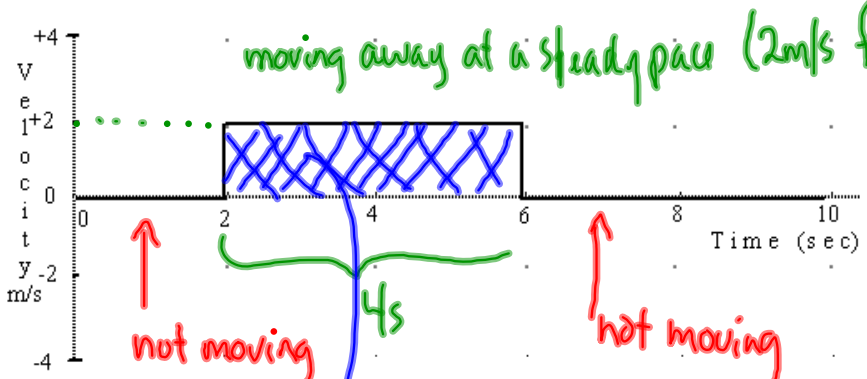
5. The velocity-time graph of an object is shown below. Figure out the total *distance* traveled by the object. Show your work.

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

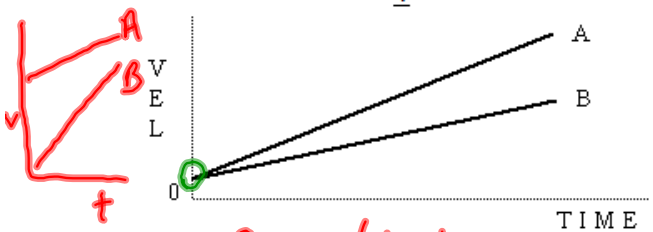
Shaded Area is a rectangle

Area = l x w

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

Area = 8m

1



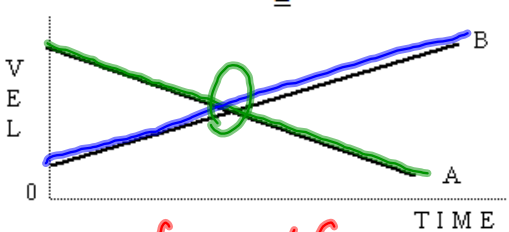
a) A is faster (higher on the graph)

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



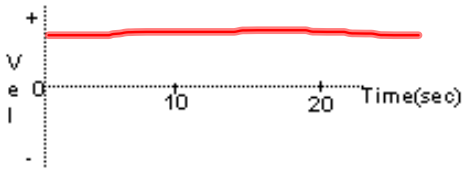
a) A is faster at first, then B

b) "

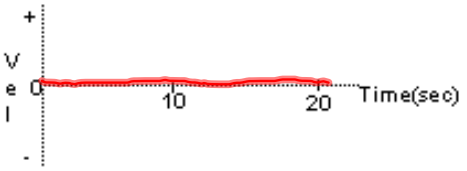
c) "

d) "

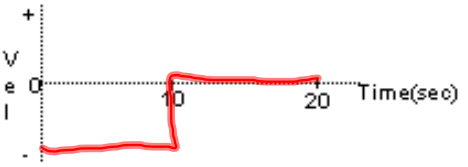
7. The object is moving away from the origin at a steady (constant) velocity.



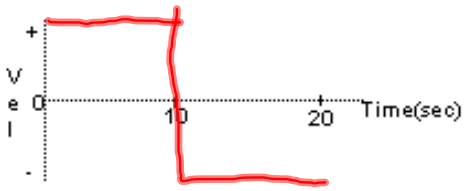
8. The object is standing still.

