

Question Number	Scheme	Marks
6 (a)	Angle $AFB = \frac{\pi - 2.275}{2} = 0.433$ *	B1*
(b)	Attempts $r\theta = 6.2 \times 2.275 = (14.105)$ Attempts $(x^2) = 6.4^2 + 6.2^2 - 2 \times 6.4 \times 6.2 \cos(0.433) = (7.36)$ or $(x = 2.71)$ Correct attempt $= 2x + r\theta + 12.8 = 2 \times 2.714 + 14.105 + 12.8 = 32.3(\text{m})$	M1 M1 dM1, A1
(c)	Attempts $\frac{1}{2}r^2\theta = \frac{1}{2} \times 6.2^2 \times 2.275 = (43.7255)$ Attempts $\frac{1}{2}ab \sin C = \frac{1}{2} \times 6.2 \times 6.4 \times \sin 0.433 = (8.325)$ Correct attempt $= 2 \times 8.325 + 43.7255 = 60.4 (\text{m}^2)$	M1 M1 dM1, A1
		(9 marks)

Question	Scheme	Marks
10(a)	$f'(4) = 6(4) - \frac{7 \times 14}{4} = -\frac{1}{2}$	B1
	$m_T = -\frac{1}{2} \Rightarrow m_N = \frac{-1}{-\frac{1}{2}}$	M1
	$y - 12 = 2(x - 4)$ or $y = mx + c \Rightarrow y = 2x + c \Rightarrow 12 = 2(4) + c \Rightarrow c = \dots$	M1 (A1 on ePen)
	$y = 2x + 4$	A1
		(4)
(b)	$\dots \frac{(2x-1)(3x+2)}{2\sqrt{x}} = \dots \frac{6x^2 + x - 2}{2\sqrt{x}} = \dots 3x^{\frac{3}{2}} + \frac{1}{2}x^{\frac{1}{2}} - x^{-\frac{1}{2}}$	M1
	$f(x) = \frac{6x^2}{2} - \frac{6}{5}x^{\frac{5}{2}} - \frac{1}{3}x^{\frac{3}{2}} + 2x^{\frac{1}{2}} (+c)$ or e.g. $f(x) = \frac{6x^2}{2} - \frac{3}{5/2}x^{\frac{5}{2}} - \frac{1/2}{3/2}x^{\frac{3}{2}} + \frac{x^{\frac{1}{2}}}{1/2} (+c)$ or e.g. $f(x) = \frac{6x^2}{2} - \left(\frac{3}{5/2}x^{\frac{5}{2}} + \frac{1/2}{3/2}x^{\frac{3}{2}} - \frac{x^{\frac{1}{2}}}{1/2} \right) (+c)$	M1A1A1
	$12 = \frac{6(4)^2}{2} - \frac{6}{5}(4)^{\frac{5}{2}} - \frac{1}{3}(4)^{\frac{3}{2}} + 2(4)^{\frac{1}{2}} + c \Rightarrow c = \dots$	M1
	$(f(x)) = 3x^2 - \frac{6}{5}x^{\frac{5}{2}} - \frac{1}{3}x^{\frac{3}{2}} + 2x^{\frac{1}{2}} + \frac{16}{15}$	A1
		(6)
		Total 10

Question Number	Scheme	Marks
11a	$2(x \pm \dots)^2$	B1
	$\dots(x \pm 3)^2 \dots$	M1
	$2(x-3)^2 - 4$	A1
		(3)
b	$(3, -4)$	B1ft
		(1)
c	$m = \frac{28 - -4}{-1 - 3} (= -8)$	M1
	$y - 28 = -8(x + 1)$	dM1
	$y = -8x + 20$	A1
		(3)
d	$y \leq -8x + 20$ and $y \geq 2x^2 - 12x + 14$ (or $y \geq 2(x-3)^2 - 4$)	B1ftB1ft
	$y \leq -8x + 20$ $y \geq 2x^2 - 12x + 14$ $y \geq 0, x \geq 0$	B1cso
		(3)
		(10 marks)

