## EXCELLENCE PROBLEM.

The curve $y=a x^{3}+b x^{2}+c$ goes through $(1,5)$ and has $y$ intercept (0, 12).
It has a stationary point at $x=3$.
Find the equation of the curve and the coordinates of the stationary point.

Sub $x=0, y=12: \quad 12=c$
Sub $x=1, y=5: \quad 5=a+b+12$
$-7=a+b$ equ 1
$y^{\prime}=3 a x^{2}+2 b x$
sub $y^{\prime}=0$ when $x=3$
$0=27 a+6 b$
$0=9 a+2 b$ equ 2
Equ $1 \times 2 \quad 2 a+2 b=-14$
Equ $2 \quad 9 a+2 b=0$
Subtract $\quad \begin{array}{rll}7 a & =14 \\ a & =2 \\ b & =-9\end{array}$
$y=2 x^{3}-9 x^{2}+12$
sub $x=3, y=-15$
Ans: $a=2, b=-9, \quad(3,-15)$

