Day 75	A Level Maths: A Tier 10-a-day
1 A ball is thrown vertically upwards at 29.4 m s^{-1} from a point h m above horizontal ground, and hits the ground 8 s later. Find (a) h, (b) the greatest height above the ground. Take g = 9.8.	
2 Solve $\sin 2\theta = -\sqrt{2}\cos\theta$ for $-180° \leq \theta \leq 180°$.	
3 X, the score (marks), is normally distributed with mean 70 and standard deviation 12. Find (a) P(X > 62.8) (b) P(62.8 < X < 78.4), each to 3 s.f.	
4 The line $y = -3x + 5$ meets the curve $y = x^2 - 4x - 15$ at A and B. (a) Find the coordinates of A and B. (b) Find the exact length AB.	
5 A lift of mass 400 kg carries a person of mass 80 kg. The cable tension is 4896 N and the lift is accelerating. Find (a) the magnitude and direction of the acceleration, (b) the force of the floor on the person. Take g = 9.8.	

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6 $f(x) = x^2 - 6x + 4$.

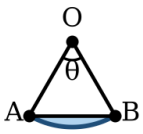
(a) Write f(x) in the form $a(x + p)^2 + q$.

(b) State the minimum value of f(x) and the value of x at which it occurs.

(c) Solve f(x) = 0, giving surds in simplest form.

7 The circle has centre O and radius 4 cm. Angle AOB = $\frac{\pi}{3}$.

Find the exact area and the exact perimeter of the shaded segment.



8 X ~ B(38, p). H_0: p = 0.25 is tested against H_1: $p \neq 0.25$ at the 10% level.

(a) Find the critical region.

(b) Find the actual significance level of the test (3 s.f.).

9 (a) Expand $(1 - x)^{\frac{1}{2}}$ in ascending powers of x up to x^2.

(b) Use x = 0.02 to estimate $\sqrt{98}$ to 4 decimal places.

10 The line l has equation $\mathbf{r} = \begin{pmatrix} -3 \\ 1 \\ -1 \end{pmatrix} + t\begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix}$.

Find the coordinates of the foot of the perpendicular from P(−2, 0, 0) to l, and the exact distance from P to l.