Answers to Worksheet 27 - Rate Problem FRQ

Calculus AB

AP® CALCULUS AB
2007 SCORING GUIDELINES (Form B)

Question 3

(a) $W'(20) = -22.1 \cdot 0.16 \cdot 20^{-0.84} = -0.285$ or -0.286 When $v = 20$ mph, the wind chill is decreasing at 0.286 °F/mph.	2 : { 1 : value 1 : explanation
(b) The average rate of change of W over the interval $5 \le v \le 60$ is $\frac{W(60) - W(5)}{60 - 5} = -0.253$ or -0.254. $W'(v) = \frac{W(60) - W(5)}{60 - 5}$ when $v = 23.011$.	3 : { 1 : average rate of change 1 : $W'(v)$ = average rate of change 1 : value of v
(c) $\left.\frac{dW}{dt}\right\|_{t=3} = \left(\frac{dW}{dv} \cdot \frac{dv}{dt}\right)\Big\|_{t=3} = W'(35) \cdot 5 = -0.892$ °F/hr OR $W = 55.6 - 22.1(20 + 5t)^{0.16}$ $\left.\frac{dW}{dt}\right\|_{t=3} = -0.892$ °F/hr	3 : { 1 : $\frac{dv}{dt} = 5$ 1 : uses $v(3) = 35$, or uses $v(t) = 20 + 5t$ 1 : answer
Units of °F/mph in (a) and °F/hr in (c)	1 : units in (a) and (c)