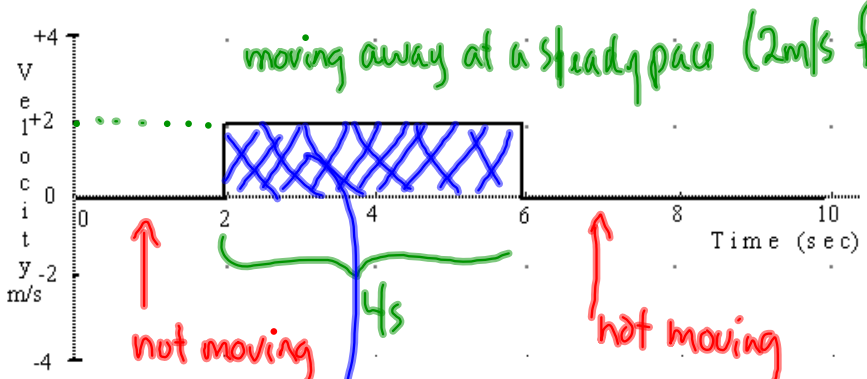
5. The velocity-time graph of an object is shown below. Figure out the total *distance* traveled by the object. Show your work.

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

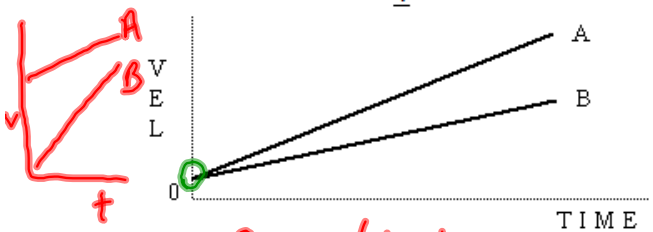
Shaded Area is a rectangle

Area = l x w

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

Area = 8m

1



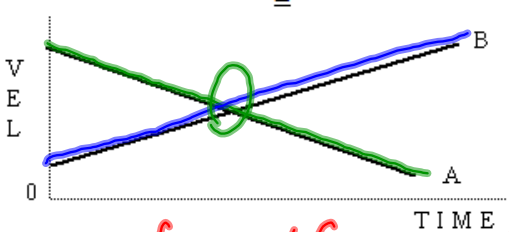
a) A is faster (higher on the graph)

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



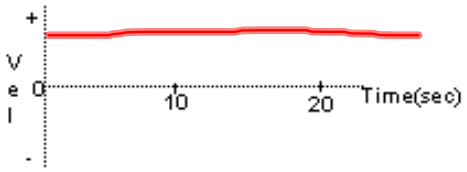
a) A is faster at first, then B

b) "

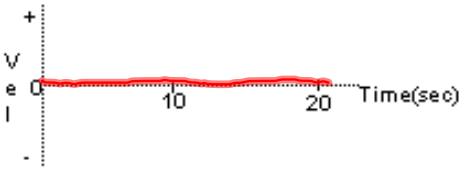
c) "

d) "

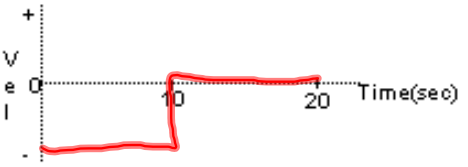
7. The object is moving away from the origin at a steady (constant) velocity.



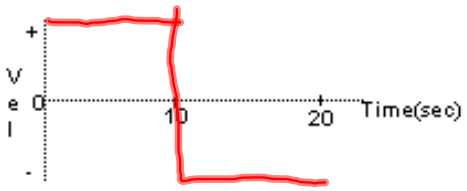
8. The object is standing still.

