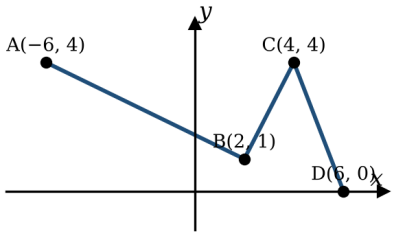
Day 222	A Level Maths: S Tier 10-a-day

1 A lift of mass M kg, carrying a passenger of mass 90 kg, hangs from a vertical cable. The tension in the cable is 3354 N and the floor exerts a force of 774 N on the passenger. Find (a) the acceleration of the lift, with its direction, (b) the value of M. Take g = 9.8 m s^{-2}.

2 Solve $\cos(\theta + 25°) = \frac{\sqrt{3}}{2}$ for $-90° \leq \theta \leq 270°$.

3 The diagram shows y = f(x), made of three straight line segments. Find the coordinates of the images of A, B, C and D on the graph of $y = 3f(2x + 8) - 3$.



4 A javelin is projected from a point O on horizontal ground with speed 63.7 m s^{-1} at an angle θ above the horizontal, where $\tan\theta = \frac{12}{5}$. Find (a) the time of flight, (b) the range, (c) the greatest height. Take g = 9.8 m s^{-2}.

5 Find the set of values of x for which both $x^2 - 1 \geq 0$ and $-x - 8 \leq 1$.

Day 222	A Level Maths: S Tier 10-a-day
6 X takes values 2, 3, 4, 5 with $P(X = x) = k(x - 1)$. X_1 and X_2 are independent copies of X. (a) Find k. (b) Find $P(X_1 + X_2 = 6)$. (c) Find $P(X_1 = X_2)$ and $E(X_1 + X_2)$.	
7 Use the substitution $u = e^x + 3$ to find the exact value of $\int_0^{\ln 3} \frac{e^x}{e^x + 3}\, dx$	
8 A and B take turns, A first, to score; the first to score wins. P(A scores) = $\frac{2}{5}$, P(B scores) = $\frac{1}{3}$ each attempt. Find P(A wins (a) on attempt 1 or 2, (b) overall).	
9 Find the exact value of $\sin(\sin^{-1}(\frac{5}{13}) + \cos^{-1}(\frac{7}{25}))$.	
10 Solve $\frac{4x - 2}{-2x + 5} > 2$.	