Day 89	IGCSE 10-a-day

1 $B = \begin{pmatrix} -5 \\ 1 \end{pmatrix}$ and $C = \begin{pmatrix} -3 & 1 \end{pmatrix}$.

(a) Work out CB.

(b) Write down the order of the matrix BC.

2 A particle P moves in a straight line. After t seconds its displacement from a fixed point O is s metres, where

$s = t^3 - 8t^2 + 3t + 3$ $(t > 0)$

Find (a) the velocity of P, (b) the acceleration of P, when t = 4.

3 Here are six numbers.

$2\pi - \pi$, $\sqrt{2} \times \sqrt{6}$, $(2 + \sqrt{5})(2 - \sqrt{5})$, $\sqrt{8} \times \sqrt{2}$, $\frac{\sqrt{20}}{\sqrt{5}}$, $\pi \div 2$

Write down the rational numbers.

4 $f(x) = 3x^2 - 18x - 10$

Use differentiation to find the coordinates of the turning point of the graph of y = f(x). State whether it is a maximum or a minimum.

5 The diagram shows a running track made from a rectangle and two semicircles.

(a) Work out the total length of the boundary of the track.

(b) Work out the area enclosed by the track.

Give your answers in terms of π.

The diagram is not drawn accurately.



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6 C is directly proportional to d. When d = 1, C = 12. (a) Find a formula for C in terms of d. (b) Work out the positive value of d when C = 60.	
7 The vectors $\begin{pmatrix} k \\ 12 \end{pmatrix}$ and $\begin{pmatrix} 4 \\ 3k \end{pmatrix}$ are parallel. k is a positive number. Work out the value of k.	
8 Show that $(1 + \tan^2 A)\cos^2 A \equiv 1$.	
9 Simplify fully $\frac{x^2 + 9x + 14}{x^2 - 4x} \times \frac{x^2 - x}{x + 2}$	
10 The temperature, T °C, of a metal bar t minutes after it is removed from a heat source is modelled by $T = 20 + \frac{80}{t}$ $(t \geq 1)$ (a) Find $\frac{dT}{dt}$ when t = 2. (b) Find the value of t when the temperature is falling at 5 °C per minute.	