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**physics 2<sup>nd</sup> Kanti study sheet for the test on the 12/21/2010**author:  
Linus Metzlerversion:  
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# 1D KINEMATICS

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## INFO

This is a study sheet by Linus Metzler about 1D Kinematics, which was mentioned in the 2<sup>nd</sup> Kanti at Mr. Geist. There is no claim for completeness. All warranties are disclaimed.



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**STUDY PART**

See also <http://www.physicsclassroom.com/class/1dkin/>

To calculate formulas use <http://wolframalpha.com>

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**VELOCITY**

$$v = \frac{\Delta x}{\Delta t} = \frac{x_{\text{final}} - x_0}{\Delta t}$$

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**ACCELERATION**

$$a = \frac{\Delta v}{\Delta t}$$

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**RULE OF THUMB**

If an object is slowing down, then its  $a$  is in the opposite direction of its motion.

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**GRAPHS**

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**X-T**

$$\text{slope} = v = \frac{\Delta x}{\Delta t} = \frac{\text{rise}}{\text{run}}$$

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**V-T GRAPHS**

$$\text{slope} = a = \frac{\Delta v}{\Delta t} = \frac{\text{rise}}{\text{run}}$$

$\text{area} = \text{displacement}$

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**EQUATIONS**

$$v(t) = \pm v_0 \pm at$$

$$x(t) = \pm x_0 \pm v_0 t \pm \frac{at^2}{2}$$

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**COMBINATION**

$$v^2 - v_0^2 = \pm 2a(x - x_0)$$

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**FREE FALL**

$$v_x = gt$$

$$d = 0.5gt^2$$

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**SOURCES**

gsw's handouts