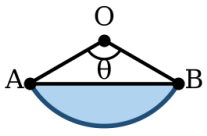
| Day 216 | A Level Maths: A Tier 10-a-day |
|---|---|
| **1** A particle P moves on the x-axis with velocity v = $(6t^2 - 30t + 24)$ m $s^{-1}$ at time t s, $t \geq 0$, and starts at O. Find (a) the times when P is at instantaneous rest, (b) the total distance P travels in the first 5 s. | |
| **2** The curve y = f(x) has a minimum point at $(-5, 1)$.<br>Find the coordinates of the corresponding point on:<br>(a) y = f(x − 2)<br>(b) y = 4f(x)<br>(c) $y = f(\frac{x}{2})$ | |
| **3** Forces $F_1 = (-4\mathbf{i} + 6\mathbf{j})$ N, $F_2 = (9\mathbf{i} - 12\mathbf{j})$ N and $F_3 = (a\mathbf{i} + b\mathbf{j})$ N keep a 2 kg particle in equilibrium. Find (a) a and b. $F_2$ is then removed; (b) find the magnitude of the acceleration. | |
| **4** The circle has centre O and radius 4 cm. Angle AOB = $\frac{2\pi}{3}$.<br>Find the exact area and the exact perimeter of the shaded segment.<br> | |
| **5** An arithmetic series has first term 14 and common difference 5.<br>The sum of the first n terms is 1850. Find n. | |

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|---|---|
| **6** Of 31 students, 19 study Maths (M), 18 Physics (P) and 15 Chemistry (C).<br>9 study M and P, 8 study M and C, 9 study P and C, and 4 study all three.<br>One student is chosen at random. Given that a student studies exactly two subjects, find the probability that they study Physics. | |
| **7** Use integration by parts to find the exact value of<br>$\int_0^{\frac{\pi}{4}} x \sin 2x \, dx$. | |
| **8** Find the set of values of k for which the line $y = -3x + k$ meets the curve $y = x^2 + x + 4$ at two distinct points. | |
| **9** Solve $e^{2x} - 5e^x + 6 = 0$,<br>giving exact answers. | |
| **10** X ~ Po(25). Use a suitable approximation to find $P(X \geq 21)$, to 3 significant figures. | |