Question	Scheme	Marks	AOs
10(a)	$(36, 27)$	B1	1.1b
		(1)	
(b)	$\frac{dy}{dx}=\frac{6t}{3t^2+3}=\frac{18}{30}$	M1	1.1b
	$y-27=\frac{3}{5}(x-36)$	M1	2.1
	$3x-5y+27=0$ *	A1*	1.1b
		(3)	
(c)	$3x-5y+27=0 \Rightarrow 3(t^3+3t)-5(3t^2)+27=0$	M1	3.1a
	$3t^3-15t^2+9t+27=0 \Rightarrow (t-3)^2(3t+3)=0$	M1	1.1b
	$t=-1 \Rightarrow Q$ is $(-4, 3)$	A1	2.2a
		(3)	
(d)	$(\text{Area} =)\int y\,dx=\int 3t^2(3t^2+3)\,dt$	M1	2.1
	$=9\left[\frac{t^5}{5}+\frac{t^3}{3}\right]_{-1}^{3}=9\left(\frac{3^5}{5}+\frac{3^5}{5}-\left(-\frac{1}{5}-\frac{1}{3}\right)\right)\left(=\frac{2616}{5}\right)$	M1	1.1b
	Area of trapezium $=\frac{1}{2}(36+4)(27+3)(=600)$	M1	2.1
	Area of R is $600-\frac{2616}{5}$	M1	3.1a
	$=\frac{384}{5}$	A1	1.1b
		(5)	
			(12 marks)

Notes

(a)

B1: Correct coordinates

(b)

M1: Correct strategy for the gradient at P

M1: For using their gradient at P and their point P with a correct straight line method

A1*: Correct equation following correct working

(c)

M1: Awarded for starting the process to find the value of t at Q. E.g. substitutes the parametric form for C into their l

M1: Deduces that $(x-3)^2$ (or $(x-3)$) is a factor and uses this to make progress in finding the required linear factor of the cubic. Alternatively solves cubic using calculator.

A1: Deduces the correct coordinates of Q

(d)

M1: For attempting $\int y\times\frac{dx}{dt}\,dt$

M1: Correct use of limits

M1: For the correct trapezium area approach using their values

M1: For a complete strategy for finding the area of R. There must have been an attempt at the area under the curve and an attempt and the trapezium and an attempt to subtract.

A1: Correct area oe e.g. 76.8