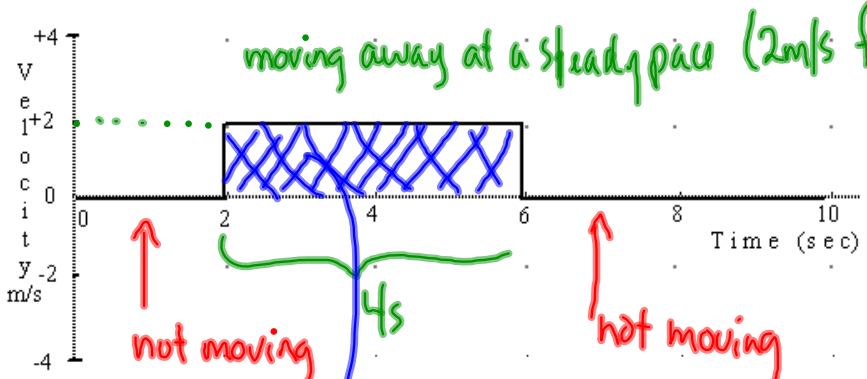
5. The velocity-time graph of an object is shown below. Figure out the total *distance* traveled by the object. Show your work.

Distance = 8 meters.



moving away at a steady pace (2m/s for 4s)

not moving

4s

not moving

Area under a v-t graph is equal to the displacement

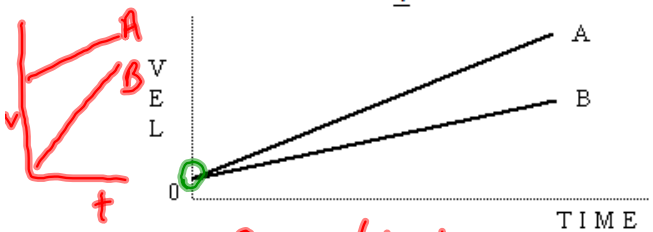
Shaded Area is a rectangle

Area = l x w

Area = (4s)(2m/s)

Area = 8m

1



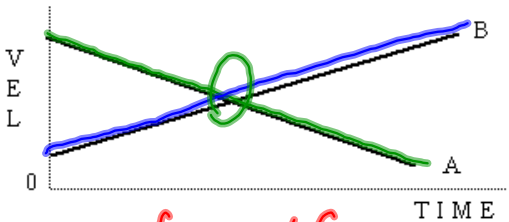
a) A is faster (higher on the graph)

b) A and B have the same velocity at the same time

c) You cannot tell which object is ahead from a v-t graph

d) Neither A or B is moving away

2



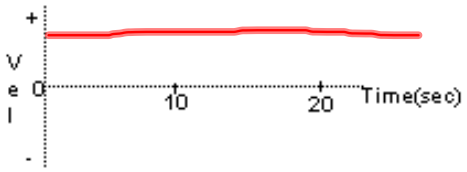
a) A is faster at first, then B

b) "

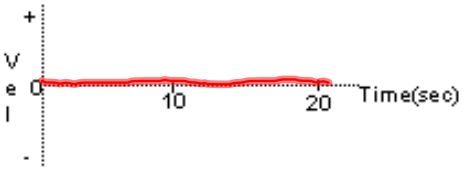
c) "

d) "

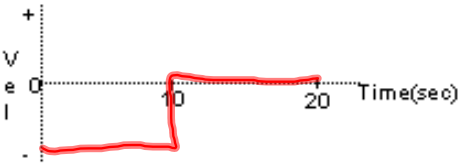
7. The object is moving away from the origin at a steady (constant) velocity.



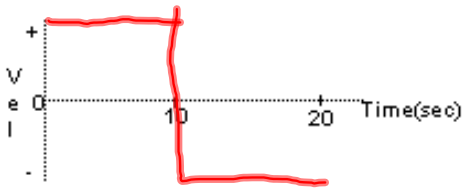
8. The object is standing still.

