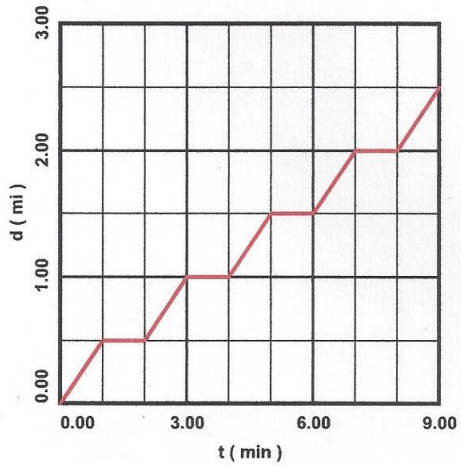
PRE–AP ALGEBRA 2

1B.3 CLASSWORK

1) The graph shows the distance d, in miles, as a function of time t, in minutes, during a 9-minute, 2.5-mile bus ride down Farnsworth Ave.



a) During what time intervals is the bus moving? What is the speed of the bus (in both mi/min and mi/hr) during these times?

$0 \le t \le 1$, $2 \le t \le 3$, $4 \le t \le 5$, $6 \le t \le 7$, and $8 \le t \le 9$ min

$v = \frac{0.5 \text{ mi}}{\text{min}} = \frac{0.5 \text{ mi}}{\text{min}} \left(\frac{60 \text{ min}}{1 \text{ hr}} \right) = 30 \frac{\text{mi}}{\text{hr}}$

b) During what time intervals is the bus stopped at a stop light? Justify your answer.

$1 \le t \le 2$, $3 \le t \le 4$, $5 \le t \le 6$, and $7 \le t \le 8$ min

The velocity of the bus is zero during these times.

c) Calculate the average rate of change of distance with respect to time (in both mi/min and mi/hr) over the time intervals

i) $0 \le t \le 1$ min
ii) $0 \le t \le 2$ min
iii) $0 \le t \le 3$ min
iv) $0 \le t \le 9$ min

i) $\frac{0.5 \text{ mi}}{\text{min}} = 30 \frac{\text{mi}}{\text{hr}}$

ii) $\frac{0.5 \text{ mi}}{2 \text{ min}} = \frac{0.25 \text{ mi}}{\text{min}} = 15 \frac{\text{mi}}{\text{hr}}$

iii) $\frac{1.0 \text{ mi}}{3 \text{ min}} = 0.33 \frac{\text{mi}}{\text{min}} = 20 \frac{\text{mi}}{\text{hr}}$

iv) $\frac{2.5 \text{ mi}}{9 \text{ min}} = 0.28 \frac{\text{mi}}{\text{min}} = 16\frac{2}{3} \frac{\text{mi}}{\text{hr}}$

2) In 1950, the cost of electricity was \$0.32 per kW · hr. In 2020, electricity costed \$0.13 per kW · hr.

a) Calculate the average rate of change of the cost of electricity with respect to time over that time interval.

b) Assuming that the average rate of change is always valid:

i) Estimate the cost of electricity in 2050.

ii) According to the model, in what year will electricity be free?

a) $\frac{0.13 - 0.32}{2020 - 1950} = \frac{-0.19}{70} = -0.002\,714\,2857 \frac{\$ \text{ per kW} \cdot \text{hr}}{\text{yr}}$

b) C = cost, Y = year

$C = -0.002\,714\,2857\,t + b$

$0.32 = -0.002\,714\,2857\,(1950) + b$

$b = 5.612\,857\,143$

$C = -0.002\,714\,2857\,t + 5.612\,857\,143$

i) $C(2050) = \$0.05$ per kW · hr

ii) $C = 0 \Rightarrow 2068$