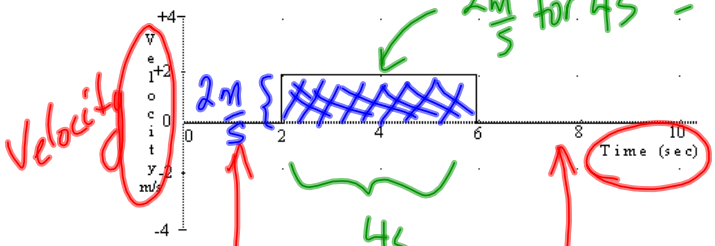
5. The velocity-time graph of an object is shown below. Figure out the total *distance* traveled by the object. Show your work.

Distance = _____ meters.



2m/s for 4s = 8m.

Velocity

2m/s

4s

Standing still

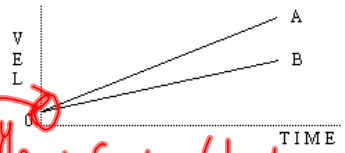
Standing

Area of rectangle = l x w

= (4s)(2m/s)

= 8m

1



same velocity

a) A is faster (higher on graph)

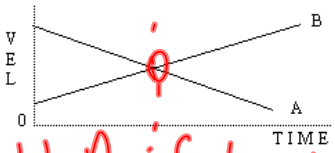
b)

Same velocity

c)

d) Neither A or B changes direction

2



a) A is faster at first, B is faster later.

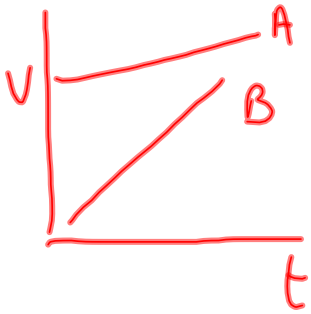
b)

same velocity

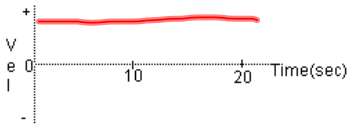
c)

you cannot tell which object is ahead from v-t graph.

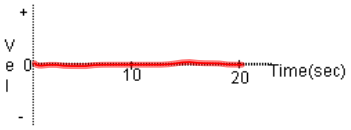
(the velocity is always positive)



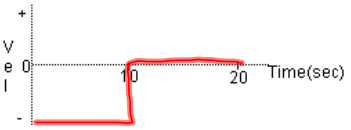
7. The object is moving away from the origin at a steady (constant) velocity.



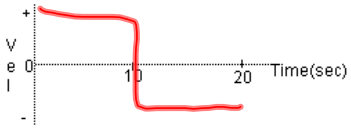
8. The object is standing still.

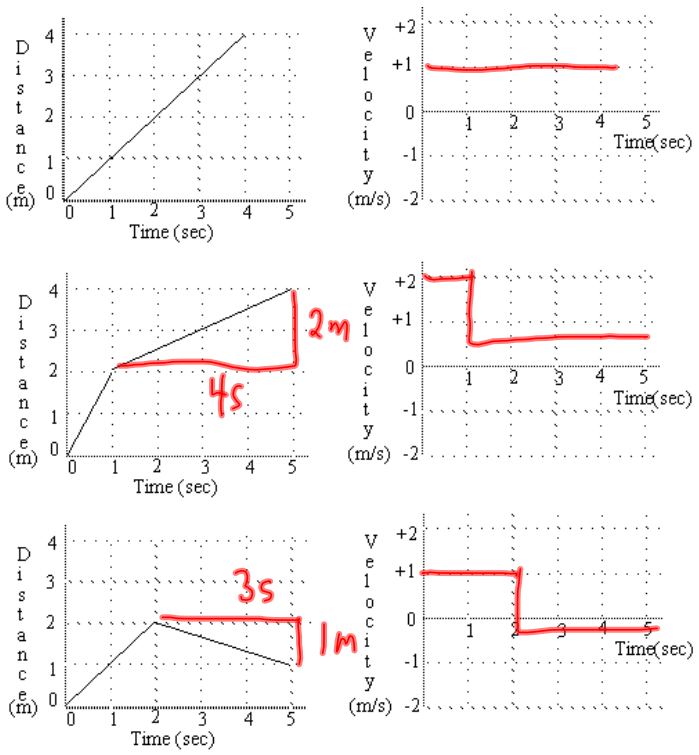


9. The object moves toward the origin at a steady (constant) velocity for 10 seconds, and then stands still for 10 seconds.