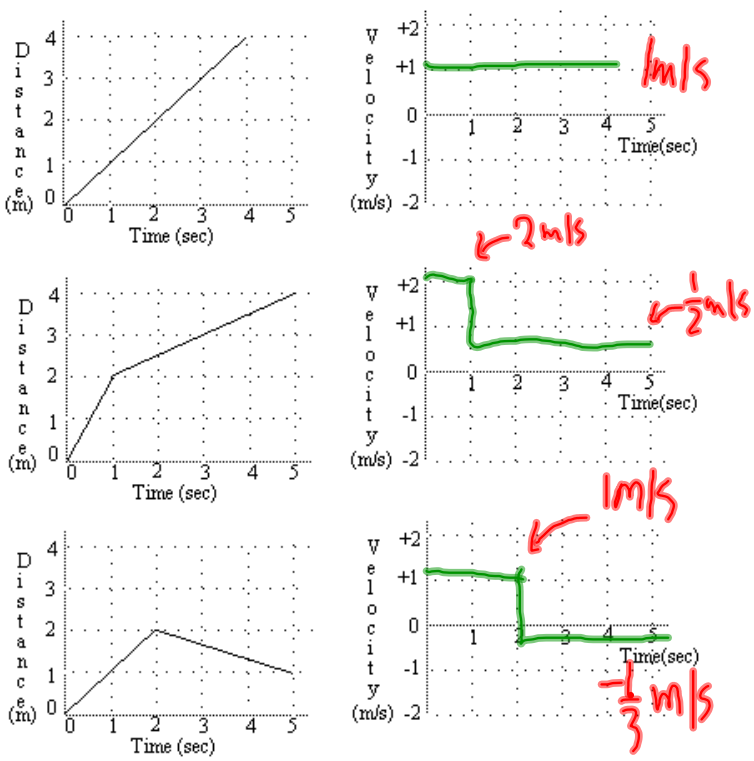


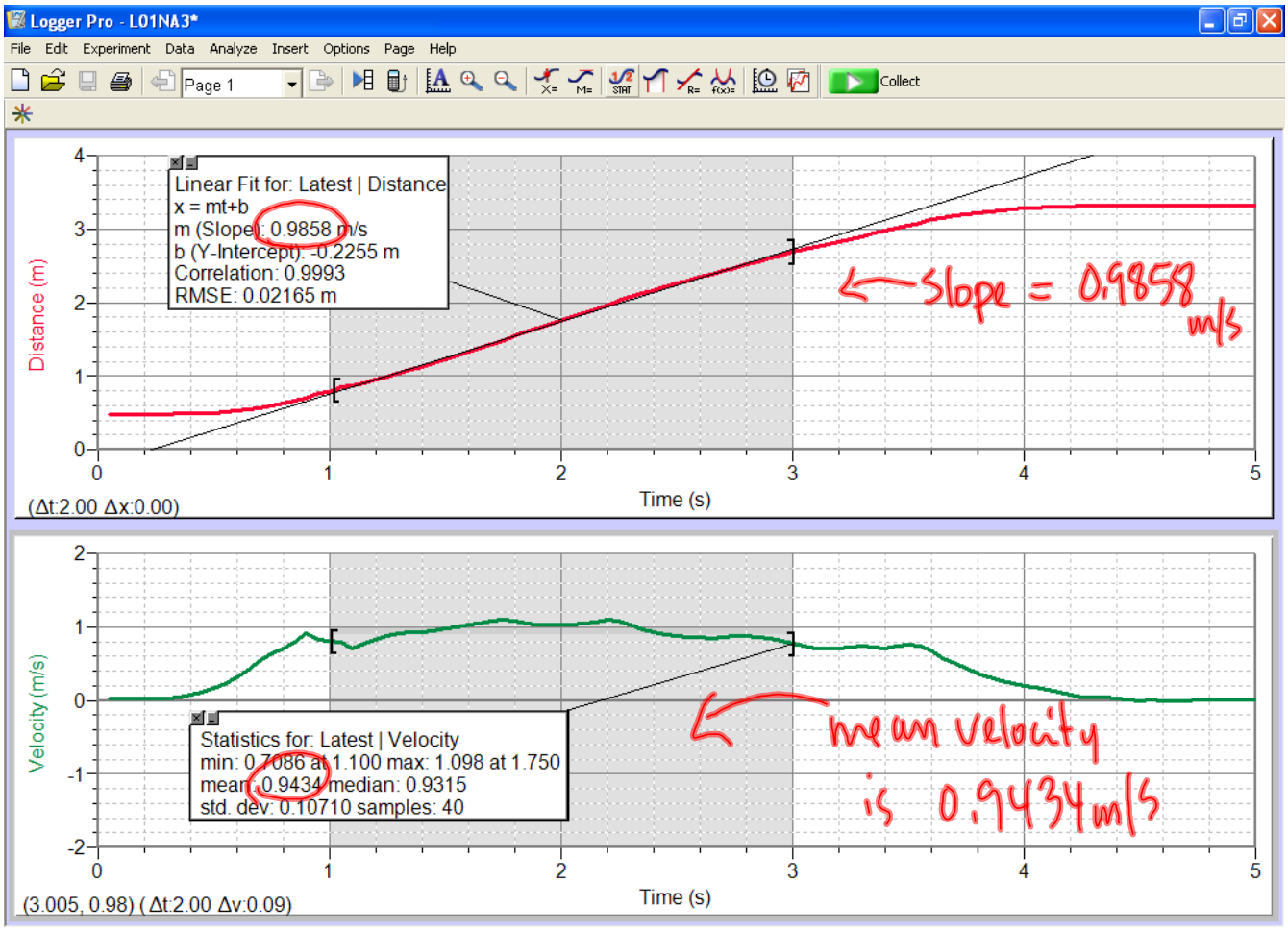
9. The object moves toward the origin at a steady (constant) velocity for 10 seconds, and then stands still for 10 seconds.



