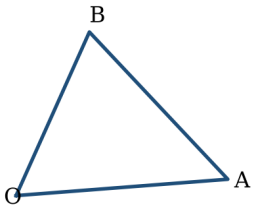
| Day 84 | A Level Maths: B Tier 10-a-day |
|---|---|
| **1** A particle has velocity $(-\mathbf{i} + 6\mathbf{j})$ m s$^{-1}$ at time t = 0 and moves with constant acceleration $(\mathbf{i} + \mathbf{j})$ m s$^{-2}$.<br>Find its velocity and speed when t = 6. | |
| **2** A biased coin with P(head) = $\frac{1}{6}$ is tossed 8 times; X is the number of heads.<br>This is done 200 times. Estimate the number of times that X = 2. | |
| **3** A sector of a circle has radius 6 cm and angle 300°.<br>Find the perimeter of the sector, in terms of $\pi$. | |
| **4** A circle has equation $x^2 + y^2 - 6x - 4y + 5 = 0$.<br>Find the coordinates of its centre and its radius. | |
| **5** In triangle OAB, OA = a and OB = b. M lies on AB with AM : MB = 2 : 3, and N lies on OB with ON : NB = 3 : 2.<br>Find OM and NM in terms of a and b.<br> | |

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|---|---|
| **6** Solve the equation $2^{2x} - 10\times2^{x} + 16 = 0$. | |
| **7** A stone is thrown vertically upwards at 14.7 m $s^{-1}$ from a point 49 m above horizontal ground. Take g = 9.8 m $s^{-2}$.<br>Find the time before it hits the ground. | |
| **8** Given that each lottery ticket wins a prize independently with probability 0.1, find the least number of tickets needed for the probability of at least one success to exceed 0.95. | |
| **9** Use integration by parts to find the exact value of<br>$\int_0^{\frac{\pi}{4}} x \sin 2x \, dx$. | |
| **10** The points A and B have coordinates (−5, 5) and (2, 7).<br>(a) Find the midpoint of AB.<br>(b) Find the line AB as ax + by + c = 0, with integer a, b, c. | |