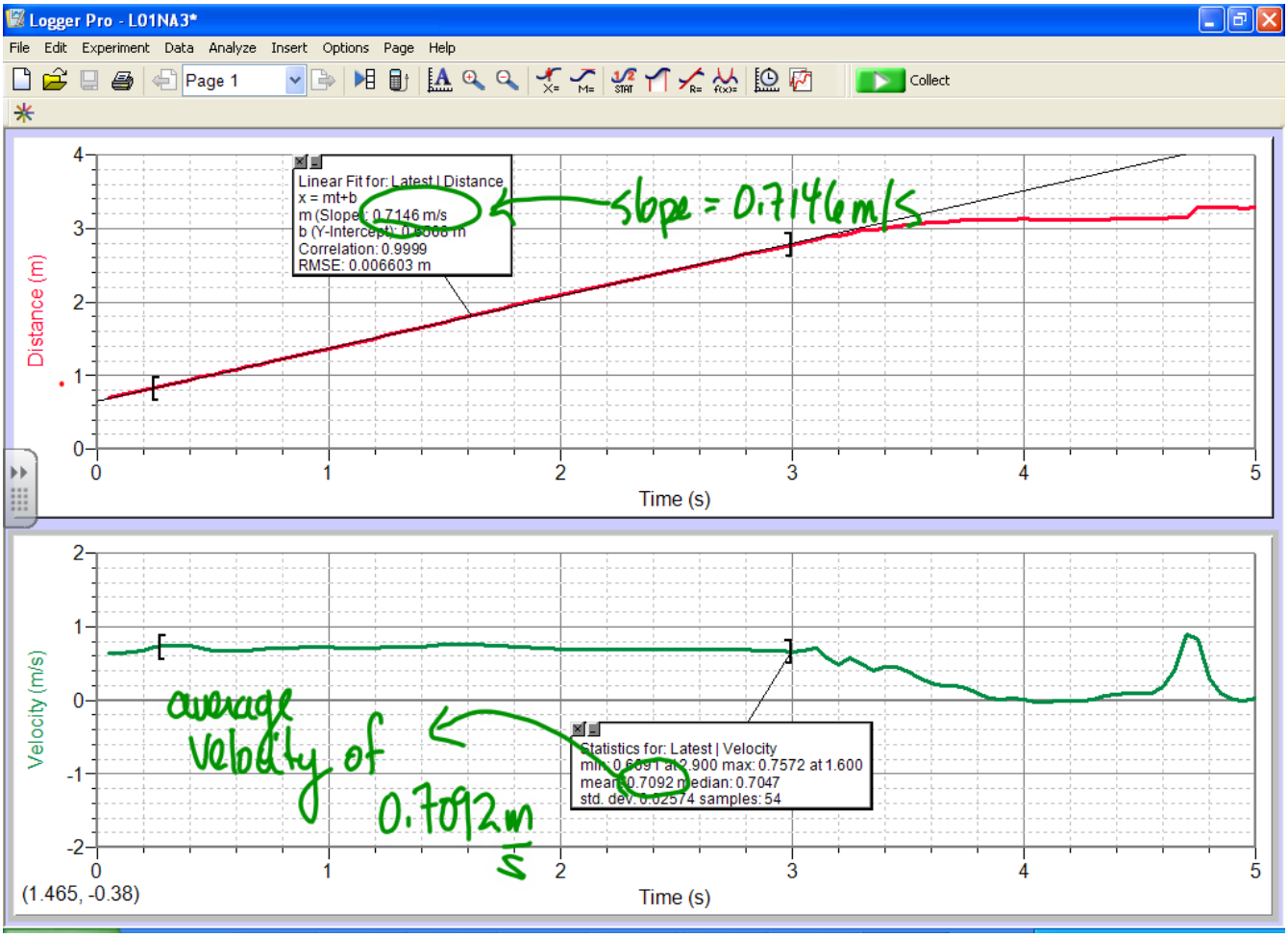


10. The object moves away from the origin at a steady (constant) velocity for 10 seconds, reverses direction and moves back toward the origin at the same speed for 10 seconds.





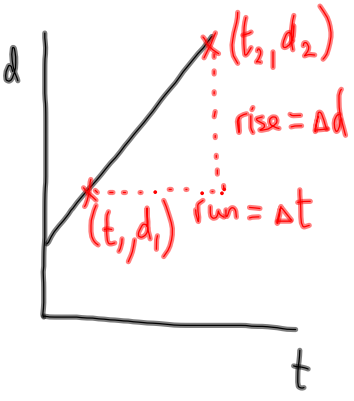
slope on d-t:
① direction } velocity
② speed


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): 0.7146 m/s
b (Y-Intercept): 0.0066 m
Correlation: 0.9999
RMSE: 0.006603 m
slope = 0.7146 m/s
Distance (m)
Time (s)
Velocity (m/s)
average velocity of 0.7092 m/s
Statistics for: Latest | Velocity
min: 0.6091 at 2.900 max: 0.7572 at 1.600
mean: 0.7092 median: 0.7047
std. dev: 0.02574 samples: 54
(1.465, -0.38)
Time (s)

Position-Time Graphs and Velocity

The slope on a position-time graph tells you the speed and the direction of the object (i.e. VELOCITY)

Constant Velocity (Uniform Motion) (i.e. a linear d-t graph)



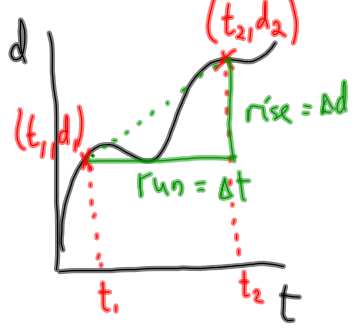
$$\text{slope} = \frac{\text{rise}}{\text{run}}$$

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

From the previous DEMO, we know that velocity is equal to the slope on a d-t graph.

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