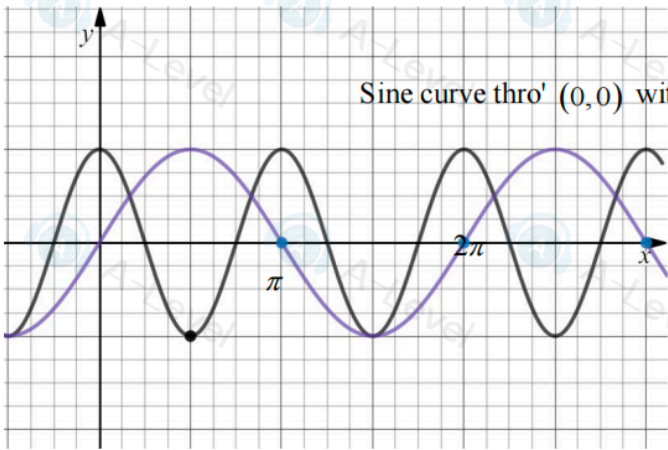
Question Number	Scheme	Marks
1.	$\int \left(\frac{8}{3}x^3 - \frac{1}{2}x^{\frac{1}{2}} - 5 \right) dx = \frac{8}{3} \times \frac{x^4}{4} - \frac{1}{2} \times 2x^{\frac{1}{2}} - 5x + c$	M1 A1
	$= \frac{2}{3}x^4 - x^{\frac{1}{2}} - 5x + c$	A1 A1 (4 marks)

Question Number	Scheme	Marks
6.(a)	Sets $4x + c = x(x - 3)$ and attempts to write as a 3TQ	M1
	Uses $b^2 = 4ac$ for their $x^2 - 7x - c = 0$	dM1
	Correct equation $49 = -4c$ or $49 + 4c = 0$	A1
	$c = -12.25$ oe	A1 (4)
(b)	Attempt to solve $x^2 - 7x - c = 0$ with their c	M1
	Attempt to find the y coordinate for their x coordinate	dM1
	$\left(\frac{7}{2}, \frac{7}{4} \right)$ oe	A1 (3) (7 marks)

Question Number	Scheme	Marks
1	$y = 2 + 10x^{\frac{1}{2}} - 2x^{\frac{3}{2}}$	
(a)	$\frac{dy}{dx} = 5x^{-\frac{1}{2}} - 3x^{\frac{1}{2}}$	M1 A1 A1
		(3)
(b)	$x = 2 \Rightarrow \frac{dy}{dx} = \frac{5}{\sqrt{2}} - 3\sqrt{2}$	M1
	$\frac{5}{\sqrt{2}} - 3\sqrt{2} = \frac{5}{2}\sqrt{2} - 3\sqrt{2} = -\frac{1}{2}\sqrt{2}$	A1
		(2)
		(5 marks)

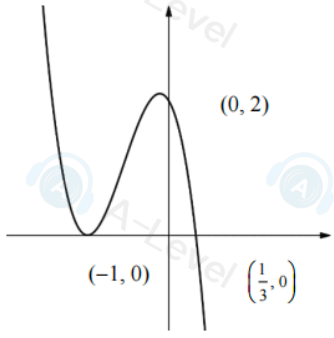
Question Number	Scheme	Marks
6a	$4(p-2x) = \frac{12+15p}{x+p}$ $8x^2 + 4px + 12 + 15p - 4p^2 \quad (=0)$ e.g. $a=8, b=4p, c=12+15p-4p^2$ $(4p)^2 - 4 \times 8 \times (12+15p-4p^2) \quad (>0)$ $3p^2 - 10p - 8 > 0 \quad *$	M1 dM1 A1*
		(3)
b	e.g. $(p-4)(3p+2) (=0) \Rightarrow 4, -\frac{2}{3}$ $p < -\frac{2}{3} \quad \text{or} \quad p > 4$	M1 M1A1
		(3)
		(6 marks)