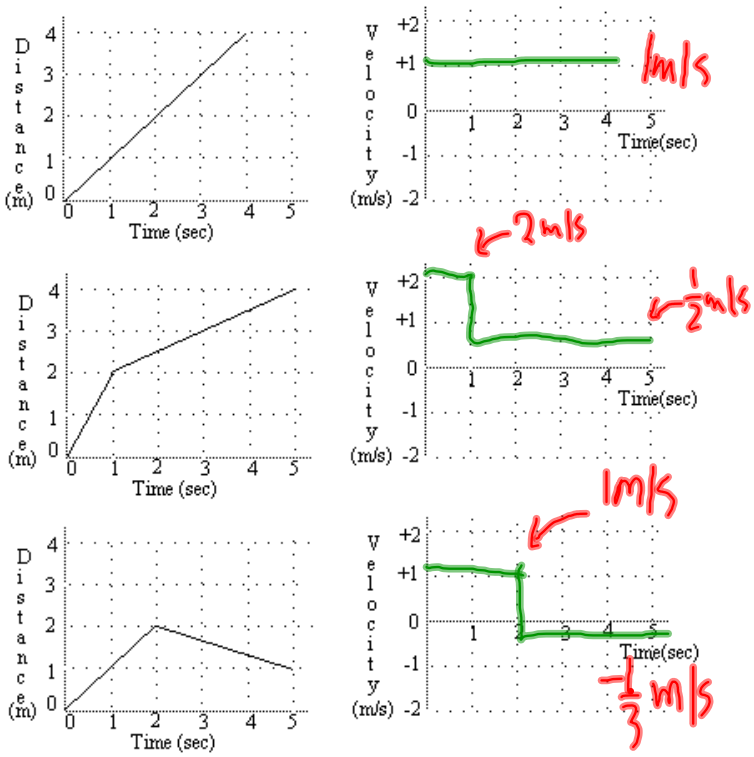


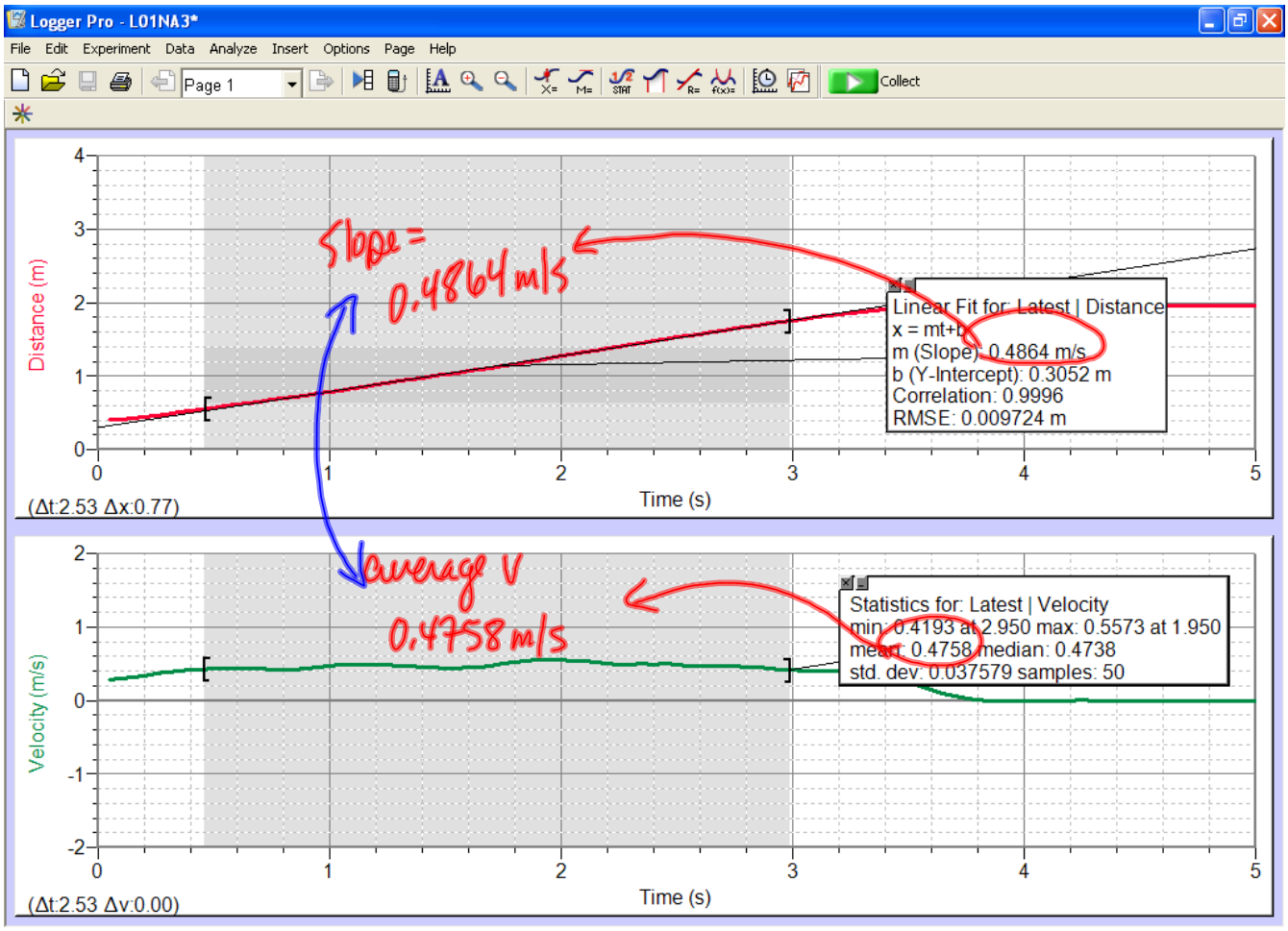
9. The object moves toward the origin at a steady (constant) velocity for 10 seconds, and then stands still for 10 seconds.