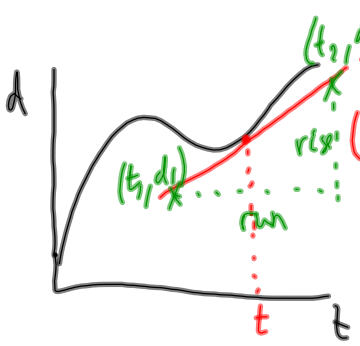
Non-Constant Velocity (Non Uniform Motion)



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

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

The average velocity is the slope of the line joining t_1 and t_2.



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

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

Instantaneous velocity is the slope of the tangent drawn at

Kinematic Terms

position ($\vec{d}$) ~ where the object is in relation to a reference point.
↑ vector quantity
ex: 5 km [W]

distance (Δd) - how far the object has travelled
↑ scalar quantity
ex: 25 km

displacement ($\Delta \vec{d}$) - change in position; where the object is now in relation to where it started
↑ vector quantity
ex: 52 km [W 32° N]

speed (v) - how fast
↑ scalar quantity
ex: 2 $\frac{cm}{s}$

velocity ($\vec{v}$) - rate of change in position
↑ vector quantity
ex: 25 km/h [E]

Speed: $v = \frac{\Delta d}{\Delta t}$ ← total distance / ← total time

Velocity $\vec{v} = \frac{\Delta \vec{d}}{\Delta t}$ ← overall displacement / ← total time.

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

* know this and how to rearrange!