\cos B = -\frac{15}{17}$.
Find the exact values of sin(A+B) and cos(A+B).

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6 The line l has equation $2x + y = -4$. (a) Find the coordinates of the foot of the perpendicular from P$(-5, 5)$ to l. (b) Hence find the shortest distance from P to l, in exact form.	
7 X, the journey time (minutes), is N$(39, 6^2)$. Find the symmetric limits about the mean between which the central 95% of values lie (3 s.f.).	
8 The tangent to the curve $y = e^{\frac{1}{2}x}$ at the point P passes through the origin. Find the coordinates of P and the equation of the tangent.	
9 $u_1 = -1$ and $u_{n+1} = \frac{1}{3}u_n + 6$. (a) Find the limit L of the sequence as $n \to \infty$. (b) Find the least n for which $\lvert u_n - L\rvert < 0.001$.	
10 A stone is projected from a cliff top 62.5 m above the sea at 20 m s^{-1}, at angle α above the horizontal, $\tan\alpha = \frac{3}{4}$. Find (a) the time to reach the sea, (b) the horizontal distance travelled, (c) the speed on impact. Take g = 9.8. Give answers to 3 s.f. if not exact.	