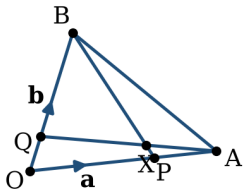
Day 61	IGCSE 10-a-day
1 Work out the gradient of the curve $y = x^3 + 3x^2 + x$ at the point where $x = -3$.	
2 $\mathbf{v} = \begin{pmatrix} k \\ 4 \end{pmatrix}$ and $\lvert\mathbf{v}\rvert = 5$. Find the two possible values of k.	
3 Anna can paint a fence in 20 hours. Ben can paint the same fence in 60 hours. They work together at these rates. How long do they take to paint the fence?	
4 A curve has equation $y = -2x^3 + 6x^2 + 4$. Find the coordinates of the stationary points of the curve.	
5 A right-angled triangle has base $(3 + \sqrt{3})$ cm and height $(3 - \sqrt{3})$ cm. Show that the area of the triangle is a rational number. Work out the area.	

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6 Use the iteration formula $x_{n+1} = 1 + \frac{5}{x_n}$ with $x_0 = 2$ (Calculator) to work out x_1, x_2 and x_3. Give each answer correct to 3 decimal places.	
7 A biased spinner lands on one of four outcomes with these probabilities. red: 2x; blue: 3x; green: 3x + 0.1; yellow: 0.1 (a) Work out the value of x. (b) The biased spinner is used 200 times. Work out an estimate for the number of times it lands on red.	
8 $\mathbf{OA} = \mathbf{a}$, $\mathbf{OB} = \mathbf{b}$, $\mathbf{OP} = \frac{2}{3}\mathbf{a}$ and $\mathbf{OQ} = \frac{1}{4}\mathbf{b}$. AQ and BP meet at X. (a) Find $\mathbf{OX}$ in terms of $\mathbf{a}$ and $\mathbf{b}$. (b) Find the ratio AX : XQ. 	
9 In triangle PQR, PQ = 8 cm and angle PQR = 150°. The area of the triangle is 26 cm^2. Work out the length of QR. Do not use a calculator.	
10 A closed cylinder (a tin) has radius r cm, height h cm and total surface area 150π cm^2. (a) Show that its volume, V cm^3, is $V = 75\pi r - \pi r^3$. (b) Find the maximum value of V in terms of π, and show that h = 2r when V is a maximum.	