Name:_____ Date:_____

Dr. Croom's Physics Chapter 2: One Dimensional Motion

Graphing Displacement, Velocity, and Acceleration

Instructions: (1) Complete the tables below using the definitions at right. (2) Graph the following data sets – create one position vs. time graph and one velocity vs. time graph. (3) For any linear relationship, find the equation of the line. (4) Describe **how** the velocity is changing. (unchanging, zero, increasing at a constant rate, decreasing at a constant rate, or changing at a non-constant rate). Put these with the graphs.

Data Set 1		
t(s)	x (m)	$\bar{v}$ (m/s)
0	0	0
1	2	
2	4	
3	6	
4	8	
5	10	

Data Set 2		
t(s)	x (m)	$\bar{v}$ (m/s)
0	12	0
1	9	
2	6	
3	3	
4	0	
5	-3	

Data Set 3		
t(s)	x (m)	$\bar{v}$ (m/s)
0	4	0
1	4	
2	4	
3	4	
4	4	
5	4	

Data Set 4		
t(s)	x (m)	$\bar{v}$ (m/s)
0	0	0
1	2	
2	6	
3	12	
4	20	
5	30	

Data Set 5		
t(s)	x (m)	$\bar{v}$ (m/s)
0	6	0
1	11	
2	15	
3	18	
4	20	
5	21	

Distance (x) – Most important to Aristotle. *Displacement* ($\Delta\vec{x}$) describes how far and in what direction an object has been displaced from its original position.

Time (t) – Most important to Galileo. Galileo described things in terms of time rates of change, a quantity divided by time.

Speed – a measure of how fast something is moving – the rate at which distance is covered. Speed is a *scalar quantity*, meaning it only is given as a magnitude.

Velocity ($\vec{v}$) – the rate at which distance is covered, including the direction in which it is covered. Velocity is a *vector quantity*, meaning it is given as a magnitude with a direction.

Acceleration ($\vec{a}$) – the rate of change of velocity. Something accelerates when its velocity, either its magnitude **or** direction, changes. Acceleration is a vector quantity.

$$\vec{a} = \Delta\vec{v} / \Delta t$$

Instantaneous Velocity – the velocity of an object at any one instant.

Average Velocity ($\bar{v}$) – of a body in motion between the points 1 and 2 is defined as the displacement of the moving body divided by the time it takes for that displacement.

$$\bar{v} = \Delta\vec{x} / \Delta t$$