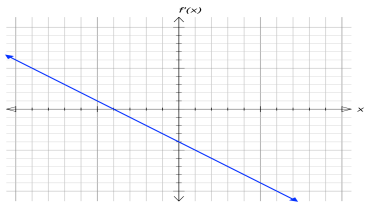


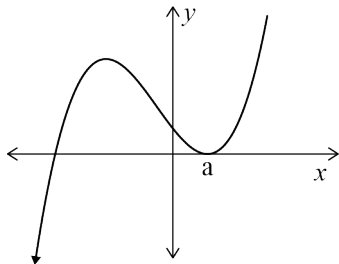
Assessment Schedule – 2012

Mathematics and Statistics: Apply calculus methods in solving problems (91262)

Evidence Statement

Q	Evidence	Achievement (u)				Merit (r)		Excellence (t)	
		Apply calculus methods in solving problems.				Apply calculus methods, using relational thinking, in solving problems.		Apply calculus methods, using extended abstract thinking, in solving problems.	
ONE (a)	$f'(x) = 6x^2 - 10$ $f'(2) = 14$	Correct.							
(b)	$p(x) = 4x - \frac{6x^3}{3} + 13$ or $p(x) = 4x - 2x^3 + 13$	Correct.							
(c)	$v = 0.2t + 5$ When $v = 8$ $8 = 0.2t + 5$ $t = 15$ secs	Finding expression for v and equating to 8.				Finding the value of t .			
(d)	$f' = -0.2 + \frac{2v}{250}$ $f' = -0.2 + \frac{2 \times 25}{250} = 0$ So $v = 25$ \Rightarrow turning point Shape of parabola or $f'' > 0 \Rightarrow$ minimum	Finding expression for f' .				Substitute 25 for v and show the value of the expression is 0 or find $v = 25$ from $f' = 0$		Justification.	
(e)	$a = 5 - \frac{1}{4}t$ $v = 5t - \frac{t^2}{8} + c$ $t = 0, v = 0$ $\Rightarrow c = 0$ $s = \frac{5t^2}{2} - \frac{t^3}{24} + c$ $t = 0, s = 0 \Rightarrow c = 0$ When $t = 30$ $s = 1125$ metres	Finding expression for v .				Finding expression for s .		Finding the distance when $t = 30$.	
NØ	N1	N2	A3	A4	M5	M6	E7	E8	
No response; no relevant evidence	Attempt at one question	1 of u	2 of u	3 of u	1 of r	2 of r	1 of t	2 of t	

Q	Evidence	Achievement (u)	Merit (r)	Excellence (t)				
TWO (a)	 <p>x intercept aligns with turning point</p>	Correct						
(b)(i)	$h'(x) = 2x - 12 = 4$ $x = 8$	Correct x co-ordinate found.						
(ii)	$h'(1) = 2 - 12 = -10$ $y + 11 = -10(x - 1)$ $y = -10x - 1$	Gradient found.	Equation correct.					
(c)	$g'(x) = 3x^2 - 18x + 24$ $x^2 - 6x + 8 = 0$ $2 < x < 4$ Justification: Shape of cubic OR check gradient at a point.	Derivative found and set equal to 0.	Solution without justification.	Justified solution.				
(d)	$A = \frac{1}{2}ax^2 - \frac{1}{2}x^3$ $\frac{dA}{dx} = ax - \frac{3}{2}x^2$ $\frac{dA}{dx} = 0$ $x = \frac{2a}{3}$ $\max A = \frac{2a^3}{27}$		Derivative found.	x found.				
NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response; no relevant evidence	Attempt at one question	1 of u	2 of u	3 of u	1 of r	2 of r	1 of t	2 of t

Q	Evidence	Achievement (u)	Merit (r)	Excellence (t)				
THREE (a)	$f(x) = \frac{x^3}{3} - x^2$ $f(6) = 72 - 36$ Hence (6,36)	Anti-differentiation found.	Coordinates found.					
(b)	$\frac{dV}{dx} = 3x^2$ When $x = 5$, $\frac{dV}{dx} = 75$	Rate of change of volume found.						
(c)	Positive cubic drawn with minimum on x -axis. Minimum at $(a, 0)$ and maximum aligned to x -intercept on $h'(x)$ 	Positive cubic drawn.	Cubic drawn with min at $(a,0)$ and max aligned with x -intercept.					
(d)	$f'(x) = 6x^2 + A$ $f'(-2) = 6 \times 4 + A = 10$ $A = -14$ $33 = 2 \times -8 - 14 \times -2 + B$ $B = 21$ $f(x) = 2x^3 - 14x + 21$ $f(4) = 93$ Hence (4, 93)	$f'(x)$ found and set equal to 10.	B found.	Coordinates found.				
(e)	$A = \frac{1}{2} \pi (1+2t)^2$ $\frac{dA}{dt} = 2\pi + 4\pi t$ $\frac{dA}{dt} = 60$ $t = 4.27$ Width = 9.55 m	Derivative found.	$A' = 60$	Width found.				
NØ	N1	N2	A3	A4	M5	M6	E7	E8
No response; no relevant evidence	Attempt at one question	1 of u	2 of u	3 of u	1 of r	2 of r	1 of t	2 of t

Judgement Statement

	Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
Score range	0 – 7	8 – 14	15 – 20	21 – 24