Day 214 **A Level Maths: B Tier 10-a-day**

1 The mass X g of a flour bag is normal with mean 170, s.d. 8.
Find, to 3 s.f., the probability a value is
(a) more than 162,
(b) between 162 and 170.

2 Given that $\tan\theta = \frac{7}{24}$ and $0 < \theta < 90°$,
find the exact value of $\tan 2\theta$.

3 The points A and B have coordinates $(-1, 2)$ and $(4, 0)$.
(a) Find the midpoint of AB.
(b) Find the line AB as $ax + by + c = 0$, with integer a, b, c.

4 A woman of mass 80 kg stands on weighing scales in a lift. The lift decelerates at 1.5 m s^{-2} while moving upwards.
Take g = 9.8 m s^{-2}.
Find the force exerted on the woman by the scales.

5 Points A, B and C have position vectors $\begin{pmatrix} -2 \\ 3 \\ 1 \end{pmatrix}$, $\begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}$ and $\begin{pmatrix} -5 \\ 5 \\ r \end{pmatrix}$ respectively.
Given that A, B, C are collinear, find r.

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6 X ~ B(7, 0.4) and Y ~ B(11, 0.6) are independent. Find P(X = 3 and Y ≤ 7), to 3 significant figures.	
7 Find the coefficient of x^2 in the expansion of $(2 + 4x)(2 + 3x)^4$.	
8 A cup of tea cools in a room at 25°C: $\frac{dT}{dt} = -k(T - 25)$. Initially T = 100 and after 6 minutes T = 55. Find k to 3 s.f. and the time to cool to 35°C, to 3 s.f.	
9 A particle of mass 2 kg is suspended in equilibrium by two light strings attached to a horizontal ceiling. The strings make angles α and β with the ceiling, where $\tan\alpha = \frac{3}{4}$ and $\tan\beta = \frac{4}{3}$. Take g = 9.8 m s^{-2}. Find the tension in each string.	
10 A sequence is defined by $u_{n+1} = \frac{u_n - 1}{u_n + 1}$, $u_1 = -3$. (a) Show that the sequence is periodic, stating the period. (b) Find u_{50} and $\sum_{r=1}^{50} u_r$.	