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)
1 m/s
2 m/s
1/2 m/s
1 m/s
-1/3 m/s


Logger Pro - L01NA3*
File Edit Experiment Data Analyze Insert Options Page Help
Page 1
Collect
Distance (m)
Time (s)
Linear Fit for: Latest | Distance
x = mt+b
m (Slope): 0.4864 m/s
b (Y-Intercept): 0.3052 m
Correlation: 0.9996
RMSE: 0.009724 m
(Δt:2.53 Δx:0.77)
Slope = 0.4864 m/s
Velocity (m/s)
Time (s)
Statistics for: Latest | Velocity
min: 0.4193 at 2.950 max: 0.5573 at 1.950
mean: 0.4758 median: 0.4738
std. dev: 0.037579 samples: 50
(Δt:2.53 Δv:0.00)
average V
0.4758 m/s

Velocity Terms

Scalar - a quantity with only size (magnitude), no direction.

28.5g
42.1s
58.5L

Vector - a quantity with BOTH size + direction

58 km [E]
41 km/h [E30°N]
81 N [UP]

Position ($\vec{d}$) - where you are in relation to a reference point
(vector)

$\vec{d}$ = 25km [E]

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

Δd = 25km

displacement ($\Delta \vec{d}$) - change in position ($\vec{d}_2 - \vec{d}_1$)
(vector) - where you are now in relation to the start

$\Delta \vec{d}$ = 42 km [N]

Speed (v) - the rate at which you cover the distance travelled
(scalar)

V = 100km/h

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

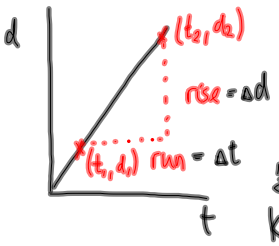
$\vec{V}$ = 4 m/s [R]

distance goes with speed

displacement goes with velocity

Position-Time Graphs + Velocity

Constant Velocity



slope = $\frac{rise}{run}$

slope = $\frac{\Delta d}{\Delta t}$

(NOTE: the slope is constant)

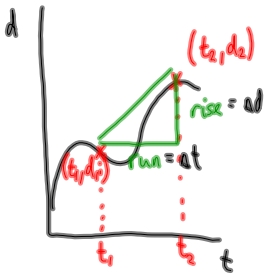
from INV 3 we know that slope = velocity

(i.e. the graph is linear)

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

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

Non-Constant Velocity

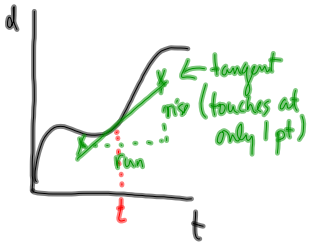


slope = $\frac{rise}{run}$

slope = $\frac{\Delta d}{\Delta t}$

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

Average velocity slope between two points on the d-t graph



slope = $\frac{rise}{run}$

slope = $\frac{\Delta d}{\Delta t}$

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

Instantaneous velocity is the slope of the tangent at time, t.

Using the velocity Equation:

$\vec{V} = \frac{\Delta \vec{d}}{\Delta t}$ Rearrange as needed.

GRASP

Given
Required
Analysis
Solution
Paraphrase