Day 297	A Level Maths: A Tier 10-a-day

1 Find the sum of all the multiples of 12 that lie strictly between 47 and 418.

2 A data set has mean 70 and standard deviation 7.
A value is treated as an outlier if it is more than 2 standard deviations from the mean.
Which of 53, 60, 75, 90 are outliers?

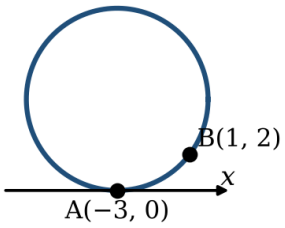
3 The vectors $\begin{pmatrix} k \\ k \\ -2 \end{pmatrix}$ and $\begin{pmatrix} k \\ -3 \\ -1 \end{pmatrix}$ are perpendicular.
Find the possible values of k and, for the larger value, the exact length of the first vector.

4 Evaluate $\sum_{r=7}^{30} (5r + 7)$.

5 Solve $4\text{cosec}^2 x + 12\cot x - 20 = 0$
for $0° < x < 180°$. Give answers to 1 d.p.

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6 The diagram shows a circle that touches the x-axis at A(−3, 0) and passes through B(1, 2). Find the equation of the circle.



7 Use the substitution u = x + 2 to find the exact value of

$$\int_0^{34} \frac{x}{\sqrt{x+2}}\,dx.$$

8 A 1000 kg car tows a 400 kg trailer by a light tow-bar on a horizontal road. Driving force 1110 N; resistances 300 N (car), 250 N (trailer). Find (a) the acceleration and the tow-bar tension. At 12 m s^{-1} the tow-bar breaks. (b) How far does the trailer then travel?

9 A uniform ladder AB (10 m, 30 kg) rests with A on rough ground, $\mu = 0.4$, and B against a smooth wall, B being 8 m above the ground. A man of mass 60 kg climbs the ladder. How far along the ladder from A can he climb before it slips?

10 $X \sim N(60, 5^2)$. Find $P(X > 71 \mid X > 66)$ to 3 significant figures.