Day 32	A Level Maths: S Tier 10-a-day

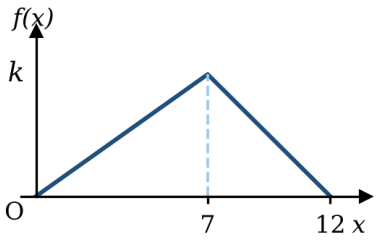
1 Solve $\cos(2\theta + 15°) = -\frac{\sqrt{2}}{2}$ for $0° \leq \theta \leq 180°$.

2 The curve C has equation $y = \frac{-2x + 20}{x - 2}$.

(a) Write down the equations of the asymptotes of C.

(b) The line $y = -x + k$ is a tangent to C.
Find the possible values of k.

3 The diagram shows the pdf of X.
Find (a) k, (b) E(X), (c) the median of X (3 s.f.).



4 The curve C has parametric equations $x = 3t$, $y = t^2$. The line $y = -\frac{2}{3}x + 3$ meets C at A and B. Find the exact length AB.

5 Use a suitable trigonometric identity to find the exact value of

$$\int_0^{\pi/4} \cos^2 2x \, dx$$

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6 A particle P moves on a line. Its displacement from a fixed point O at time t seconds is s metres, where $s = 3\sin\frac{t}{2} + 4\cos\frac{t}{2}$.
Find (a) the greatest distance of P from O, (b) the greatest speed of P, (c) the first time P is at its greatest distance from O (3 s.f.).

7 Solve $\log_3(x + 20) + \log_3(x - 6) = 3$, justifying clearly any root that you reject.

8 A test of H_0: $p = 0.2$ against H_1: $p < 0.2$ uses a sample of 50 at the 1% level.
(a) Find the critical region for X, the number of successes.
(b) Find the actual significance level.
(c) Find P(Type II error) when in fact $p = 0.05$.

9 A particle P moves on a straight line. The velocity of P is v m s^{-1} and its acceleration is $-0.25v^2$ m s^{-2}. At $t = 0$, $v = 20$.
Find (a) the time taken for the speed of P to halve, (b) the distance P travels in this time, to 3 s.f.

10 The circle in the diagram touches both axes and passes through P. Find the equation of the circle, giving it in the form $x^2 + y^2 + ax + by + c = 0$.

