Calculus 2.4 Notes- Rates of Change

If you drop a rock on Mars it will fall according to the equation $y = 1.86t^2$ in meters per second.

a) Find the average speed of the rock for the first two seconds.

b) Find the average speed over $[1, 4]$.

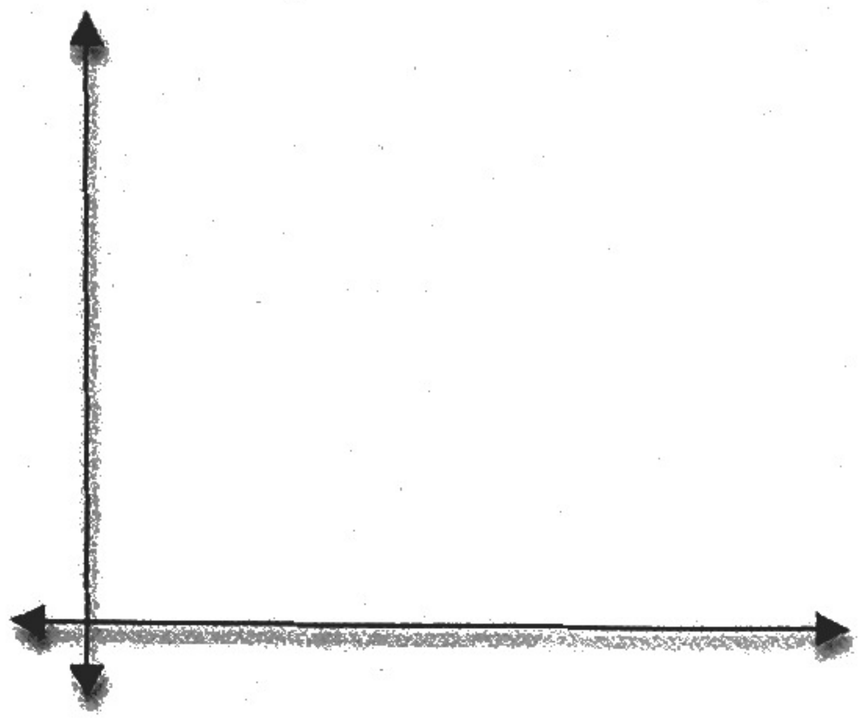
c) Find the instantaneous speed at 3 sec.

What did we learn?

Average rate of change-

Instantaneous rate of change-

Draw a general sketch of how we calculated the instantaneous rate of change.



Difference Quotient Theorem-

For each of the following:
a) Find the average rate of change over the given interval.
b) Find the instantaneous rate of change at *a*.
c) Write an equation of the tangent line.
d) Write an equation of the normal line.

1. $f(x)=\frac{1}{4}x^2$ over $[1,3]$, $a=1$.

2. $f(x)=\frac{1}{x}$ over $[-2,-1]$, $a=2$.

3. $f(x)=x^2-x$ over $[0,4]$, $a=3$.

4. Find the slope of the tangent line of $f(x)=-2x^2+1$ at $x=a$.

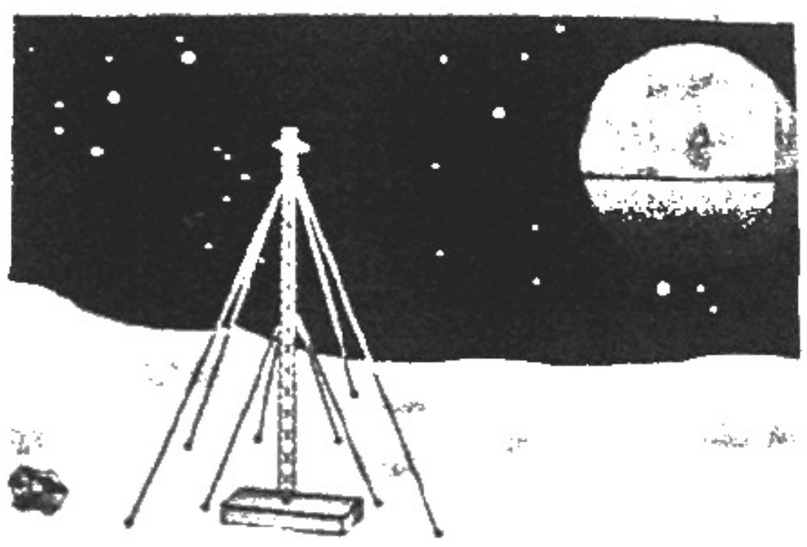
5. Find the slope of the tangent line of $f(x) = 9 - 3x^2$ at $x = a$.

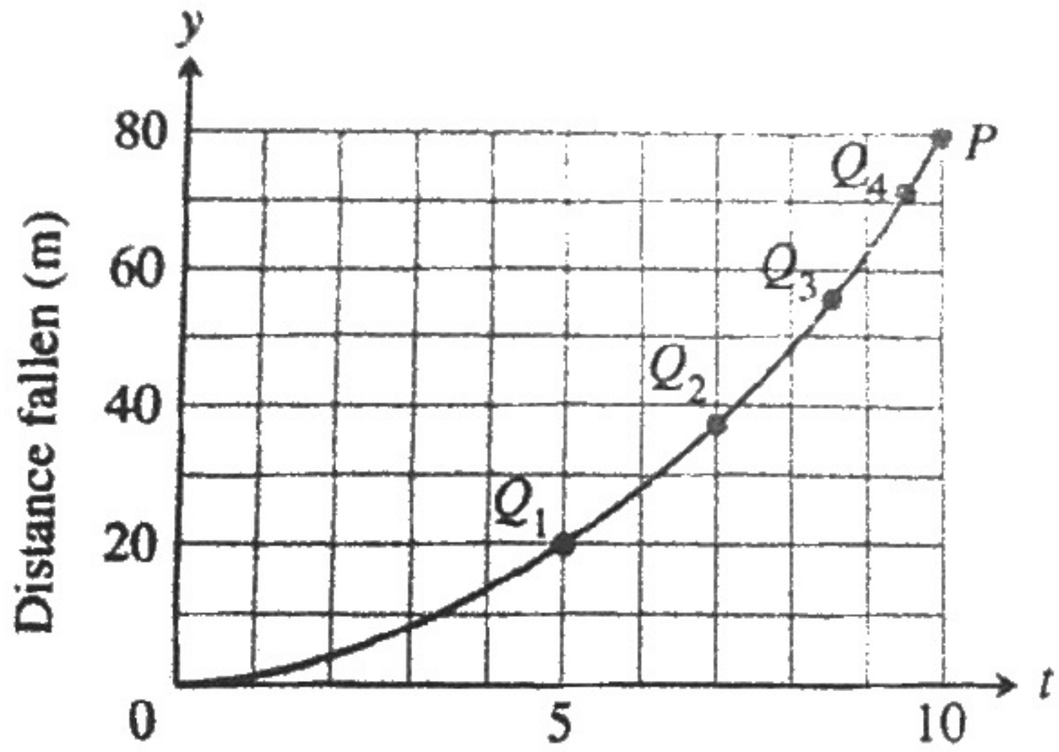
Book Example:

In Exercises 7 and 8, a distance-time graph is shown.

(a) Estimate the slopes of the secants PQ_1, PQ_2, PQ_3, and PQ_4, arranging them in order in a table. What is the appropriate unit for these slopes?

(b) Estimate the speed at point P.





Assign 2D
P. 66 1-4. P. 92-94 1, 5, 7, 9, 11, 23, 28, 29, 32, 36, 38. Extra: P.94 #2.
QR P. 105 1, 5, 6, 7.
QNT