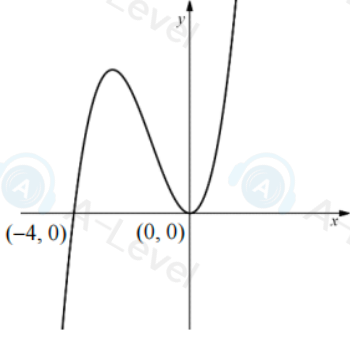
Question Number	Scheme	Marks
1.	$\int (2x-5)(3x+2)(2x+5) \, dx$ $(2x-5)(3x+2)(2x+5) = (6x^2 - 11x - 10)(2x+5) = \dots$ $= 12x^3 + 8x^2 - 75x - 50$ $\int (2x-5)(3x+2)(2x+5) \, dx = 3x^4 + \frac{8}{3}x^3 - \frac{75}{2}x^2 - 50x + c$	M1 A1 M1, A1ft, A1
		(5 marks)

Question Number	Scheme	Marks
5. (a)	$\left(\frac{\pi}{2}, -1\right)$	B1 B1 (2)
(b)	 Sine curve thro' (0,0) with max/min of ± 1 Fully correct	M1 A1 (2)
(c)	(i) 30 but follow through on $10 \times$ the number of their solutions $0 \rightarrow 2\pi$ (ii) 32	B1ft B1 (2) (6 marks)

Question Number	Scheme	Marks
2. (a)	$5(x+3) > 4(2x-5) \Rightarrow 5x+15 > 8x-20 \Rightarrow ax > b$ or $px < q$ $\Rightarrow x < \frac{35}{3}$	M1 A1 (2)
(b) (i)	$x^2 - 6x + 1 = (x-3)^2 \pm \dots = (x-3)^2 - 8$	M1, A1
(ii)	$(x-3)^2 - 8 = 0 \Rightarrow x = 3 + \sqrt{8}$ or $3 - \sqrt{8}$ $x^2 - 6x + 1 \geq 0 \Rightarrow x \leq 3 - \sqrt{8}, x \geq 3 + \sqrt{8}$	M1 A1 (4)
(c)	$x \leq 3 - \sqrt{8}, 3 + \sqrt{8} \leq x < \frac{35}{3}$	B1 (1) (7 marks)

Question Number	Scheme	Marks
9 (a)	$x \dots -5$	B1 (1)
(b)	$f(x) = (x+5)(3x^2 - 4x + 20) = 3x^3 + 11x^2 + 100$	M1
	$f'(x) = 9x^2 + 22x$	M1 A1cso (3)
(c)	Finds $f'(-4) = 9 \times (-4)^2 + 22 \times -4 = (56)$	M1
	Sets $f'(x) = "9x^2 + 22x" = "56"$	dM1
	$9x^2 + 22x - 56 = 0 \Rightarrow x = \frac{14}{9}, (-4)$	ddM1 A1cso (4)
(d)(i)	$(-1, 84)$	B1
(ii)	$(-4, 336)$	B1 (2)
		(10 marks)

(b)		B1B1B1
		(3)
		Total 6

3(a)		B1B1B1
		(3)

Question	Scheme	Marks
6(a)	$y - 5x = 75, y = 2x^2 + x - 21$ $\Rightarrow 2x^2 + x - 21 = 5x + 75$ $\Rightarrow 2x^2 - 4x - 96 = 0$ or e.g. $x^2 - 2x - 48 = 0$ or $\Rightarrow y = 2\left(\frac{y-75}{5}\right)^2 + \frac{y-75}{5} - 21$ $\Rightarrow 2y^2 - 320y + 10350 = 0$ or e.g. $y^2 - 160y + 5175 = 0$	M1
	$x^2 - 2x - 48 = 0 \Rightarrow (x-8)(x+6) = 0 \Rightarrow x = -6, 8$	dM1
	$x = -6 \Rightarrow y = 45$ or $x = 8 \Rightarrow y = 115$	dM1
	$P(-6, 45)$ and $Q(8, 115)$	A1
		(4)
(b)	e.g. $y \leq 2x^2 + x - 21, y - 5x \leq 75, y \geq 0, x \leq -3.5$ $x \leq a$ where $-3.5 \leq a < 3$ (or $a \leq x \leq b$ where $a \leq -15, -3.5 \leq b \leq 3$)	M1A1A1
		(3)
		Total 7