Day 155	IGCSE 10-a-day
1 (a) Solve $5 - 2x \leq 19$ (b) n is an integer. Write down all the values of n that satisfy $4 \leq 2n + 2 < 10$	
2 The mean of 11 numbers is 83. One number is removed and the mean of the remaining 10 numbers is 90.3. Work out the number that was removed.	
3 $y = x(x - 4)(2x + 4)$ Find $\frac{dy}{dx}$.	
4 Rationalise the denominator of $\frac{29}{3\sqrt{5}}$ Give your answer in its simplest form.	
5 $M = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$. (a) Find the coordinates of the image of the point (4, 3) under the transformation represented by M. (b) Describe fully the single transformation represented by M.	

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6 $y = 2x^3 + 12x^2 + 18x$ (a) Find the coordinates of the stationary points. (b) Use $\frac{d^2y}{dx^2}$ to decide whether each is a maximum or a minimum.	
7 In an animal shelter, the ratio of the number of cats to the number of dogs is 2 : 3. Then 18 more cats are added and 3 more dogs are added. The ratio is now 2 : 1. How many dogs were there at the start?	
8 OA = $\mathbf{a}$ and OB = $\mathbf{b}$. OP = $\mathbf{a}$, OQ = $-\mathbf{a} - 8\mathbf{b}$ and OR = $-5\mathbf{a} - 24\mathbf{b}$. (a) Show that P, Q and R lie on a straight line. (b) Work out the ratio PQ : QR in its simplest form.	
9 A piece of wire 136 cm long is cut into two pieces. One piece is bent to form a square of side x cm. The other piece is bent to form a rectangle whose length is twice its width. (a) Show that the total area, A cm^2, enclosed by the two shapes is $A = x^2 + \frac{(136 - 4x)^2}{18}$. (b) Find the value of x for which A is least, and work out this least area.	
10 $g(x) = x^2 + 4x - 2$ for $x \leq -2$. (a) Find the range of g. (b) Find $g^{-1}(x)$.	