Day 2	A Level Maths: B Tier 10-a-day

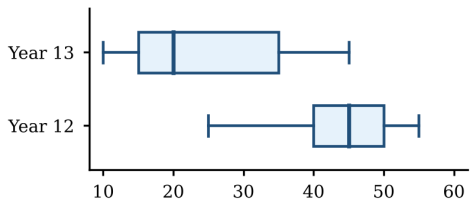
1 Solve $\sin(x + 0.3) = 0.4$ for $0 \leq x \leq 2\pi$, giving answers to 3 significant figures.

2 Find the set of values of x for which $2x + 1 > -8$ and $x^2 + 2x \geq 0$.

3 Use the substitution $u = x^2 + 1$ to find the exact value of

$$\int_0^2 x(x^2 + 1)^2 \, dx.$$

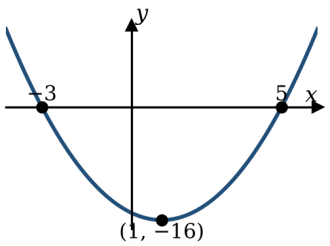
4 The box plots show the times taken (minutes) to complete a puzzle for two groups.
(a) Find the interquartile range of each group.
(b) Compare the two distributions.



5 A woman of mass 40 kg stands on weighing scales in a lift. The lift decelerates at 0.5 m s^{-2} while moving upwards.
Take g = 9.8 m s^{-2}.
Find the force exerted on the woman by the scales.

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6 The diagram shows the curve y = f(x), a quadratic.
(a) Find the coordinates of the local maximum point of y = |f(x)|.
(b) How many solutions has |f(x)| = 16?



7 A particle moves in a straight line. At time t seconds its velocity is $v = 3t^2 - 4t$ m s^{-1}.
Find the distance moved between t = 2 and t = 6. (The particle does not change direction.)

8 The line 4x + 3y = k is a tangent to the circle $(x + 3)^2 + (y - 2)^2 = 100$.
Find the two possible values of k.

9 A closed cylinder has radius r cm and volume 128π cm^3.
Show that its surface area is $S = 2\pi r^2 + \frac{256\pi}{r}$, and find the minimum S.

10 A coin is thought to land heads with probability 0.4. It is tossed 50 times and lands heads 15 times.
Test, at the 5% significance level, whether the probability of heads is different from 0.4.