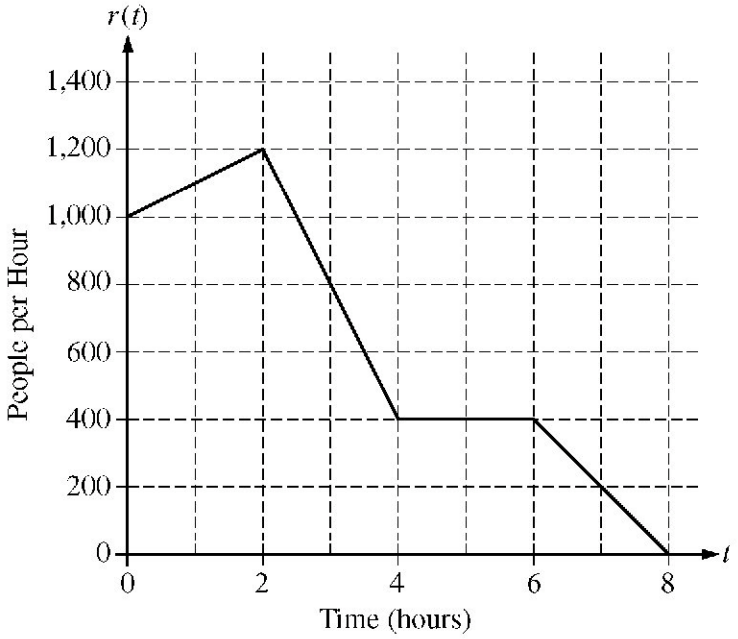
AP Calculus Name _____

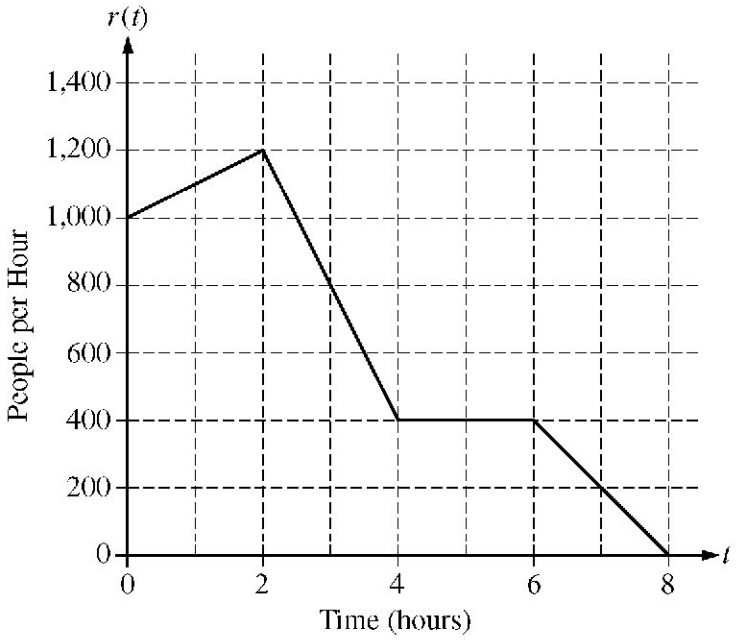
2010 AB/BC 3 Modified
Rate of Change and Definite Integrals



There are 700 people in line for a popular amusement–park ride when the ride begins operation in the morning. Once it begins operation, the ride accepts passengers until the park closes 8 hours later. While there is a line, people move onto the ride at a rate of 800 people per hour. The graph above shows the rate, $r(t)$, at which people arrive at the ride throughout the day. Time t is measured in hours from the time the ride begins operation

(a) How many people arrive at the ride between $t = 0$ and $t = 3$? Show the computations that lead to your answer.

