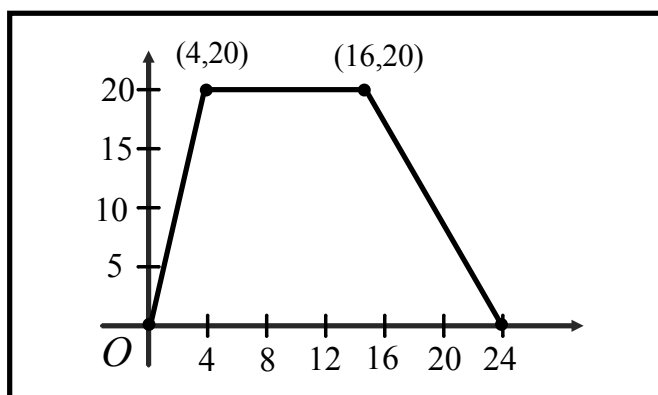


AP Test Question
2005
No Calculator Allowed



- 5) A car is traveling on a straight road. For $0 \leq t \leq 24$ seconds, the car's velocity $v(t)$, in meters per second is modeled by the piecewise-linear function defined by the graph above.

a) Find $\int_0^{24} v(t) dt$. Using correct units, explain the meaning of $\int_0^{24} v(t) dt$.

- b) For each of $v'(4)$ and $v'(20)$, find the value or explain why it does not exist. Indicate units of measure.

- c) Let $a(t)$ be the car's acceleration at time t , in meters per second. For $0 < t < 24$, write a piecewise-defined function for $a(t)$.

- d) Find the average rate of change of v over the interval $8 \leq t \leq 20$. Does the Mean Value Theorem guarantee a value of c for $8 < c < 20$ such that $v'(c)$ is equal to this average rate of change? Why or why not?