

13. Brendan drives along Route 10 in his new Fred Flintstone Special. His distance from home is modeled by the function

$$F(t) = 10t^2 - 9t \text{ for } 0 \leq t \leq 10,$$

where  $F(t)$  is measured in feet and  $t$  is measured in minutes.

(a) Find  $F(2)$  and  $F(10)$ . Indicate units of measure.

$$F(10) = 10(10)^2 - 9(10) \\ 10(100) - 90 = 910 \text{ feet}$$

$$F(2) = 10(2)^2 - 9(2) \\ 10(4) - 18 \\ 40 - 18 = 22 \text{ feet}$$

(b) What is the average rate of change of the traffic flow over the time interval  $2 \leq t \leq 10$ ? Indicate units of measure.

$$\frac{910 - 22}{10 - 2} = \frac{888}{8} = 111 \text{ feet/min}$$

(c) What is the instantaneous rate of change in the number of cars at  $t = 10$ ? Indicate units of measure. Show work. Don't forget the limit expression!

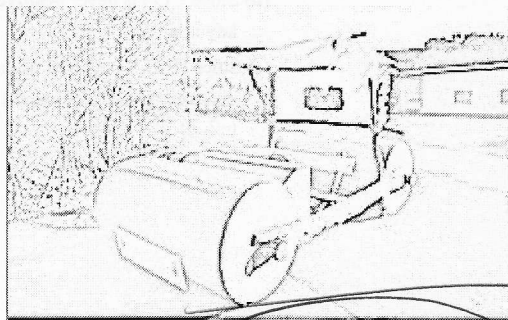
$$\lim_{h \rightarrow 0} \frac{10(10+h)^2 - 9(10+h) - [910]}{h}$$

$$\frac{10(100 + 20h + h^2) - 90 - 9h - 910}{h}$$

$$\frac{1000 + 200h + 10h^2 - 90 - 9h - 910}{h}$$

$$\frac{1000 + 200h + 10h^2 - 90 - 9h - 910}{h}$$

$$\lim_{h \rightarrow 0} \frac{191h + 10h^2}{h}$$



$$\lim_{h \rightarrow 0} 191 + 10h = 191 \text{ ft/min}$$