How Fast on Average?

1. An automobile enters a road and travels the following distances in metres during the next 6 seconds, where s represents distance in metres and t time in seconds.

t	0	1	2	3	4	5	6
s	0	1	3	6	10	15	21

a) Sketch a smooth graph of s as a function of t for $0 \le t \le 6$ on the graph grid provided.

b) Determine the average rate of change of distance with respect to time for the interval: $t \in [3,6]$.

c) On the graph, draw a straight line joining the points representing the start and end of the time interval in part a). How is the quantity calculated in part a) related to the line drawn?

Note: In general , for a function $f(x)$,

(1) A line passing through two points, $(a, f(a))$ and $(b, f(b))$ on the graph of $f(x)$ is called a **secant**.

(2) The ____________ of the secant determines the ________________________ of the function over the interval $[a,b]$. The units used will be ________________________

___.

d) On the curve, draw the secant from $t = 0$ to $t = 3$. Use the secant drawn to determine the average rate of change over the interval $t \in [0,3]$. ________________

e) Based on the above example, describe the following methods that can be used to determine the average rate of change for a function $f(x)$, over the interval $[a,b]$.

(i) algebraic	(ii) graphical

f) If the points in part a) satisfy an equation of the form $s = pt^2 + qt$, determine p and q. Use this equation to determine the average rate of change for $t \in [15,20]$. What assumption is being made here?