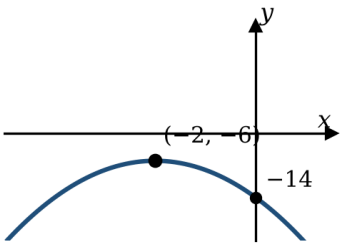
Day 139 **A Level Maths: A Tier 10-a-day**

1 X, the journey time (minutes), is N(29, 6^2). The highest 30% of values exceed k.
Find k to 3 significant figures.

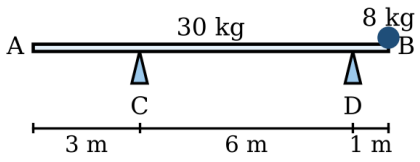
2 The diagram shows the curve with equation y = f(x), where f is a quadratic.
The turning point is marked, and the curve crosses the y-axis as shown.
Find f(x), giving it in the form $ax^2 + bx + c$.



3 The 800 items in a list are numbered 1 to 800.
A systematic sample of 40 items is taken, starting with a random item among the first few.
The first item selected is number 20.
Find the sampling interval and the number of the last item selected.

4 The curve y = f(x) has a minimum point at (−3, 3).
Find the coordinates of the corresponding point on:
(a) y = 2f(x)
(b) y = −f(x)
(c) y = f(−x)

5 A uniform beam AB rests on supports at C and D, with a particle attached at B. Find the reactions at C and D. Take g = 9.8. Give answers to 3 s.f. if not exact.

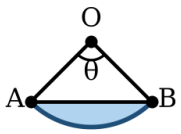


Day 139 **A Level Maths: A Tier 10-a-day**

6 The circle has centre O and radius 12 cm.

Angle AOB = $\frac{\pi}{2}$.

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



7 A circle passes through A(−9, −9) and B(16, −4).
Its centre lies on the line y = 3x − 13.
Find the equation of the circle.

8 $f(x) = x^2 - 3$. Show that the Newton-Raphson formula gives $x_{n+1} = \frac{1}{2}(x_n + \frac{3}{x_n})$,

and use it with $x_0 = 3$ to find x_2 as an approximation to $\sqrt{3}$, to 4 d.p.

9 Particle A (3 kg) lies on a rough table, $\mu = 0.1$, joined by a light string over a smooth pulley to particle B (7 kg), 0.8 m above the floor. Released from rest; B lands without rebounding. Find (a) the acceleration of A before B lands, (b) the further distance A moves. Take g = 9.8.

10 $g(\theta) = \frac{1}{21 + 15\sin\theta + 8\cos\theta}$

(a) Write $15\sin\theta + 8\cos\theta$ in the form $R\sin(\theta + \alpha)$, with α acute.
(b) Find the greatest and least values of $g(\theta)$ and the smallest positive θ at which the greatest value occurs (1 d.p.).