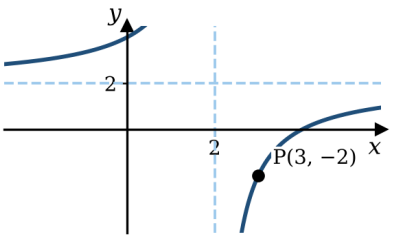
Day 355 **A Level Maths: S Tier 10-a-day**

1 A data set has lower quartile 15 and upper quartile 22. An outlier is a value more than 1.5 × IQR beyond the nearest quartile.
(a) Find the range of values that are not outliers.
(b) 8 observations have mean 20. The largest is 37, an outlier, and it is removed. Find the new mean.

2 A train accelerates uniformly from rest at 2 m s^{-2} to a speed of V m s^{-1}, travels at this speed, then decelerates uniformly at 2.8 m s^{-2} to rest. The journey takes 58 s and covers 728 m. Find V and the time spent at constant speed.

3 The diagram shows the curve C, its asymptotes (dashed) and a point P. C has equation $y = \frac{a}{x + p} + q$. Find a, p and q.



4 A chord AB of a circle, centre O and radius 9 cm, subtends an angle of $\frac{\pi}{3}$ at O.
Find the exact area and the exact perimeter of the minor segment cut off by AB.

5 A curve has parametric equations
$x = -3 + 5\cos t$, $y = -2 + 5\sin t$.
Find its Cartesian equation.

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6 Given that $\cos 3\theta \equiv 4\cos^3\theta - 3\cos\theta$, solve $\cos 3\theta = \cos\theta$ for $0 < \theta < 360°$.

7 Large Data Set, daily mean air temperature (°C), Heathrow, September 2015 (n = 30): mean 15.3, sd 2.5. (F = 1.8C + 32)
(a) Find the mean and sd in °F.
(b) Is a reading of 22 more than 2 sd above the mean?

8 A geometric series has first term 6 and common ratio 5.
Find the least n for which $S_n > 83364$.

9 The points A, B, C have coordinates (2, 1, −2), (4, 5, 2), (1, 1, 3).
Find angle ABC to 1 d.p., and the exact area of triangle ABC.

10 A uniform rod AB (4 m, 80 N) is hinged at A to a vertical wall and held horizontal by a string BC, C on the wall above A, with $\tan\alpha = \frac{5}{12}$, where α is the angle between string and rod. A 30 N particle hangs at P, AP = 2 m.
Find (a) the tension, (b) the magnitude and direction of the hinge force (3 s.f. and 1 d.p.).