10. The object moves away from the origin at a steady (constant) velocity for 10 seconds, reverses direction and moves back toward the origin at the same speed for 10 seconds.




Distance (m)
Time (sec)
Velocity (m/s)
Time(sec)
1m/s
2m/s
$\frac{1}{2}$m/s
1m/s
$-\frac{1}{3}$m/s


Logger Pro - L01NA3*
File Edit Experiment Data Analyze Insert Options Page Help
Page 1
Collect
Linear Fit for: Latest | Distance
x = mt+b
m (Slope): 0.9858 m/s
b (Y-Intercept): -0.2255 m
Correlation: 0.9993
RMSE: 0.02165 m
Distance (m)
Time (s)
(Δt:2.00 Δx:0.00)
slope = 0.9858 m/s
Statistics for: Latest | Velocity
min: 0.7086 at 1.100 max: 1.098 at 1.750
mean: 0.9434 median: 0.9315
std. dev: 0.10710 samples: 40
Velocity (m/s)
Time (s)
(3.005, 0.98) (Δt:2.00 Δv:0.09)
mean velocity is 0.9434 m/s

Velocity Terms

Scalar ~ a quantity that has no direction (only size) 25.2 g, 5.4 h

Vector ~ a quantity that has both magnitude (size) and direction 150 m

2.5 m/s [E] 150 m [N30°E]

Position ($\vec{d}$) (vector) ~ where you are with respect to a reference point.

$\vec{d}$ = 5 km [W]

distance (Δd) (scalar) ~ how far you have travelled

Δd = 115 km

displacement ($\Delta \vec{d}$) (vector) ~ change in position, where you are now in relation to where you started.

$\Delta \vec{d}$ = 15 km [E]

Speed (v) (scalar) ~ the rate that you cover the distance you travel

v = 100 km/h

Velocity ($\vec{v}$) (vector) ~ the rate of change of your position

$\vec{v}$ = 25 km/h [N]

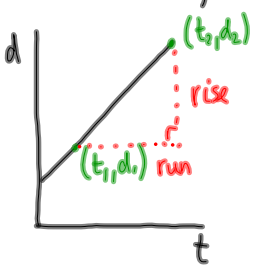
size or magnitude | dir

distance => speed

displacement => velocity

Velocity and Position-Time Graphs

Constant Velocity



$\text{Slope} = \frac{\text{rise}}{\text{run}}$

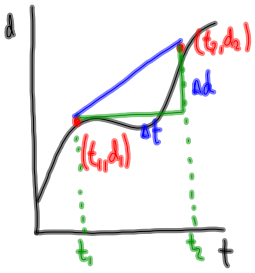
$\text{Slope} = \frac{\Delta d}{\Delta t}$

Slope = velocity

$\therefore \vec{v} = \frac{\Delta \vec{d}}{\Delta t}$ (velocity)

$v = \frac{\Delta d}{\Delta t}$ (speed)

Non-Constant Velocity

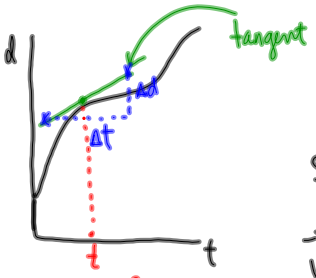


$\text{Slope} = \frac{\text{rise}}{\text{run}}$

$\text{Slope} = \frac{\Delta d}{\Delta t}$

$\text{Slope} = v_{ave}$

$\therefore \vec{v}_{ave} = \frac{\Delta \vec{d}}{\Delta t}$



$\text{Slope} = \frac{\Delta d}{\Delta t}$

$\text{Slope} = v_{inst}$ (instantaneous velocity)

$\vec{v}_{inst} = \frac{\Delta \vec{d}}{\Delta t}$

Slopes of tangents need to be found graphically.

Speed:	$v = \frac{\Delta d}{\Delta t}$	$v_{ave} = \frac{\Delta d}{\Delta t}$	$v_{inst} = \frac{\Delta d}{\Delta t}$
velocity:	$\vec{v} = \frac{\Delta \vec{d}}{\Delta t}$	$\vec{v}_{ave} = \frac{\Delta \vec{d}}{\Delta t}$	$\vec{v}_{inst} = \frac{\Delta \vec{d}}{\Delta t}$
	from a graph or numbers	from a graph or numbers	from a graph