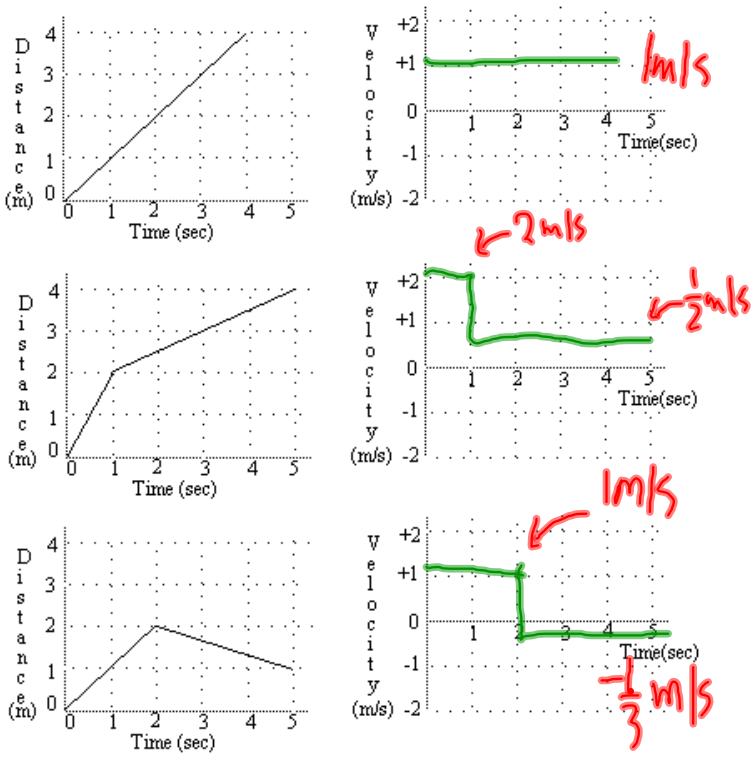


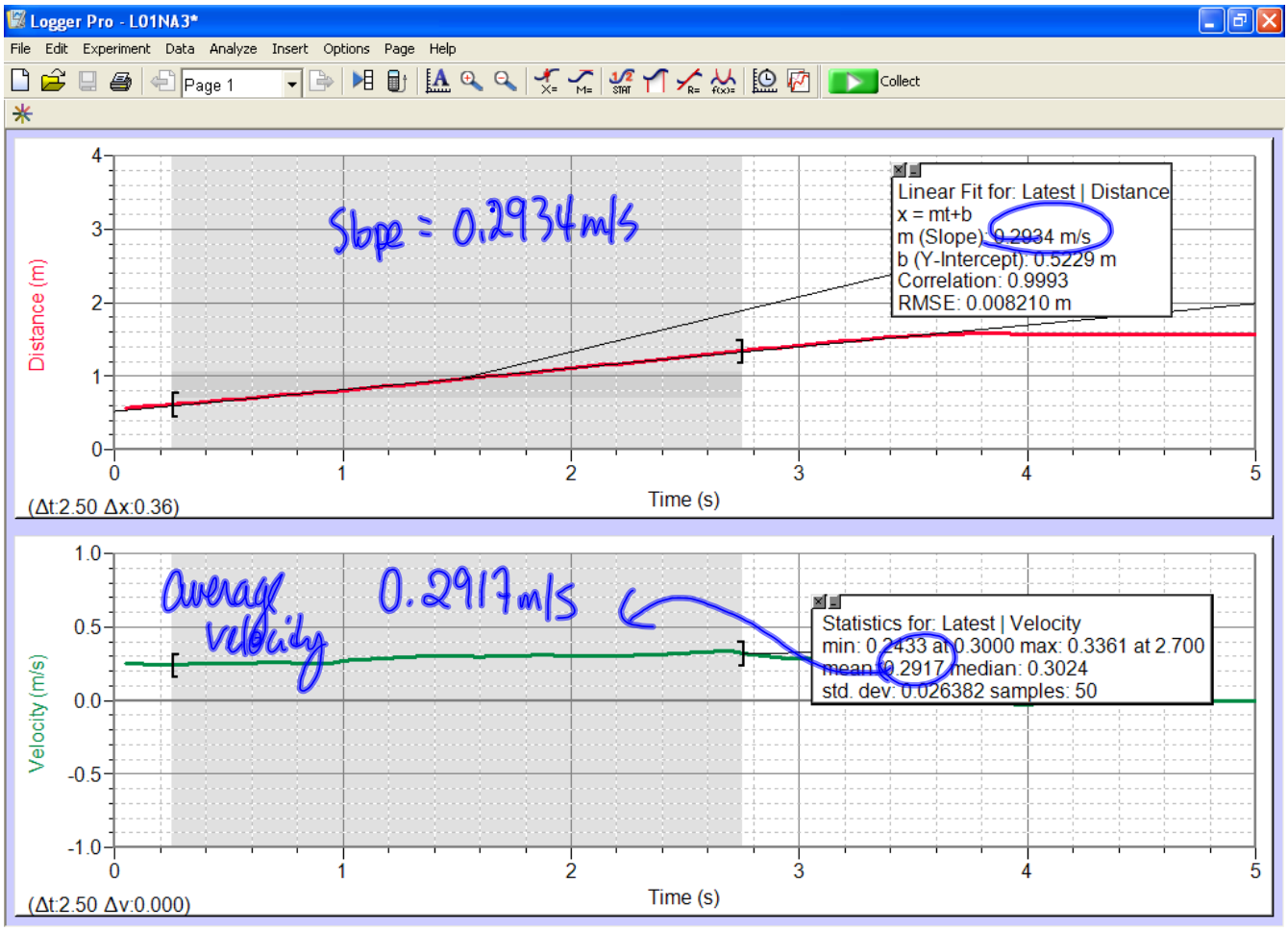
9. The object moves toward the origin at a steady (constant) velocity for 10 seconds, and then stands still for 10 seconds.



