1	**i**	$(2x - 3)(x - 4)$ $x = 4$ or 1.5	M1 A1A1	or $(11 \pm\sqrt{(121 - 96)})/4$ if M0, then B1 for showing $y = 0$ when $x = 4$ and B2 for x = 1.5	3
	ii	$y' = 4x - 11$ = 5 when $x = 4$ c.a.o. grad of normal = −1/their y' $y[\ -\ 0\ ]$=<u>their</u> −0.2 $(x - 4)$ y-intercept for <u>their</u> normal area = ½ × 4 × 0.8 c.a.o.	M1 A1 M1f.t. M1 B1f.t. A1	condone one error or 0 = their (-0.2)x4 + c dep on normal attempt s.o.i. normal must be linear or integrating <u>their</u> f(x) from 0 to 4 M1	6
	iii	$\frac{2}{3}x^3 - \frac{11}{2}x^2 + 12x$ attempt difference between value at 4 and value at 1.5 $[-]5\frac{5}{24}$ o.e. or [−]5.2(083..)	M1 M1 A1	condone one error, ignore + c ft their (i), dep on integration attempt. c.a.o.	3

2	**i**	$y' = 3x^2 - 12x$ use of $y' = 0$ $x = 0$ and 4 (0, 12) and (4, –20) $y'' = 6x - 12$ used max when $x = 0$, min when $x = 4$	B1B1 M1 A1 A1 M1 A1	 Allow y = 12 and y = -20 y' used each side of TP or good sketch Both stated, only one needs testing	7
	ii	when $x = 2$ $y' = -12$ grad of normal = 1/12 $y + 4 = 1/12(x - 2)$ $y = \frac{1}{12}x - 4\frac{1}{6}$	B1 B1ft M1ft A1	 from their y' accept any numerical m Or -4 = their(m) x 2 + c Any recognisable 25/6, at worst 4.1	4 **[11]**