Question	Answer	Marks	Partial Marks
10(a)	$\overrightarrow{PQ} = 5\mathbf{i} + 15\mathbf{j}$ or $\overrightarrow{OQ} - \overrightarrow{OP} = 5(\overrightarrow{OR} - \overrightarrow{OP})$	**B1**	
	$\overrightarrow{OR} = 3\mathbf{i} - 2\mathbf{j} + \frac{1}{5}(their(5\mathbf{i} + 15\mathbf{j}))$ or $\overrightarrow{OR} = x\mathbf{i} + y\mathbf{j}$ $\overrightarrow{PR} = \mathbf{i} + 3\mathbf{j}$ and $\overrightarrow{PR} = (x-3)\mathbf{i} + (y+2)\mathbf{j}$ $x - 3 = 1$ and $y + 2 = 3$ oe or $5\overrightarrow{OR} = \overrightarrow{OQ} + 4\overrightarrow{OP}$ = $8\mathbf{i} + 13\mathbf{j} + 4(3\mathbf{i} - 2\mathbf{j})$ oe	**M1**	**FT** $\overrightarrow{PR} = \frac{1}{5}(their(5\mathbf{i} + 15\mathbf{j}))$
	$\overrightarrow{OR} = 4\mathbf{i} + \mathbf{j}$	**A1**	
	$\lvert their\ \overrightarrow{OR} \rvert = \sqrt{their(4^2) + their(1^2)}$	**M1**	**FT** *their* $a\mathbf{i} + b\mathbf{j}$
	$\frac{4\mathbf{i} + \mathbf{j}}{\sqrt{17}}$ oe	**A1**	
10(b)	$\overrightarrow{RS} = \lambda\mathbf{j} - their(4\mathbf{i} + \mathbf{j}) = -4\mathbf{i} + (\lambda - 1)\mathbf{j}$ soi or finds [equation RS is] $y = 3x + c$	**M1**	
	Correct method to find λ: $\frac{-4}{5} = \frac{\lambda - 1}{15}$ oe or [for some scalar t, $t(\lambda - 1) = 15$ and $-4t = 5$, therefore] $-\frac{5}{4}(\lambda - 1) = 15$ oe or finds e.g. $-2 = 3(3) + c$ oe	**M1**	**dep** on prev **M1** **FT** *their* $\overrightarrow{PQ}$
	$\lambda = -11$ cao	**A1**	

Question	Answer	Marks	Partial Marks
11	Length of rectangle: $6 + e^3$ or $\left[(6+e^3)x\right]_0^2$	**M1**	
	Area of rectangle: $2(6 + e^3)$ soi	**A1**	
	Area between curve and x-axis: $\int_0^2 (6+e^{4x-5})\,dx = \left[6x+\frac{1}{4}e^{4x-5}\right]_0^2$	**M2**	**M1** for $\frac{1}{4}e^{4x-5}$
	Correct use of limits in *their* $6x+\frac{1}{4}e^{4x-5}$: F(2) – F(0)	**M1**	dep on an attempt to integrate that results in $ax + be^{4x-5}$
	their area of rectangle – *their* area between curve and x-axis	**M1**	dep on an attempt to integrate using correct limits
	$\frac{7}{4}e^3+\frac{1}{4e^5}$ or 35.2 or 35.15.... isw	**A1**	nfww
11	**Alternative method**		
	Length of rectangle: $6 + e^3$ soi	**(M1)**	
	$\int_0^2 \left(their(6+e^3)-(6+e^{4x-5})\right)dx$	**(M1)**	
	$\int_0^2 \left((6+e^3)-(6+e^{4x-5})\right)dx$ oe	**(A1)**	
	$\int_0^2 (e^3-e^{4x-5})\,dx = \left[e^3x-\frac{1}{4}e^{4x-5}\right]_0^2$ oe	**(M2)**	**M1** for $\frac{1}{4}e^{4x-5}$
	Correct use of limits in *their* $e^3x-\frac{1}{4}e^{4x-5}$ F(2) – F(0)	**(M1)**	dep on an attempt to integrate that results in $ax + be^{4x-5}$; may be unsimplified
	$\frac{7}{4}e^3+\frac{1}{4e^5}$ or 35.2 or 35.151374.... rot to 4 or more sf	**(A1)**	nfww