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
Slope = 0.2934 m/s
Linear Fit for: Latest | Distance
x = mt+b
m (Slope): 0.2934 m/s
b (Y-Intercept): 0.5229 m
Correlation: 0.9993
RMSE: 0.008210 m
Distance (m)
Time (s)
(Δt:2.50 Δx:0.36)
Average velocity
0.2917 m/s
Statistics for: Latest | Velocity
min: 0.2433 at 0.3000 max: 0.3361 at 2.700
mean: 0.2917 median: 0.3024
std. dev: 0.026382 samples: 50
Velocity (m/s)
Time (s)
(Δt:2.50 Δv:0.000)

Velocity Terms

Scalar - a quantity that has only size (magnitude), but no direction

42cm, 6°C, 85g

Vector - a quantity that has Both size + direction

45km/h [E], 3cm [R] 852km [N30°E]

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

(vector)

5km [E 45° S]

distance (Δd) - how far you have travelled

(scalar)

Δd = 32.5 km

displacement ($\Delta \vec{d}$) - change in position ($\vec{d}_2 - \vec{d}_1$)

(vector)

- where you are now in relation to where you started

$\vec{\Delta d}$ = 50km [N]

Speed (v) - the rate at which the distance is covered

(Scalar)

v = 25km/h, 3m/s

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

(vector)

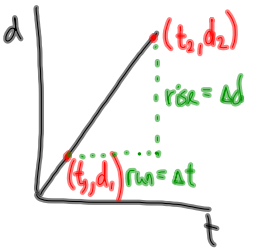
$\vec{v}$ = 4km/h [S]

(Scalar) speed => distance

(vector) Velocity => displacement.

Velocity and Position-Time Graphs

Constant Velocity



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

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

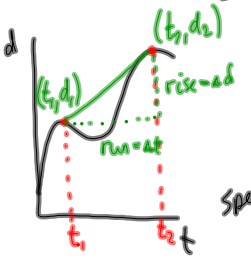
(NOTE: The slope is constant i.e. linear)

from INV 3, we know that slope is the same as velocity (d-t)

$$V = \frac{\Delta d}{\Delta t}$$ ← speed

$$\vec{V} = \frac{\Delta \vec{d}}{\Delta t}$$ ← velocity.

Non-Constant Velocity



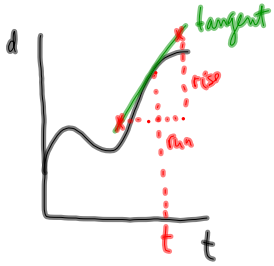
$\text{slope} = \frac{\text{rise}}{\text{run}}$

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

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

speed → $V_{ave} = \frac{\Delta d}{\Delta t}$

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



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

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

$V_{inst} = \frac{\Delta d}{\Delta t}$

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

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

Velocity equation:

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

GRASP

G - Given
R - Required
A - Analysis
S - Solution
P - Paraphrase