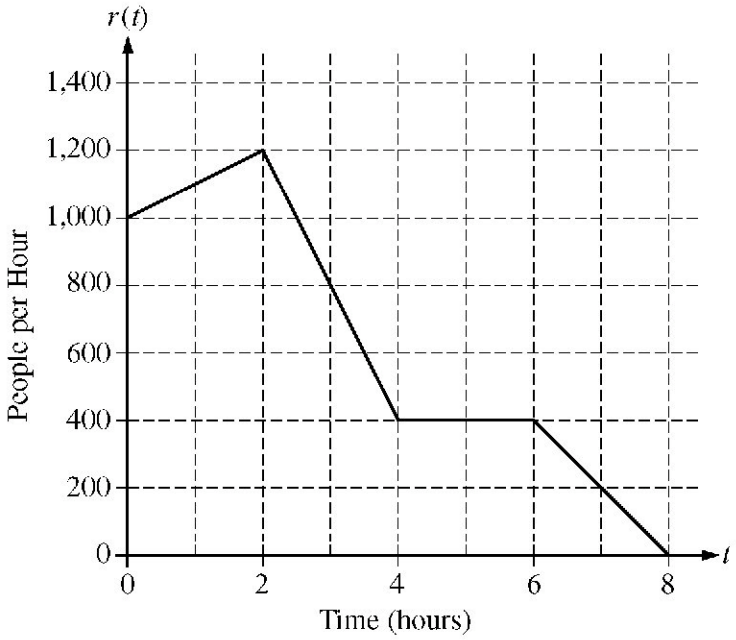
(b) What is the value of $r'(2.5)$? Using appropriate units, what is the meaning of $r'(2.5)$ in the context of this problem?



(c) Let $w(t)$ be the number of people waiting in line t hours after the ride begins operation. Complete the table below. Explain how you arrived at your answers.

t	$w(t)$
0	
1	
2	

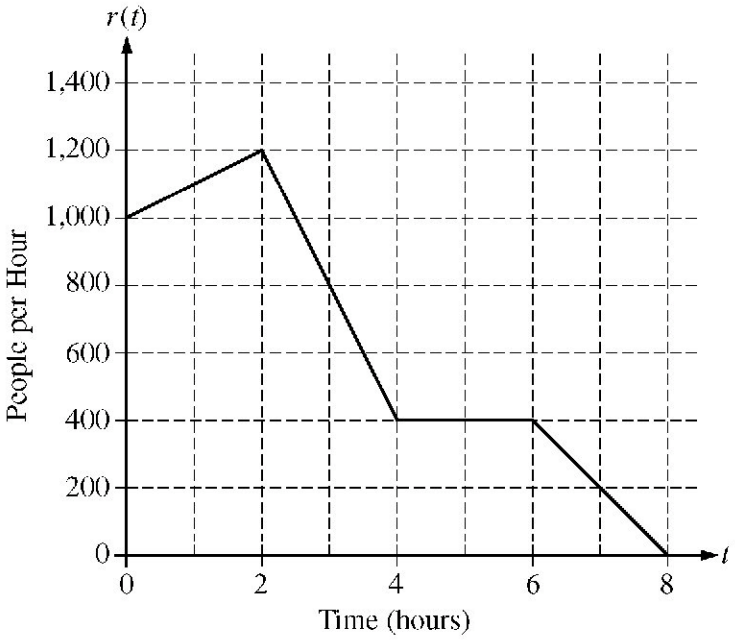
(d) Is the number of people waiting in line $w(t)$ to get on the ride increasing or decreasing between $t = 2$ and $t = 3$? Justify your answer.



(e) What is the value of $w'(2.5)$? Using appropriate units, what is the meaning of $w'(2.5)$ in the context of this problem?

(f) What is the value of $w'(3.5)$? Using appropriate units, what is the meaning of $w'(3.5)$ in the context of this problem?

(g) Is there a time when $w'(t) = 0$? Justify your answer.



(h) When is the number of people waiting in line the largest? Justify your answer.

(i) What is the earliest time when there is no longer a line? Justify your answer.